**Physics Overwritten in a new perspective: “Epistemologically Different Worlds”**

**(Einsteins’ relativities without “spacetime”, quantum mechanics, pre-Big Bang, Big Bangs and “inflation”, dark matter and dark energy, the superstring theory, and Bohr’s complementarity)**

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*A clever person solves a problem. A wise person avoids it.*

(Albert Einstein)

*Matter will be spiritualized when the true theory of physics is found.*

(Kurt Gödel)

*As an older friend, I must advise you against it, for in the first place you will not succeed; and even if you succeed, no one will believe you*.

(Planck writing to Einstein)

*Truth... is much too complicated to allow for anything but approximations.*

(John von Neumann)

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**Introduction**

**The EDWs perspective, a new general framework of thinking**

**for all physicists!**

“The present situation in physics is as if we know chess, but we don't know one or two rules.”

Richard Feynman

In other works (2002, 2005, 2008, 2011, 2012, 2014, 2015, 2016; Vacariu and Vacariu 2010, 2016a, 2016b), we have showed that the greatest illusion of human knowledge is the notion of “world”, of “uni-verse”, or as we called it, the “Unicorn-world”, and this notion has survived from the oldest times until today. In these works, we have indicated that the “world”, the “Universe” does not exist, but the “Epistemologically Different Worlds” (EDWs) exist (more specifically, for many EDWs, it is about the entities and the interactions which really exist and only represent these EDWs). *We emphasize that the EDWs perspective is a new Copernican revolution in human thinking, the greatest movement in Physics, Cognitive Neuroscience, and Philosophy!* During the past 15 years, we have applied the EDW paradigm to the main particular sciences and main theories in physics (quantum mechanics, Einstein’s special and general relativity, and the relationship between them), cognitive science (to the main theories like computationalism, connectionism, and the dynamical system approach), cognitive neuroscience, and biology (just to the relationship between life and organism/cell). Also, we showed that the entire Philosophy since Ancient period until now is totally wrong (just because, all philosophical approaches have been constructed within the “Unicorn-world”). This book closes the circle of great topics concerning the main particular sciences (physics, cognitive (neuro)science, and biology) and philosophy grasped in all our previous books (2008-2016): it is about the relationship between the main theories and concepts of Physics vs. the EDWs perspective!

The main theories that we investigate in this and our previous works have been created within the Unicorn-world, therefore, all these approaches have been quite wrong. Some of these theories have been partially re-write in our previous books (Einstein both relativities, thermodynamics, and our EDWs perspective, see Vacariu and Vacariu 2016, 2017, etc.), but even some notions of these theories were wrong. For instance, in our previous book (2016), we indicated that “spacetime” cannot even exist (spacetime cannot have any kind of ontology!). Therefore, in 2017, re-wrote Einstein’s both relativities without “spacetime”. The majority of theories in Physics have been created within the unicorn world and therefore these theories have been quite wrong or at least the authors of these scientific theories have been used wrong concepts.

This book is a collections of our previous ideas, but we strongly emphasize that some of these idea are quite developed in this work. Therefore, this book can be labeled as: “a philosopher overwriting Physics within a new paradigm, the ‘Epistemologically Different World’ (EDWs) perspective”! We emphasize that some parts of this book are from our previous works (but even so, these parts are modified, we added new paragraphs or sub-chapters), but some parts are new written. In general, the new details of this book are the results of following Presura’s book about Physics (2014) written in Romanian. His book is a general overview of the main theories in Physics. Presura is a physicist who wrote a book about these theories in a quite easy language for large public (also for philosophers). There are quite many paragraphs from Presura’s book that are quoted in our book. We emphasize that Presura’s paragraphs inserted in our book are our translations. Also, we inserted quite many of his ideas but we mentioned his name each time. We apologize if some notions or ideas are wrong translated.

The first Chapter is about the EDWs perspective. In Chapter 2, we introduce more details about the rejection of “spacetime”. In Chapter 3, we insert the ideas from our book Vacariu and Vacariu 2017 about Einstein’s relativity without “spacetime”. However, new paragraphs are introduced in this chapter. In Chapter 4, we are indicating that all alternatives of quantum mechanics have been wrong: parts of this chapter are from our previous works, other parts and paragraphs are new ideas/comments. In Chapter 5, we discuss about the Grand Unified Theory (GUT) and the Theory of Everything (TOE), Big Bang (transformed, according to the EDWs perspective, in many Big Bangs – in this way, we avoid Alan Guth’s empty notion of “inflation” which contradict Einstein’s principle of constant speed of light which cannot be surpassed by anything else). In Chapter 6, we introduce an updated version about the dark matter and the dark energy (in 2016, we published a book about “dark matter/energy, space and time and other pseudo-notions in Cosmology” and in 2020 we published a chapter in a book edited by the physicist Michael Smith - see the bibliography. We mention that, in that book, except our chapter, all the other chapters are written by physicists!). For instance, in section 6.4, we introduce a new alternative to dark energy and dark matter, an alternative that is different even from this updated approach! In Chapter 7, we furnish more details about the non-existence of “hyperspace” and the futility of the “superstring theory”. In Chapter 8 in indicate the clear great distinction between our EDWs and Primas and Atmanspascher’s approach (under Spinoza’s “dual aspects” approach and Bohr’s “complementarity” constructed within the unicorn world). In the last chapter, chapter 9, we analysis Rovelli’s rejection of “spacetime” (based on Einstein’s general relativity) within the unicorn world. We rejected the ontology of “spacetime”, but our argument is totally different than Rovelli’s argument. Moreover, we indicate that Rovelli’s argument is quite wrong, constructed within the unicorn world.

In the second edition we added sub-chapter 6.6, that is, the relationship between theormodynamics, quantum mechanics, dark energy and dark matter. We introduce a new approach about dark energy and dark matter (excluding the presence of macro-macro-EW, as we wrote in our previous works).

As a conclusion, we emphasize that we have overwritten the main theories, ideas and concepts of Physics within the new Copernican framework of thinking, the EDWs perspective. The umbrella under which we have been working indicates that the great problems of Physics are pseudo-problems constructed within the wrong framework, the “Unicorn world” (the Universe/world) which does not really exist. Therefore, we have to replace the unicorn world with the EDWs! At the end of our Introduction, we mention that that have been many physicists, cognitive neuroscientists and philosophers who have published UNBELIEVABLE similar ideas to our ideas long time after our ideas being published!).[[1]](#footnote-1) It is not something surprising since the EDWs has changed everything in human knowledge! Therefore, we end this chapter with this paragraph:

“*The distance between the pioneers and the much smaller followers becomes so great that the latter cannot reach the former; the age of servile imitation begins – yet not of nature, but of the style of the great masters, zealous copyists remove the labels from the elixirs of the Magi and put them on their vials.” (Arnold Gehlen,* Images of time*)*

**Chapter 1**

**The epistemologically different worlds” (EDWs)[[2]](#footnote-2)**

**1.1 Principles concerning the existence and the interactions of objects (the whole-parts relationship)**

In this chapter, we will present and analyze the principles referring to the existence of objects/entities and their interactions, answering questions such as: who determines the existence of different entities, where are these entities, what are the relationships between them, which objects really exist and which objects we believe that exist, etc. These principles are valid for any set of non-living objects (natural and artificial, or man-made). We will see that the physical (non-living) objects (processes) do not exist, as it has been assumed so far, in the same “world” or “Universe” (namely the unicorn world), but they exist in EDWs (epistemologically different worlds).

Let us see how these sets of objects and implicitly these EDWs appeared in the past. According to the actual physical theories that explain the universe (the unicorn world), after many “Big Bangs” (from our viewpoint), there was the quantum plasma (made of quarks and gluons), which had an extremely high temperature. As the plasma became less and less hot, the first microparticles (photons) escaped from that plasma. Later, the planets appeared in the “Universe” and much later, life emerged on the surface of at least one planet, the Earth. This view is constructed within the paradigm of the “Universe”; however, as we will see in the entire book, the notion of Universe/world is completely wrong. Let us see how these sets of ED (epistemologically different) objects and therefore these EDWs appeared. In reality, there were the electromagnetic fields/waves which appeared after many Big Bangs, then, in the same place where these electromagnetic fields were placed, but corresponding to them, the microparticles appeared, and later the macro-entities (the planets, etc.) appeared. 4.5 billions years ago, Earth and later life appeared. In this context, we introduce the five principles concerning physical objects and their interactions.[[3]](#footnote-3)

(1) Epistemologically different interactions constitute epistemologically different objects, and epistemologically different objects determine epistemologically different interactions.

(2) Any object exists only at “the surface”, due to the interactions which constitute it.

(3) Any object exists in a single EW and interacts only with the objects from the same EW.

(4) Any EW (a set of objects and their interactions) appears from and disappears into nothing.

(5) Any EW is, therefore all EDWs share the same objective reality, even if one EW does not exist for any other EDW.

The existence of a (physical) object generally requires a “spatio-temporal” framework. However, in our book 2016b (or next chapter of this book), we indicated that the space and time (or spacetime) cannot even exist, i.e., space and time (spacetime) cannot have any ontological status! The ontological status of space and time (spacetime) would produce strong ontological contradictions in both paradigms: the EDWs framework or the wrong unicorn world (the Universe/world). Every object exists in one single epistemological world (EW), which means that the object exists and interacts only with the entities from the same EW. The main notions of the EDWs perspective (existence and interaction/perception) are strongly interrelated. (See our previous works) The great English philosopher Berkeley said that “to exist means to be perceived”. From our perspective, the “interaction” is a kind of “perception”, therefore, these two notions are quite equivalent in our framework. The proposition (1) or Berkeley’s slogan can be rephrased in the following way: “To exist means to interact”. The planets existed and had existed long before man appeared on Earth and they will exist even if human beings disappear in the future. The planets (like all the macroscopic objects) exist one for the others within the macro-EW. This statement is also valid for the microparticles which exist within the micro-EW. The human body is not the only entity who “perceives”/“interacts” with different macro-objects/entities. There are micro-entities, for instance, which interact within the micro-EW.

If an object is constituted by certain interactions with other entities/objects, what does constitution mean? The interactions constitute the surface of an object (i.e., the object itself). When a human being perceives an object with the help of her eyes, she actually sees only the surface of the object. For example, a man looks at an apple on a table in front of her. She simply sees the peel of that apple (the apple as a “whole”), but she does not see anything inside the apple. In order to see the inside of that apple, the apple needs to be cut. If she cuts the apple in two parts, that apple no longer exists as an object/entity, but only two parts of that apple would exist.

We will make a very important observation: the apple is perceived not just by men, but also by other animals; also, the apple interacts with other objects (it can interact with other apples, for instance). Let us suppose that the apple is on a plate placed on a table. As we have written above, we know that the man interacts with (perceives) the plate which, in its turn, interacts with the table. In the EDWs perspective, since the apple, the plate and the table interact (the entities “perceive” each other), these objects are in the same EW. Of course, an apple does not interact only with the plate and the table, but it can interact with other objects, as well (e.g. with other apples in a fruit basket). The essential thing is that these actions are precisely the ones that *constitute* the apple, the plate and the table. In other words, these interactions furnish for the objects their ontological status. Without these interactions, the apple (like all entities/objects) would simply not exist. In other works, if only the micro-EW (i.e, only the micro-entities) existed, that apple (the only macro-entity in the “Universe”) would not exist) would not exist. Instead, only the microparticles would exist in the micro-EW. We emphasize that any apple (like any macro-object) does not exist for an electron (for any microparticle)!

We can use the same reasoning in the case of planets. If there were a single planet in the “Universe”, without anything else existing outside of it, that planet would not exist just because it would not interact with anything else. A planet exists only because it interacts with other planets, in other words, those interactions constitute that planet. It is therefore absurd to claim that the planet would exist “by itself” or “it would exist for God”[[4]](#footnote-4). Instead, what would exist would be the microparticles corresponding to the planet, since they would interact with each other.

Another question is: “How did natural objects, such as planets, appear?” According to the current physical theories, after the Big Bang, the first entities which appeared in the “Universe” were the electromagnetic waves and long time after this phenomena, the microparticles appeared but, according to the EDWs, these microparticles (which correspond to the micro-EW) correspond to the electromagnetic waves (which belong to the field/wave-EW). Later, the planets (macro-entities) were formed when a huge amalgam of microparticles were unified. Within the unicorn world, it was believed that the “microparticles form/compose a planet”. It was accepted a kind of identity between the planet and that huge amalgam of microparticles. Moreover, one of the elementary rules indicates that two objects (or sets of objects) cannot exist in the same place, at the same time. It means that, within the Universe (unicorn world), the planet cannot even exist, only the microparticles exist.

From our viewpoint, this sentence is totally wrong: the planet does not exist for the microparticles, the microparticles do not exist for the planet since there are two EDWs. The apple exists only for other macro-objects like other apples, for the plate, for the table, for the planet Earth. The microparticles “by themselves” exist, too, but only for other microparticles, not for the planets or the tables. So, there is no point in claiming that the microparticles “form” or “compose” a table or a planet. Composition, emergence, supervenience and identity are all wrong notions that created many other pseudo-notions in various branches of science (for instance, cognitive (neuro)science, physics, biology) and philosophy. Such notions are simply inventions (illusions) of the human mind. That is why we can say that a planet appeared spontaneously out of nothing. The planet Earth, for instance (that belongs to the macro-EW), appeared out of nothing, but it corresponds to the EW of microparticles. Of course, without the existence of microparticles, we would be unable to speak of the existence of planets, but it does not mean that the microparticles exist for the macroparticles. The macro-EW does not exist for the micro-EW and only the human being, changing her observation conditions, can observe (indirectly, through *correspondence* EDWs, but these EDWs *do not exist for one another*. On the contrary, for the microparticles, the planets do not exist, the microparticles do not exist for the macroparticles. Moreover, because of certain interactions, only the surface of an object exists, therefore notions like “internal existence”, “internal determination” or “essence” of an object are meaningless notions, when it comes to characterize an object. An object exists only as a whole, i.e. the surface has no parts.

We will provide another example: in front of us is a table. The components of that table (for example, its legs) are not separate from its surface, so they do not exist independently of it. In other words, the “legs” of a table do not exist as “objects”. They exist only as “parts of the table” in the mind of the person who perceives that table, i.e, from the viewpoint of that person, but the legs do not have any ontological status! Only the table as a whole has an ontological status. If we completely separate the legs of a table from the tabletop, the table would cease to exist. However, the legs and the tabletop would exist as macro-entities in the same EW as the table, namely the macroscopic-EW. (for more details, see Gabriel Vacariu 2016a) In other words, the whole does not exist for the parts, the parts do not exist for the whole. In some cases, like the table and the legs, the whole and the parts exist in the same EW. In other cases, the whole and the parts can exist in EDWs: for instance, the table and the amalgam of the microparticles exist in EDWs.

Certain particular traits are an object and these “characteristics” (the object) can be perceived by a human being, others cannot. Moreover, the human eyesight adds certain characteristics to the perceived objects which do not actually exist. As we well know, “colors” do not exist in the objects themselves; color is a perception of the light which is reflected with a certain frequency and wavelenght from the surface of the object and it is received by the human eyes. The human being does not perceive the thing-in-itself (which does not even exist!), but, in this case, she has a “mental representation” of the macro-objects (the table, stones, planets, etc. which rally exist in the macro-EW). A planet can “perceive” (i.e., interacts with) another planet even though we cannot say that a planet “observes” the same “characteristics” that a human being does. Still, some traits/characteristics remain the same (what the English 17th century philosopher Locke called the “first-order” traits), while other traits are “different” (the “second-order” traits). Moreover, a bat perceives objects from the macro-EW as having very different traits from those we perceive. For example, colors do not exist for the bats. And yet the walls of the cave, for instance, exist both for bats and humans, even if the second-order traits greatly differ. Because the EDWs exist (more precisely, are), the question “Which world truly exists?” makes no sense, because all EDWs share the same objective reality and the world/Universe does not exist (the Universe was just a human mind creation until Gabriel Vacariu discovered of the existence of EDWs in 2001 and published his first ideas about EDWs in 2002!).

As we saw in the introduction, one of the main problems in the history of human thinking was the relationship between different “entities”. “Causality” is one of these very problematic relationships. Obviously, the notion of “relationships” is strongly related to the notion of “levels”. Used under an ontological framework, “levels” entail causalities (which really exist in some cases). Used under an epistemological framework, “levels” becomes an empty notion, since such levels cannot exist in the same EW. For instance, throughout the last centuries, there have been strong debates regarding different pairs of levels: the mental level and the neuronal level, (i.e., the mind-brain problem), the micro-level (with microparticles like electrons and protons) or the macro-level (with macro-objects such as planets or tables). If we accept that, in such cases, both “levels” exist, we appear to be faced with quite strong ontological contradictions: two entities/objects exist in the same place, at the same time. Therefore, it is not possible for a table and its microparticles to exist in the same place, at the same time. The acceptance of different types of “levels” has been a quite incredible Ptolemaic epicycle (wrong notions with wrong arguments) in the history of human thinking. For instance,

- the “levels of analysis” used by many contemporary philosophers is just a “linguistic game” which used to dominate analytical philosophy;

- the “levels of organization” used by some scientists and philosophers led to contradictions regarding the identity of certain entities; and

- the “ontological levels”, introduced by Descartes but still used today, produces ontological contradictions within the unicorn world.

Therefore, from our viewpoint, we have to replace “levels” with EDWs:

* the micro-EW and the macro-EW are, but one EW does not exist for any EDW;
* the electromagnetic field-EW and the micro-EW are, but one EW does not exist for an EDW
* the mind-EW does not exist for the macro-EW (where the brain/body really exist).

We will draw your attention again upon the fact that if we reject the EDWs perspective, strong contradictions and anomalies will continue to dominate philosophy and sciences. In this context, we introduce an essential postulate, **the postulate of correspondence:**

Since an EW does not exist for any EDW, the “correspondences” (no ontology) between the entities/processes which belong to the EDWs cannot have any ontological status. Therefore, the notion of “causalities” (or any ontological relationship) between the ED entities which belong to the EDWs (or causality between any two EDWs) is a completely wrong/meaningless concept.

The notion of “correspondence” has produced many illusions (“pseudo-notions”) in particular sciences and philosophy during the last centuries, but mainly in the last century! As we will see in this book (as well as in our previous books), the notion of “causality” between the entities which belong to the EDWs has always been used in the human thinking, but this “causality” is a completely wrong notion since one EW does not exist for any EDW. How can we attribute the causality (a “law” or something similar) between the ED entities which belong to the EDWs since these ED entities do not exist one for another? The scientific or philosophical explanations of some causalities between the entities which belong to the same EW seem to be quite correct. However, many other “causalities” investigated by the scientists and the philosophers have produced strong “anomalies” which created strong Ptolemaic epicycles. Such Ptolemaic epicycles were formed over centuries, when a scientist or philosopher believed (incorrectly) that there were certain “causalities” between the objects placed (according to that old framework, the unicorn world) within the “same world” (as we called, the “Unicorn-world”). The human beings have thought that certain objects have been placed in the same “spatio-temporal framework” when, in fact, some of them didn’t even exist for others (they belong to the EDWs), and moreover, the “spacetime” has no ontology (or both “space” and “time” have no ontologies).

Let us return to the quite problematic parts-whole relationship[[5]](#footnote-5) by analyzing some examples. Surprisingly, perceiving two objects which appear to be different, people think that those objects are placed in the same spatial-temporal framework (the unicorn world) and thus they seek the relationship (causality) between them. However, those objects do not even exist for each other, so there cannot be any relationship (causality, emergence, etc.) between them, not even one of “identity”! Obviously, the causalities between the entities which belong to the EDWs cannot be explained through generally accepted scientific theories. Why? Because these “causalities” do not exist! Again, such anomalies were created because of the wrong single-viewer perspective of human beings: one observer, one world. Within the EDWs perspective, when we try to grasp the relationship between the entities which belong to the EDWs, in some cases, we have to replace causality, identity and other linguistic notions with “correspondences” (with no ontology at all!). Below, we will give some examples.

(1) The example concerning the microparticles and a table (or a planet). As we know, the table (or the planet) and the microparticles exist in the EDWs, but the table does not exist for the microparticles, nor the other way round. However, with the EDWs framework, we can say that the table corresponds to that set of microparticles. As we have seen above, we cannot claim that the microparticles “form/ compose” the table because the table does not exist for the microparticles, nor the other way round, so the notion of “forming/composing” makes no sense. We would like to emphasize that the identity of an object is given neither by its essence, nor by what it has “inside” (its “composition” or other related metaphysical concepts, which are just empty notions), nor by the perceptual-constitutive mechanisms of human beings (as Kant and some people working in quantum mechanics believed).

Let us investigate in more details, the imagine in which a researcher “sends an electron towards a table”. The question is the following: “What does the electron perceive”? A microparticle (the electron for instance) does not “perceive”, but “to perceive” would be equivalent, in this case, with “to interact”. So, the question would be: “What does the electron interact with?” Most people would answer: “The electron will interact with the table”. But this answer is completely wrong because it given from the “human being’s viewpoint” within the unicorn world. The correct answer relies on the “point of view” of the electron (not on that of any human observer): the electron interacts with (“perceives”) a huge conglomerate of microparticles which, for the human observer (and other macro-entities), represents the “table”. If we replace the table with a planet, we get the same question and the same answer: the planet, and therefore its gravity, does not exist for an electron or any other microparticle (there is no “quantum gravity” because no “graviton” has been discovered yet, but we believe, from the EDWs perspective, the “gravitons” cannot even exist). The electron “perceives”/interacts only a huge conglomerate of microparticles which, for humans, represents a planet. Moreover, we insist on emphasizing that a planet does not exist for an electron, no matter how long the electron travels through the whole universe. In the entire “Universe”, the electron (and any other microparticle) encounters only huge conglomerates of microparticles which human being considers as being “planets”. However any planet (a macro-entity) exists for other planets within the same macro-EW. The microparticles and the macroparticles (among which planets) are ED objects/entities which belong the EDWs, no more or less.

1. An automobile and its components: the same rules are true for the relationship between the car and the microparticles, which are also components, but microscopic ones: if we consider that both exist (in the same EW), we break the ontological rule of whole-parts. However, in this case, the whole (the car or the table) and the parts (the microparticles and their micro-forces) are in the EDWs, not in the same EW (as the car and its macroscopic components). For the relationships between a macroscopic object and a set of microparticles (and also for the parts-whole relationship), we have to replace the notion of “composition” with that of “correspondence”: in this case, an automobile is not “composed of its parts”, because the automobile (the macro-entity) does not exist for its parts (the micro-entities) and vice-verse. “A table is not composed of microparticles”, just because the table only “corresponds” (ontologically) to a set of microparticles (and their micro-forces), since the table (and other macro-objects and their force, gravity) and the microparticles (and their micro-forces) belong to the EDWs.

The “parts-whole” distinction is a philosophical distinction, which has led to many “metaphysical” (more exactly, linguistic) games that have nothing in common with nature (the EDWs). What really exists in the EDWs and what we have believed that exist within the unicorn world are very “different things”. Again, the human language/thought has been a quite dictatorial status in establishing the dominance of the “unicorn world” until we discovered the being of EDWs!

The conclusion of investigating all these examples is that the parts and the whole exist (a) in some cases in the EDWs: for instance, the microparticles and the macroparticles; (b) in other cases, in the same EW, but not at the same time: in the same EW, the whole does not exist for its components and vice-verse (there would be strong ontological contradictions!). In principle (5), when we claim that “all EDWs have the same objective reality”, we use the Kantian expression of “objective reality” with almost the same meaning that Kant intended. The “conditions of observation” are replaced by “conditions of interaction” and thus the Kantian epistemological notion of “constitution” (even if “ontologically loaded”) becomes a true ontological-epistemological concept available for the EDWs. The first part of principle (5) is “any EW is”. Some EDWs do not really exist (like the macro-EW, the micro-EW and the field-EW which are just labels, no more), but only the macro-entities, the micro-entities and the waves-entities really exist but in these EDWs. Therefore, an EW does not really “exist” (i.e. it does not exist in relationships with other EDWs (or entities), but it “is”. Only certain epistemologically different objects/entities (and their interactions) “exist” within their “spatio-temporal frameworks” (no ontological status). These EDWs do not have interactions, they do not exist. So, according to our principles, “an EW is”, “an object exists” within a “place” for a period of “time” (space and time do not have any ontology, see below or Vacariu and Vacariu 2016b). Using different conditions of observation (our eyes or an electronic microscope, for instance), we see that the macroparticles and the microparticles exist in “nothings” (the illusory “spacetime”) that are, in reality, EDWs. All the epistemologically different entities and their epistemologically different interactions (all “the EDWs”) have the same objective reality!

**1.2 Principles Concerning the Brain/Body and the Corresponding I (the Self/Mind)**

In this sub-chapter, we will explain the principles referring to the body (to the organism in general, brain included) and the corresponding mind (i.e., the self or life). Generally, the body/organism exists in the macro-EW along with other macroparticles. For instance, our bodies exist in the same macro-EW as tables and planets. As we saw in the previous sub-chapter, the microparticles do not compose our bodies, but they correspond to them, since they belong to the micro-EW. What are the relationships between a body and its cells, between an organism and its life, between a cell and its life, between a human body and a mind? It has been mistakenly claimed that “the organism has life”, and since the biologists consider that the smallest living entity is the cell, and therefore, “a cell also has life”. In our previous works, our question has been this one: where do we locate “life” inside the organism or emerging from the organism, or the “mind” related to the brain? Until we discovered the EDWs, all alternatives have been quite wrong. Life/mind is an EW, while the body is an entity which belongs to the macro-EW, and therefore, the mind/life does not exist for the brain/organism.

There are people who consider that there are at least strong similarities, if not an identity, between life and mind. (See Gabriel Vacariu 2016) Therefore, seeing the situation from that perspective, the statement “An organism has life” is quite similar to “the brain has mind”. In biology, after 100 years of research, nobody can describe the true relationship between an organism (or a cell) and “life”. Also, scientists (neuroscientists, psychologists, computer scientists etc.) working in Cognitive Neuroscience have been unable to solve the mind-brain problem after many decades of working in spite of the fact that they have used various apparatuses (EEG, fMRI, MEG, PET, etc.) to scan or “read” the brain. From our viewpoint, ontologically speaking, within the EDWs perspective, there are no great differences between “life” and “mind”, these different notions refer tot the same identity, the mind-EW! “Life = mind”, therefore the mind-EW is the life-EW.

The human entities are not the only observers within a particular EW. Each entity has its own “point of view”, or, better said, it “interacts with” other entities which belong to the same EW. Even in the unicorn world, certain animals have points of view which are, more or less, different from the human one. More precisely, many animals (for example, the bat) perceive the external world quite differently than the human beings. From animals, we can move on to less and less complex living beings, such as bacteria, both multicellular and unicellular, whose perspective differs even more strongly than the human one. If we accept the postulate that the smallest entity that has life (that life “emerges from”) is the cell, we can wonder how a cell “perceives” its surrounding environment. While some researchers may find this question ridiculous, we have to remember that, within the EDWs, even an electron or a planet “perceives” (i.e., “interacts with”) other entities from the same EW. So, if we consider that a bat perceives its environment, then we can also consider that “a unicellular organism perceives its surroundings” or that “a cell interacts with/perceives its external environment”. However, in this context, the question would be: “What is the environment of life?” (we do not refer to the organism). As we will see below, the concept of “living being” is quite similar or even identical to that of the “mind”, so “life/mind is an EW”. In fact, as we emphasized above, we consider that “life”, “mind”, self are different notions which refer to the same entity/EW, the mind-EW. In this context, let us introduce the principles regarding the mind/life/self and the body/organism/cell:

(6) The mind/I/self/life corresponds to a body/organism/cell). The mind/self/life does not exist for the body, the body does not exist for the mind.

(7) The I is an EW. Therefore, the I is in an “illusory temporal framework”, while the body exists (in an “illusory spatio-temporal framework”).

(8) Having a certain set of components, from our point of view, the body corresponds to (but it is not composed of) an amalgam of macro-objects (arms, legs etc.) (or cells) and their relationships. The body and its corresponding parts (also, cells) belong to the same macro-EW. Also, a body corresponds to a certain set of microparticles belonging to the micro-EW.

(9) Certain mental states and processes form the knowledge that is the I.

(10) As an entity, the I has unity as an indeterminate individuality (it does not have illusory “spatial dimensions”, or correctly, the I has no parts).

The human body is nothing more or less than an entity like all other entities: the body is something epistemologically different from the self (the mind-EW or the life-EW): the body exists in the macro-EW, while the mind (the I or the self) is an EW. Various instruments of observation (or measurement) simply allow the I to perceive EDWs indirectly (i.e. through correspondences). However, there are no relationships between the body and its micro-entities (or its cells): each microparticle interacts with an amalgam of other microparticles (which belong to the micro-EW) and they all correspond to our body (which belongs to the macro-EW). Moreover, the body/ brain (which belongs to the macro-EW, where we can find planets, tables, and other macroparticles) does not exist for the self (the I), which is an EW. The self (the living being) requires the existence of the corresponding brain (body). Without this correspondence, the I/mind cannot be. The I (the self) is an entity and an EW at the same time. This is the only case in which we encounter the paradoxical situation in which something is both an entity and an EW. Obviously, since the self (the mind) corresponds to an organism/cell and the self is an EW, then like any EW, the self appears from and disappears into nothing (or it comes from nowhere and returns there).

(11) To exist means to disappear, to live means to die. It is quite impossible for something to exist forever, as well as it is quite impossible for something to live forever. Everything which exists, it exists for a period of “time”[[6]](#footnote-6) and it will disappear in the future with necessity. Also, what it does lives, it lives for a period and it dies in the future with necessity. So, it is compulsory for us to introduce “disappear” in the definition of existence, “death” in the definition of life! Otherwise, the definition of “existence” and “life” would not be a complete definition…

One of the essential features of the “correspondence” between the I and the body/brain is that, in the absence of the “I”, the body (which includes the brain) would not be able to survive in its environment. Also, the mind/life would not exist/be without its correspondence with the brain/organism. We cannot continue to maintain, as we have done so far, that the biological functions (which are the results of evolution) are enough for an organism (a body) to survive in its environment. An organism has no “knowledge” about its external environment, even if the body strongly interacts with the entities which belong to its environment. Such interactions do not “represent knowledge”: a planet interacts with another planet, but could we consider that those planets have/possess “knowledge” about these interactions? Also, the body/brain) has no knowledge at all, but only neuronal, chemical, organic interactions, no more or less. Does a neuron “perceive” color or space? Does a neuron “feel the time passing”? The neurons (and the white matter and all other components of the brain) do not possess any kind of knowledge at all. Again, there are only electrical and chemical (and other kinds of) interactions/reactions, but not “knowledge”. Certain physical (neuronal) processes take place, but these are all. However, all these chemical, neuronal and bodily processes/interactions correspond to the mind-EW (or self-EW or life-EW). Within the unicorn world, the coordination of all the biological functions of an organism are thought to be the result of evolution. The evolution of an organism is explained through this coordination. From the EDWs perspective, the coordination of all biological functions needs a “unity” which is impossible to be used within the biological mechanisms of an organism. Only the self (the I or the mind or life) has this kind of unity, which corresponds to some biological mechanisms, but which does not exist within an organism. Even if there is a *correspondence* between this unity and the neural and body mechanisms/functions of an organism, this unity is nothing more or less than the mind/life/self. Again, this unity corresponds to the development of an organism and the evolution of a species in a particular environment. We return to our analogy: can we find the unity of a table (i.e. for the standard table, its rectangular surface placed on four legs) within the corresponding microparticles? Obviously, there is no such surface (with certain features like surface, color, etc.) within the micro-EW.

We believe that the scientists working in the field of cognitive neuroscience are making a major mistake since they avoid taking into account the essential role of development and evolution when they analyze the relationship between the mind and the brain/ body (especially using brain imaging with EEG, fMRI and PET). For instance, when we use fMRI for the brain imaging (for scanning or reading the brain), we cannot grasp the corresponding results in the development of an organism and in the evolution of the species. These corresponding results would represent the I/ self/living being. Many mental and behavioral functions appear during the development of the corresponding organism. After a period of training (which can last for weeks, months or years), many neural areas get less and less activated when they perform the same functions during development. In EDW, the mind-EW, in psychological terms, the explicit knowledge (the conscious or declarative knowledge) is transformed into the implicit (unconscious or procedural) knowledge in order to perform certain tasks (such as speaking a foreign language, riding a bicycle etc.). After the training, the tasks are accomplished better, so more training leads to better accomplishments. The problem is that when we scan the brain of an adult, we cannot observe the activation of all these neural processes, of chemical and electrical reactions, of neural waves etc. However, the required mental functions are performed without any problem. Certain neuronal patterns (which were the most strongly activated at the beginning of that task) seem to be inactive, or at least they are much less active. Most probably, because of their “habitation” (“training”), the neural patterns are less activated, but not completely inactive, since the task is accomplished more efficiently. The same “processes of habituation” have been necessary during the evolution of the species. Therefore, in order to achieve a task, many parts of the brain are involved, but we are unable to observe all of them.

One of our major mistakes is that we correlate some mental functions only with certain neural functions which we observe using fMRI and PET. In reality, if we go back in time (to the development of an organism and the evolution of the species), we will notice that many other neural areas are involved in performing a certain mental function, more exactly, the whole brain and body participate for those functions. Under these circumstances, it is futile to try and identify what oscillations, neuronal, chemical reactions and many other processes (not only activation of neuronal patterns, which can be seen using fMRI) take place inside the brain (physical reactions are correlated with any mental task). Why do we think that, when we use fMRI, we can actually “read the brain”? We read only the “top” of the brain processes (i.e, the most activated parts of the brain), we introduce some “labels” (i.e., we correlate the activation of some neuronal patterns with some mental tasks that belong to the I) and then we claim that we “read the brain”. For instance, if we could scan the brain of a child during its first months of life, we would probably observe the activation of numerous parts of the brain even for the simplest movements of the arms, the legs, or even the eyes. After a period of training, many parts of the brain will cease to be “activated” as strongly as at the beginning by such actions. Nevertheless, those tasks are performed better and better. Consequently, using fMRI and PET, we can find only certain neural areas, maybe the most activated ones, but not all those which are correlated with certain mental functions. Moreover, we cannot observe the activation of some neurons and their oscillations with the same apparatus.

Each mental function (each mental representation) belongs to (more exactly, “is”) the unity of the I/self. This unity represents the “indeterminate individuality” of the I/self, or better said, the I is an “indeterminate individuality”. This means that the I/self/mind (which is also life, see the next chapter) has no spatial framework, only an “illusory” temporal one. In this sense, we cannot identify the life or the mind as being placed within an illusory spatial framework. No matter what conditions of observation we choose, we will not be able to identify the “individuality” of the life/ mind/self. Therefore, this individuality is indeterminate (not non-determinate). Trying to reduce the indeterminate individuality to a completely determinate individuality (which would presuppose at least a illusory spatial/spatio-temporal framework) would mean a mixture of EDWs. We can talk about color or surface only when we refer to entities placed within such a framework, but can we consider that mental states (for instance, emotions or beliefs) having those illusory spatial dimensions? We can perceive indirectly, through correspondence, a planet (or a table) with the corresponding eyes that belong to the body situated within the corresponding EW (the macro-EW), but we cannot perceive the self/ mind/ life because each of them is the self/ I. However, a self does not exist (more correctly, it “is not”) for any other self (since the self is an EW) so, linguistically, it is meaningless to talk about a self. It is better to refer to “the self” and not to “a self”. All mental perceptions (which correspond to the functions of certain biological mechanisms) are the I. Therefore, the I/ self cannot perceive itself. It is like asking an eye to see itself. In such a situation, it is impossible to think of a sixth sense which would perceive the being. To do so would lead to a contradiction. We will name this inconsistency the “being-perceiving” contradiction, which leads to this rule:

*Being an EW, the mind/the I/self/life cannot directly perceive anything.*

Nobody considers that life as such perceives something, but many people believe that the mind perceives the external world. However, the mind, just like life, does not perceive anything. We cannot reduce them even to the brain/body reactions. In fact, with the EDWs perspective, we have to reject all these kinds of reductionism. Based on Descartes’ principle (“I think, therefore I am”), we introduce a *special principle* (SP):

*(SP) The self (mind) exists just because it corresponds to the brain/body (a macro-entity that exists in the macro-EW). The mind (self) corresponds to the body/brain (a macro-entity that belongs to the macro-EW), but also to an amalgam of microparticles (that belongs to the micro-EW or to an amalgam of electromagnetic fields (that belongs to the field-EW). Anyway, without the existence of the macro-entities (within the macro-EW), the self would be impossible to be!*

The mind cannot correspond only to an amalgam of microparticles! Based on SP, we will argue, in the next section, that the “beings of EDWs” (including the existence of the mind as an EW) has to be accepted by everybody.

**1.3 Epistemologically Different Worlds (EDWs)**

The Hyperverse is an abstract notion, ontologically-epistemologically speaking, and it represents the sum of all EDWs. Ontologically, independently of our existence/ observation, the entities of a particular EW do not exist for those that belong to an EDW. Epistemologically, using no more than one set of conditions of observation, the human beings are unable to observe (indirectly, through correspondence) entities from more than one EW at any one moment; this fact is due to the nature of attention/consciousness (a serial process). *All the EDWs are like many branches of a tree. We know only a branch, from BB, the field-EW, the micro-EW, the macro-EW, and the mind-EW, but we have to be aware that there are many branches like this branch. Also, each EW can correspond to two branches (not only one)! In this way, the picture of all EDWs are like the branches of a tree, but one branch (a particular EW) does not exist for any other branches (EDWs)!*

We have to keep in mind the fact that in order to observe entities which belong to a new EW, we have to construct the conditions of observation which will allow us to interact indirectly with the entities in that EW. Following the ideas of the great physicist Bohr (see Vacariu 2005, 2008), any new apparatus of observation is a macro-tool constructed and manipulated by our hands/ body (including the brain) which correspond to the mind. In Kantian terms, within the EDWs perspective, the conditions of possibility for our tools of observation should reflect at least in part (in certain determinations) the conditions of possibility for the interaction of a set of organisms (and/ or objects) that belong to an EW (see Vacariu 2008). We can become aware of EDWs only through the “hyperontologization of epistemology”. The ontologies of EDWs have become epistemologies and vice-verse. Nonetheless, these ontologies are not different ontologies but epistemologically different ontologies which represent the hyperontology of the Hyperverse (this is an abstract expression since one EW does not exist for any EDW).

The EDWs perspective is really a new framework of thinking that requires a new language. As an abstract notion, the Hyperverse (all the EDWs) creates the semantic framework necessary for the understanding that the EDWs are but not exist (only the “objects”/entities exist). Each set of interactions constitutes the surfaces of the entities that belong to an EW. Thus, the surface somehow mirrors the EW: the interactions constitute the objects. Since any mental representation is the self, the self only “represents” the “external world” (the macro-EW, for instance, which is external to the brain/ body, but not to the self). Ontologically speaking, there are no “entities inside an object”, because that would break the whole-parts rule: those parts correspond to the object. It is an ontological contradiction to consider that the parts of a car (as independent entities), and the car (as a whole) exist in the same place at the same time. Again, there are no two sets of objects that ontologically exist in the same place, at the same time. Either the car, or the set of its parts can exist in a certain place at a certain time. Therefore, the phrase “inside an object” is merely an abstract notion. We emphasize here that the EDWs are not only those that we already know. There are EDWs (everywhere) that we do not have any idea yet, exactly as the Greek Philosophers had no idea about the electromagnetic waves.

What does the expression “epistemologically different” actually mean? Obviously, it does not mean the same thing as “ontologically different”, which refers to the ontologically different substances or different types of matter. There is no ontological meaning for our expression. The difference is neither ontological (as Descartes believed was the case for the mind and the body/ brain), nor linguistic (the way Carnap, a famous philosopher belonging to Vienna circle, believed it to be). The notion of “epistemological difference” imposes certain hyperontological limits related to the limits of each entity in any EW. “To exist” or “to be” means to have certain limits which entail “determinations”. The living being/the I as an “indeterminate individuality” has certain limits (the self is not “infinite” in anyway) or, more precisely, it has certain epistemological-ontological limits. The notion of “epistemological difference” assigns to each class of entities the same epistemological abilities that human being has, i.e. observation/ interaction (within the EDWs perspective, these are epistemological-ontological abilities).

As mentioned in the previous section, if something were a planet (or an electron), it would interact with another macroparticle (or with microparticles). If that individual were a cell, it would interact with the environment specific to a cell. However, the living being (“life”) that corresponds to a cell does not interact with anything else, since it is an EW! It has to be very clear that the expression “epistemologically different” eliminates many of the speculations (the Ptolemaic epicycles) that philosophers and scientists have developed over centuries. It eliminates the ontological-epistemological contradictions typically available within the “unicorn world”. The human organism needs to change its conditions of observation in order for a human being to observe (indirectly, through correspondences) certain epistemologically different entities that belong to the EDWs. Now we can clearly understand the expression “epistemological-ontological”. Changing certain conditions of observation (the difference between them being an “epistemological-ontological threshold”), the I observes (indirectly, through correspondences) the EDWs. In other words, the threshold is an epistemological-ontological one between ED entities that belong to the EDWs. We believe that the knowledge we have about the world is certain, but many parts of it are false. These distortions, instead of representing the truth about certain entities (objects or minds/lives that really exist or are), have presented the pseudo-relationships (causalities or not) between them. In the position of the dictator-observer, the human being has imposed the tyranny of the unicorn world! Until Gabriel Vacariu discovered the being of EDWs, the human beings had no idea about them, all human beings believed they were living within the unicorn world! From the point of view of the human being, it seems that all entities belong to the same “framework”. From the point of view of another “entity”, an object can observe only the other objects/entities which interact with it. In general, the interactions between certain objects take place in a “spatio-temporal framework” (no ontology, see Vacariu and Vacariu 2016b or next chapter). The framework of an object (for instance, that of a microparticle) is not the same as the spatio-temporal framework of a biological human organism, since the microparticle does not observe/ interact with the macroparticle. Therefore, the microparticles and the macroparticles are in “epistemologically different spatio-temporal frameworks” (no ontologies, they are in reality “nothingness” without any ontological status). This is the main reason why we have to reject the idea that all entities are within the same “spatio-temporal framework”, i.e. the unicorn world. Obviously, assuming that everything exists in the same spatio-temporal framework can be (pragmatically) helpful in our daily life. However, in science (and in philosophy), the fundamental problems require the EDWs paradigm!

From the human point of view, it would seem that the number of the types of EDWs is not too large. If we extend the conditions of observation/ interaction to all ED entities, however, the number of EDWs increases considerably. If we accept that “being is” and that it corresponds to an organism, we have to reject the notions of levels, attributes, supervenience, composition and elementary particles. “Being” (or life-EW) corresponds to an organism, therefore we have to hyperontologize all classes of entities that do not interact or emerge or are identical (those that have an epistemological difference). An entity needs to have a unity that represents its identity, even in the case of an indeterminate individuality such as the self/ mind/ life. In this context, based on SP, we will introduce the next proposition, the *principle of hyperontologization*:

*(11) The I is, therefore all the EDWs are, while the Hypernothing hyperis.*

The unity of the I/ self/ life and the unity of a planet have an ontological character: both are/ exist. If we were just decomposable organisms, or if the “I” lacked unity, we would be unable to acknowledge the existence (being) of EDWs and the “I” would not be an entity. Only the “I” (the self with its unity) is able to discover the being (existence) of EDWs. The relationships between the mind and the brain (between life and an organism, or between the whole and its parts), such as “identity” or “emergence” or any other type of relationship, are all rejected just because are totally wrong constructed within the unicorn world. As a whole, the I is an indeterminate individuality (implicit knowledge), but the spontaneous appearance of an explicit/ conscious representation determines the I to be in a certain state. Thus, we have to make another distinction for the I, between the explicit and the implicit states. Spontaneity is indeed “a determination of my existence” (see the footnote below) but this determination has to be explicit, since “the I is” and might or might not have determinations. More precisely, these determinations are the I/living being. Spontaneity explains explicit/conscious knowledge. Thoughts could not appear out of nothing, they are parts of the implicit/ unconscious knowledge (memory, etc.) which become explicit/conscious thoughts. Only an EW (including the living being) appears out of nothing. Conscious/explicit thoughts appear spontaneously from the unconscious/ implicit knowledge (that is the I). The indeterminate individuality (of the living being) would be the condition of possibility for this type of spontaneity.

In the context of the EDWs perspective, it is important to answer the following question: “What was there before the Big Bang?” Most physicists would tell us that this question is meaningless for the only reason that they do not have any plausible (scientific) answer. From our point of view (see our previous works!), this question has a plausible (philosophical) answer. We believe that there was an EDW (or maybe that EW still exists), which we will call the “pre-Big Bang EW”. (See also Vacariu 2012) In his previous work, Gabriel Vacariu wrote that Big Bangs (BBs) happened simultaneously in many places, not “one in an infinitesimal point”. In this way, we can avoid Alan Guth’s empty notion of “inflation”. (For more details, see Vacariu 2014) Also, it is possible that many other “Universes” except our “Universe” appeared at the same time or even earlier or later (“multiverse”[[7]](#footnote-7)). However, the micro-EW (or the macro-EW) did not appear from the “pre-Big Bang EW”. There are no causalities between any two EDWs. The idea of any kind of causality between ED entities that belong to EDWs is meaningless. Obviously, there are some correspondences, but we cannot speak of causalities. Any EW appears from and disappears into nothing. Then what is the role of that “pre-Big Bang EW”? There are some correspondences between ED entities and processes that belong to the pre-Big Bang EW and the micro-EW (this is allegedly the EW that first appeared after the Big Bang). Again, “what was there before the pre-Big Bang EW?” Was there another EW? Then there could be an infinite chain of EDWs. How can we stop the expansion of this infinite chain? Moreover, how could we avoid having a theoretically small or big infinity? In the case of the small infinity, imagine dividing a table in infinite parts, while in the case of the big infinity we can imagine traveling in infinite space and time. Within the unicorn world, nothing could stop us from thinking of such infinities. We can only rule them out by using the EDWs framework.

Before the pre-Big Bang EW there might have been an EDW, and before this EW there could have been an EDW and so on, but we do not have an infinite chain of EDWs. Following Aristotle’s “Prime Motor” against this regress *ad infinitum*, we also stop this infinite chain of EDWs by assuming that, in this chain of EDWs, there hyper-was (hyperbeing) an EW (let us call it EW0). It is possible for this EW0 to be just because there is EDW that lacks “spatial dimensions” (the mind-EW) and some entities exist without a “temporal coordinate” (e.g. photons) that belong to a particular EW (the micro-EW). If we have an EW without even the illusion of “space-and-time”, the question “What was there before it in the chain of EDWs?” is rendered meaningless. If we talk about the EW0, the questions referring to a pragmatic “spatio-temporal framework” of the entities belonging to this EW are meaningless. Therefore, we cannot divide a table in infinite parts, neither can we theoretically travel in infinite “space and time” because, at “a certain moment”, we move into the EW0 that has not even such pragmatic, “illusory framework of spacetime” (i.e., the “nothing”). What is important to remember from this example is that, within the EDWs perspective, we rule out any kind of infinity (see last chapter, anyway). Notions such as the world, infinity and many others have been created by the human mind within the unicorn world. It is now time to renounce invented notions like these, which have always created great problems for the human understanding.

**1.4** **The history of the EDWs after many the Big Bangs (approx. 13.8 billion years ago) and more details about the “non-existence” of the gravitational force (no ontological status) and no “spacetime”**

Related to space and time, we would like to introduce our view about the history of the “Universe” (i.e., the first EDWs after the Big Bangs. “Space” is an illusion created by the human mind: on the Moon, for instance, it is nothing between two stones (placed on the surface of the Moon - situated within the macro-EW), but this “nothing” (no ontological status) corresponds to the Higgs particles (that belong to the micro-EW) which correspond to the electromagnetic waves (that belong to the field-EW). Such CORRESPONDENCES has created the illusions of “space” and “time” or “spacetime” (all empty words) within the human minds within the unicorn world!

The electromagnetic waves have the greatest speed of moving. 300.000 years after many Big Bangs (approx. 13.8 billions years ago), the light (electromagnetic waves) moved with c, the speed of light. These electromagnetic waves (parts of the field-EW) have, inevitable, certain interactions which produced waves’ oscillations. Being more and more such interactions, the electromagnetic waves became strongly curved. Exactly these electromagnetic curvatures corresponded with microparticles which appeared, spontaneously, in the micro-EW. Obviously, any microparticle corresponds with an electromagnetic wave. In this way, for instance, the photons were created within the micro-EW. Also, the photons (in an EDW) moved with c. Between two photons, for instance, there were “nothing” which just *corresponded* to the electromagnetic waves. So, in that period, there were created the illusory “empty spaces” between the micro-entities (the micro-EW) and later the macro-entities (the macro-EW). So, the curves of the electromagnetic waves correspond to the microparticles and the “nothings” between the microparticles (we called “space”!). Later, the variations of the values of some parameters of the micro-EW produced the conglomerations of the microparticles which corresponded to the appearances of the macro-entities (like planets) within the macro-EW. The “space” between the planets in the macro-EW (for instance) is “nothing” that corresponds to something (electromagnetic fields, for instance) that belong to an EDW (the field-EW, for instance). Just because of these correspondences, people has believed that the “space” really exists!

On the same line, because of the existence of some particular processes (which, usually, involve motions), we can talk about “time” (an illusory notion). For instance:

* The internal neuronal processes *correspond* to our internal feeling of “time”.
* The rotation of a limb of a watch means one minute/hour.
* The complete rotation of the Earth around its axis means one day.
* The complete rotation of the Earth around the Sun means one year.

Let us furnish a new explanation for the gravitational “force”. Einstein indicated that the gravitational force is the curvature of spacetime. In our book 2017, we re-write both the special and the general relativity without “spacetime”. Continuing our explanation from 2017, we furnish a better explanation of the “gravitational force” within the EDWs perspective. Einstein indicates that this force did not exist, gravitation being just the curvature of “spacetime”. However, if the “spacetime” does not exist, then this force does not exist at all! In reality, it is the curvature of “nothing” which corresponds to somethings that belong to the EDWs, the field-EW, for instance. The gravitational force is not the curvature of “spacetime” (realized by planets, for instance), but the curvature of “nothing” which corresponds to an electromagnetic field (which belongs to the field-EW) and this curved electromagnetic field is part of all larger electromagnetic field (which includes concentrated electromagnetic field which corresponds to the microparticles which correspond to a planet).

The “gravitational waves” cannot even exist! What declare the scientists that are the “gravitational waves”? It is believed that the gravitational waves are “ripples in space” which travel with the speed of light!

In 1916, Albert Einstein suggested that gravitational waves could be a natural outcome of his general theory of relativity, which says that very massive objects distort the fabric of time and space—an effect we perceive as gravity. Accordingly, very massive objects spiraling toward each other should wrinkle space-time and send those distortions across the cosmos, like ripples spreading across a pond at the speed of light… In essence, gravitational waves “are propagating disturbances of the shape of spacetime,” says [Shane Larson](https://research.northwestern.edu/people/shane-larson), an astrophysicist at Northwestern University and member of the LIGO scientific collaboration… Though many other scientists accepted Einstein’s prediction, Einstein himself wasn’t totally convinced that he was right; over the next several decades, he continually waffled over the question of gravitational waves and occasionally published papers refuting his original idea.

(<https://www.nationalgeographic.com/news/2017/10/what-are-gravitational-waves-ligo-astronomy-science/>)

Or

Gravitational waves are ripples in the structure of [spacetime](https://en.wikipedia.org/wiki/Spacetime). Much as a ship traveling across the surface of a calm sea leaves a wake behind it, so moving objects in the universe create gravitational waves. The “ships” in the case of gravitational waves are extremely violent and cataclysmic events far off in the cosmos: black hole mergers, neutron star collisions, supernovae. All of these generate waves in the structure of spacetime, stretching and squeezing it as the ripples travel across the universe. …

However, for decades after 1915, Einstein himself was [unconvinced](https://www.discovermagazine.com/the-sciences/even-einstein-doubted-his-own-gravitational-waves) of the existence of gravitational waves.  In 1936, he and colleague Nathan Rosen published a [paper](https://physicstoday.scitation.org/doi/10.1063/1.2117822) entitled Do Gravitational Waves Exist? which, initially, was rejected by one journal because of a mathematical error….

It was the error that had caused the authors to conclude that gravitational waves don’t exist. When Einstein had corrected the error, the paper’s conclusion became exactly the opposite! Although the evidence now pointed to their existence, Einstein remained unconvinced, and believed that even if gravitational waves did exist, they would be so very weak that humans could never develop the technology to detect them….

It should be noted that Einstein was not the only theorist who worked on gravitational waves. Important contributions were made by other famous scientists, among them [Robert Oppenheimer](https://en.wikipedia.org/wiki/J._Robert_Oppenheimer), [Roger Penrose](https://en.wikipedia.org/wiki/Roger_Penrose), [Karl Schwarzschild](https://en.wikipedia.org/wiki/Karl_Schwarzschild), [Arthur Eddington](https://en.wikipedia.org/wiki/Arthur_Eddington), [Kip Thorne](https://en.wikipedia.org/wiki/Kip_Thorne) and [Richard Feynman](https://en.wikipedia.org/wiki/Richard_Feynman). But it was Feynman who, in January 1957, finally convinced the doubters that not only do gravitational waves do exist, but they can carry energy as well, explaining this by using something he called his[Sticky Bead argument](http://physicsbuzz.physicscentral.com/2016/06/gravitational-waves-explained-sticky.html)…

Another key prediction of Einstein was that gravitational waves would travel at the speed of light. By measuring the difference in time between when the gravitational wave signal arrived at the two LIGO observatories – in Hanford, Washington, and Livingston, Louisiana, separated by nearly 2,000 miles (3,000 km) – scientists were able to determine that Einstein’s prediction was completely correct. Gravitational waves do indeed propagate at the speed of light.

(<https://earthsky.org/space/definition-what-are-gravitational-waves> *Posted by*[**Andy Briggs**](https://earthsky.org/team/andybriggs)*in*ASTRONOMY ESSENTIALS | SPACE | **April 26, 2020)**

Obviously, from our viewpoint, spacetime cannot even exist (see Vacariu and Vacariu 2016), therefore, the gravitational waves also cannot exist! In fact, a great macro-object like a planet or accumulation of planets (like a galaxy) do not “disturb the fabric of spacetime” since spacetime cannot have any ontology. Gravitation has no ontology, it is “nothing” surrounding the planets and galaxies in the macro-EW which corresponds to the “curved electromagnetic field” (which belongs to the field-EW). Moreover, obviously, the “gravitational waves” would move with speed of light since they are nothing which correspond with the electromagnetic waves (with the speed of light, c)!

The main rule for the EDWs is the following: there cannot be any “universal law”, since the “world”/“Universe” does not exist! Each EW has its own laws which correspond to the ED entities and ED laws (i.e., to EDWs)! However, the EW0 has no laws, since it cannot have any ontological status. Otherwise, there should be an EDW “before” the EW0. In the next chapter, we will see that the Hypernothing (the EW0 or the Hyper-EW) *hyperis*, i.e., it has a *hyperontology*. An epistemological-ontological law presupposes, in general, certain entities and their relationships. The existence of any entity or any particular EW presupposes correspondences at least to a “previous” EDW. This is the reason the first EW, the EW0, cannot have any entity or any law! Therefore, following Aristotle’s movement of avoiding the regression *ad infinitum*, we know that it should be the “hyperbeing” (not “be”/“exist”), but this hyperbeing does not send to “God”! Because an observer “perceives” a physical law, for instance, it means that the observer really exist/is. Since the observer is, she is not “nothing”. So, it means that we cannot reduce everything to the EW0, at least from any observer’s viewpoint! Therefore, all EDWs really are.

You can notice another observer has the “same viewpoint”, therefore both observers really are/exist. In the “temporal” order/history of EDWs, we accept today, that after the Big Bangs, the first EW has been the field-EW. However, before the many Big Bangs, there was at least an EDW (we have no idea what kind, but almost sure there were many EDWs which maybe still would be), and before that EW was an EDW and so on. However, following Aristotle, we have to stop this regress *ad infinitum*: i.e., we have to stop this chain of EDWs with the first EW, that is the EW0. In this context, the general rule is the following: since the self is, we have to accept the beings of EDWs with a corresponding “hyper-beginning”, that is the Hypernothing (EW0)! Otherwise, we would not be, we would be just “illusions”. Interestingly, from a viewpoint outside of all the EDWs, we human beings and all other entities, are indeed just “illusions”! Why do a friend of you accept your self really is/exists? Just because your body and her body are in the same macro-EW and each body corresponds to a self. So, in principle, there is no illusion here. The point is that the self is an EW, the body belongs to the macro-EW and all the EDWs correspond to the Hypernothing (the Hyper-EW). From the viewpoint of the Hypernothing, “nothing” exists! Let us suppose the Hypernothing can ask this question: “Do the I exist?”. The answer has to be: “No, I do not exist, I am not.” The Hypernothing would not be able even to inform you that it “hyperis”. Somebody can inform you that she exists (is), but nothing can tell you “the Hypernothing hyperis”. The notion “hyperbe” (necessary for the Hypernothing) is not proper to any language on Earth, unfortunately…

Within the *unicorn world*, we can have the idea that our mind and the corresponding body (which belongs to the macro-EW) are parts of the Hypernothing, the EW0. In a religious way (wrong framework, anyway), mainly Spinoza’s “pantheism”, we can have the idea that the mind and the body are parts of “God”, but this view is wrong (like all other approaches from philosophy, physics and religion)! Apparently, we can interpret Plato’s “participation” as being quite similar to “correspondence”, but Plato’s “participation” has an ontological meaning at all, being constructed within the unicorn world. Plato considers that any object (appearance) “participates” to the idea of that object. For instance, a tree is a tree just because it “participates” to the idea of “tree”. The problem is that Plato did not clearly explain the notion of “participation” (the main concept of his approach). Even if Aristotle rejected the notion of “participation”, in our interpretation, it is not about something which has a physical status, it is just about the “correspondences” between the Hypernothing (the Hyper-EW) and ED entities that belong to the EDWs. Moreover, we have to recall Aristotle’s “Unmoved Prime Motor” which did not have the attribute of “moving”, but it produced for other entities which were “produced” by it. From our viewpoint, the Prime Motor (EW0) did not exist for any EDWs, therefore it did not exist for the EW1. So, this “production” did not have any ontological status, there were no direct relationship between the Unmoved Prime Motor and the other “moved entities”. Why this state of affair? Because, exactly as Aristotle thought, in our view, in order to avoid the regress *ad infinitum*, we have to stop not only the causality but even the “correspondence” between the EW0 and the EW1! The relationship between EW0 and EW1 is neither “causality”, nor even “correspondence”, but only a “hyper-correspondence” between these two EDWs! We need to introduce here the “*hypercorrespondence*” just to stop the regression *ad infinitum*. From our viewpoint, the “participation” of objects that belong to the EDWs to the “Ideas” means the “hyper-correspondences” of ED those entities (EDWs) to the Hypernothing (which has a hyper-unity). The Hypernothing cannot have any property of an entity that belong to any EDW or an EDW. We cannot think directly the hyper-properties of the Hypernothing since our self corresponds to the brain/body, a macro-entity (with classical features) which belongs to the macro-EW.

As we already know, as an EW, the Hypernothing (i.e., the EW0) has not existed for any EDW. Even if the EW1 appeared, the EW0 did not exist for EW1. In fact, from Parmenides’ viewpoint, nothing could change in the EW0 (more exactly there could not be any “changes” in the EW0, otherwise, we would fall in regression *ad infinitum*, again!). Therefore, we do not need any Big Bang for the appearance of the EW1. The Hypernothing still hyperis exactly as it has always been! The field-EW (the first EW of our “Universe”, 380.000 year after the so-called, an empty notion, the “Big Bang” or 13.82 billions years ago) did appear from “nothing”, indeed, but this “nothing” corresponded to the pre-Big-Bang-EW. The same idea is available for the appearance of the EW1: this EW appeared from “nothing” (no ontological status) which *hyper-corresponded* to the EW0. However, the EW0 did not appeared from “nothing” since it has always hyper-been there.[[8]](#footnote-8) The EW0 hyperis and the macro-EW (for instance) corresponds to the micro-EW and field-EW but hypercorresponds to the EW0 (the Hypernothing still hyperis since nothing could have changed this EW or within it). Even a mind-EW hypercorresponds to the EW0, but again nothing has changed within the EW0.

The question is then: “What did produced the appearance of the EW1?” Nothing! Since there were no changes within the EW0, the appearance of the EW1 was not caused by the EW0 (EW0 did not exist for the EW1, anyway), but from the “nothing” which hyper-corresponded to the Hypernothing! We emphasize here that it is about a hyper-relationship between the EW1 and EW0! Therefore, we can say: “Even if ‘nothing’ happened in the Hypernothing, the EW1 appeared!” which is equivalent with this sentence: “Because of “everything” changed in the Hypernothing, the EW1 appeared”!

Another alternative would be the following: Hawking’s and many actual physicists consider that the “actual Universe appeared from Nothing through the separation of ‘matter’ from ‘anti-matter’”. Within the EDWs, from our viewpoint, we can interpret this idea: “*the Hyperverse has always hyper-been” and suddenly (corresponding to it), EW1 and EW2 appeared in the same time (EW1 being “matter” and EW2 being “anti-matter”, together these EDWs represent “nothing”, i.e., they correspond to the Hypernothing, that is, they cannot even exist for the EW0 (with its hyperontology). So, “nothing” is still there, but these “nothing” corresponds to the EW1 and EW2!* In other words, together the EW1 and the EW2 are “nothing”, (these EDWs correspond to the Hypernothing[[9]](#footnote-9))! The Hypernothing is “nothing”, and the EW1 (matter) and the EW2 (antimatter) appeared “inside of” (in fact, “corresponding to”) this “nothing” and together they have always been “nothing”, i.e, the Hypernothing. So, since 13.82 billions ago, there have been ED entities in the field-EW, later the micro-EW and much later the macro-EW which together with the EW1 and the EW2, they have not existed, “in reality” (i.e., from the viewpoint of the Hypernothing, of the hyperontology). The Hypernothing has always been, but it does not exist for any ED entities (which belong to the EDWs). Within the EDWs perspective, it is meaningless to ask about the Big Bang (the appearance of the “Universe”), you can ask about the appearance of the field-EW or the micro-EW or life-EW, but no more. Together with the EDWs, our macro-bodies do not exist for the Hypernothing, we are really “nothing”, that is, our bodies cannot have any ontology, not even the “macro-ontology” of the entities from the macro-EW, just because the EW1 + EW2 = nothing which corresponded to the Hypernothing! Our bodies exist only from the viewpoint of other entities which exist in the same macro-EW, a pseudo-“four-dimensional” viewpoint, but these macro-entities correspond to the micro-entities which correspond to the field-entities which correspond to other ED entities from EDWs but finally, the entities from the EW1 *together* with ED entities from the EW2 (which correspond to the EW0) are “nothing”!

We can ask when the EW1 or the EW2 appeared, but it is meaningless to ask about the appearance of the Hypernothing (with its hyperontology), since it is a kind of “nothing” which “permitted” the “separation” of the EW1 and the EW2, no more or less. We repeat, our bodies (and obviously, our minds-EDWs) are “nothing” (they do not “exist”, i.e., they do not “hyperexist”) in relationship with the Hypernothing (no ontology, but a kind of hyperontology of “nothing”). We are nothing and in this way we avoid the regress *add infinitum*, the postulate of God and Hawking’s “nothing”, there is the EW1 and the EW2 within the same “place” with “nothing”. The EW1 and the EW2 did not exist for the Hypernothing (a kind of “nothing”, no more or less). So, from the hyperontologically viewpoint, “nothing” have always existed, that is, “nothing” is still now, everywhere! So, we emphasize a detail: the separation of EW1 and EW2 from the Hypernothing did not even take place since the EW1 and the EW2 did not exist for the EW0! There has been the Hypernothing (a kind of “nothing”) still there until now and, because of this hyperontology, we avoid very serious ontological contradictions and any question about the beginning of the Hyperverse (the EW0). Since “nothing” has no ontology, it is meaningless to ask when when “nothing” started. Since the Hyperverse has a hyperontology of hypernothing, it is meaningless to ask about its beginning. The separation of the EW1 and the EW2 took place in correspondence to the Hypernothing (wrongly, but intuitively, “from nothing”).

Anyway, as we emphasized in other works, even if from “nothing” (i.e., the Hypernothing-EW), it appeared the “matter” and the “anti-matter” 13.82 billions years ago, it was necessary a “*click*” from “outside” since this “nothing” (no ontology, no hyperontology) “was” before this “click” even 50, 100 billions years ago or even “eternally”, but following Aristotle, this “eternity” rejects the idea “from nothing appeared everything”). “The separation of “matter” from “anti-matter” could took place earlier or later than 13.82 billions years ago! Therefore, the Hypernothing needed a hyperontology just because of this “click”, which it was necessary to be, somehow, inside of “something”, but the EW0 could not be:

- “nothing” (no ontology, therefore “nothing” can happen there),

- “a kind of regress *add infinitum*” (rejected by Aristotle),

- “God” (which, as we showed in our previous works, it cannot even exist).

Within the unicorn world (with nothing and then the separation of matter from anti-matter), it would be quite wrong to consider that the separation of EW1 from EW2 took place, instantly, but not inside “nothing” (since nothing can happen there), but in fact within both the EW1 and the EW2, since these EDWs did not exist before this separation, and before this separation was “nothing”. It has to be clear that the “Hypernothing” is neither “nothing”, nor “God” and not regress *ad infinitum*, but “the Hypernothing hyperis”, no more or less. Our bodies exist in the macro-EW, but together with the EW2, we would not exist, we would be “nothing”, so, from the viewpoint of the Hypernothing we do not exist, we are “nothing”. From this viewpoint, we do not even exist, nothing have always existed (no ontology), therefore the “beginning of the Universe” would be meaningless! In reality, our bodies exist only within the macro-EW, our minds are only as EDWs (they do not exist even for our brains). From the Hypernothing’s viewpoint, all ED entities do not “really” exist, therefore the Big Bang (13.82 billions years ago) for the “Universe” is meaningless! It is not meaningless the beginning of a particular EW, for instance, the field-EW appeared 13.82 billions years ago, the mind-EW of a person appeared in correspondence with his body appeared. The first life-EW appeared 4.3 billions years ago on Earth (which appeared 4.5 billions years ago).

The field-EW, the micro-EW and the macro-EW (more exactly, the electromagnetic fields, the microparticle entities and the macroparticle entities) do not really exist in relationship with the Hypernothing (with its hyperontology), since these ED entities together with the entities from the EW2 (anti-matter) correspond to the Hypernothing (which does not have an ontology)! So, our bodies, for instance, do not exist for the Hypernothing, “we do not exist” in relationship with the Hypernothing (which it is a kind of “nothing”), “we do not exist” for nothing else (the microparticles, the electromagnetic waves, etc.). Everything is “nothing” (more exactly, the Hypernothing), since “everything” from all EDWs correspond to the EW1 and EW2 which correspond to the Hypernothing.

In Spinoza’s pantheism (within the unicorn world), we can say: “Any EW is an ‘attribute’ (or a ‘mode’) of the Hypernothing”, but this statement would be quite wrong. Since one ED does not exist for any EDW, then, from our viewpoint, any kind of “pantheism” is quite wrong. It has to be clear: all EDWs (which are) *hypercorrespond* to the EW0 (which hyperis). Obviously, Spinoza’s “dual aspect approach” is quite wrong, since the “aspects” (i.e., the phenomena) of the “noumena” and the noumena itself are placed all within the same world, the Unicorn-world! The microparticle-EW did not exist for the field-EW, the macro-EW did not exist for the micro-EW, while all EDWs did not “exist” for the EW0. However, all EDWs have the same objectivity! Therefore, the question asked by a person: “What was the beginning?” is meaningless because the body of that person belongs to the macro-EW, while the mind is an EW, and moreover, it would be quite wrong to ask about the being of the “beginning”, and the question about the being of the EW0 is meaningless![[10]](#footnote-10) *It is meaningless to ask, for instance: “What was before the field-EW?”, but it has to be very clear that it is hyper-meaningless to ask “What was before the EW0?”* We repeat: for the EW0, nothing could have changed (equivalent with “everything has changed”). Therefore, there is no “evolution” from EW0 to EW1, for instance. Anyway, there is no “evolution” from an EW to an EDW, since one does not exist for the other. We know that we have to exclude any causality between two EDWs. The cause of the appearance of EW3, for instance, is not the existence of EW2, even if without the EW2, the EW3 could not appeared. We have to preserve the correspondences between any EDWs, but there has to be certain hypercorrespondences between the Hypernothing and all EDWs!

**Chapter 2**

**Space and time (spacetime) cannot even exist within the EDWs!**

*...for us physicists, the distinction between the past, present and future*

is only a stubbornly persistent illusion.

Albert Einstein

**2.1 Space, geometry and physics**

In our previous works (Vacariu 2014, Vacariu 2016b, Vacariu and Vacariu 2017), we indicated that space and time (spacetime) cannot have any ontological status. In this chapter, we introduce more arguments supporting this idea. We are not the firsts who claim this idea, but we furnish a new framework for the rejection of the existence of space and time (spacetime), that is, within the framework of EDWs perspective, we introduce totally new arguments against the ontology of spacetime!

For Newton, the Euclidean spatial geometry, Galileo’s kinematics and the structure of space-time are a priori. (Friedman 2001, p. 61) Essentially, there is the Galilean group of transformation which furnishes the constitutive priori structure of Newtonian space-time. The gravitational field, the distribution of mass defined within this structure are not a priori. (Friedman 2001, p. 66) As everybody knows, in the history of human thinking, the most dramatic debate regarding the space and time was between Newton (who claim the existence of absolute space and time) and Leibniz (who denied the existence of absolute space and time) and Berkeley (followed by Ernst Mach who strongly influenced Einstein and his theory of special relativity). Kant introduced pure intuitions of space (Euclidean one) and time, but in the 19th Century, the appearance of non-Euclidean geometry rejected these pure intuitions.

Because of the crises produced by the non-Euclidean geometries in the late 19th and early 20th centuries, mathematicians tried to eliminate appeal to such things as intuitions, and developed the concept of “formal symbol manipulation and computation”. (Horst 2005) First Bolzano (who directly rejects the Kantian notion of an “a priori spatial intuition”) and then Gauss, Peano, Frege and Hilbert tried to replace “intuitions” in geometry with the “formal calculus”. “The most influential strategy for formalization was that of Hilbert, who treated formalized reasoning as a ‘symbol game’, in which the rules of derivation were expressed in terms of the syntactic (or perhaps better, non-semantic) properties of the symbols employed.” (Horst 2005) However, Clark mentions the pioneers of the *formal logic* from 17th Century Pascal and Leibniz, followed by Boole, Frege, Russell, Whitehead, etc.[[11]](#footnote-11) Later, elaborating his general relativity, Einstein indicated that the space (more exactly, the “spacetime”) surrounding the Earth is curved by the mass of our planet, therefore, the force of gravity does not really exist.

For the special theory of relativity, the spatio-temporal framework is still the Euclidean spatial geometry, Lorentzian kinematics, and the structure of Minkovski’s four-dimensional space-time which are a priori. (Friedman 2001, p. 62) The particular fields (electromagnetic fields, distribution of charges, etc.) defined within this “structure” are not a priori. (p. 66) Einstein showed that we cannot separate space from time, what really do exist would be the framework with four dimensions: three spatial dimensions and one temporal dimension. For Einstein, the spacetime “is not only not absolute, but is dynamic, responding to the presence of mass and energy”. (Hooper 2006, p. 159) Einstein has transformed the light principle that was an empirical principle for Newton into a constitutive *a priori* one. “Einstein has ‘elevated’ an empirical law to the status of a convention or to the status of a coordinating or constitutive principle”. (Friedman 2001, p. 88) Very importantly, in the general relativity,

finally, we rewise our background of space-time once again. Now, only the infinitezimally Lorentzian manifold structure-space-time topology sufficient to admit some or another (semi-)Riemannian structure- is constitutively apriori: the particular (semi-)Riemannian metrical structure realized within this structure then is determined empirically form the distribution of mass-energy, and thus the specific principles of metrical geometry now counts as axioms of connections. (Friedman 2001, p. 62)

In the general theory of relativity, there is a group of transformation (all “one-one bidefferentiable transformations (diffeomorphisms)” are a priori, therefore, the “underlying topology and manifold structure” are still constitutive a priori. (Friedman 2001, p. 66) However, according to this theory, the gravity is caused by the massive objects which warp the surrounding space, more exactly, gravity being a property of space. In this sense, the physical geometry (the metric of physical space) is *no longer* constitutive, the “metric of space(time)” being dependent on the distribution of mass-energy via Einstein’s field of equation. (Friedman 2001, p. 66) If, according to Newton’s theory, the gravitational force is independent of inertial mass, according to the general theory of relativity, these notions are equivalent. “The inertial structure is defined in terms of ‘free-falling’ trajectories in a gravitational field” and so the “gravitational force is directly incorporated into the geometry of space-time and thus into the constitutive framework of our theory.” (Friedman 2001, pp. 89–91) We can understand that, in Newton’s period, people could not even conceive certain notions from Einstein’s theory. However, ignoring the microphysical forces, Einstein adopted a perspective on the relationship between this necessary geometry and the entities as “practically rigid bodies”. (Friedman 2001, p. 114) (Within EDWs, we do not “ignore any forces” and each EW has its own irreducible primitives!)

The general theory of relativity requires a different notion of “spatio-temporal framework” than the one postulated by Newton’s theory. In this sense, Friedman presents “three revolutionary advances”: a new field of mathematics (tensor calculus or the general theory of manifolds originally elaborated by Riemann), Einstein’s principle of equivalence, and his equations for the gravitational field. (Friedman 2001, pp. 37-8) The principle of equivalence and Einstein’s field equations require a curved space-time framework. Thus, geometry “functions” as part of the constitutive framework for our experience. (Friedman 2001, p. 62) The constitutive *a priori* part establishes knowledge about experience and in this sense “they are *a priori* to or independent of experience.” (Friedman 2001, p. 73) The *a priori* physical principles (mechanical part) mediate between the abstract mathematical tools and the empirical phenomena. The function of this mechanical part is to create, in one mathematical-physical theory, the necessary link between two parts with different structures: abstract and empirical. But a legitimate question here would be what exactly this concept of the “empirical part” designates? For Einstein, the coordinating principles constitute a new framework for space, time, (spacetime) and motion (Friedman 2001, p. 107), therefore all the empirical laws have constitutive meaning only in the framework created by the *a priori* constitutive principles. Even the individuation of entities requires such conceptual framework. That is necessary not only because the entities that are in motion belong to a certain spatiotemporal framework, but also because “the knowledge of physical rigidity presupposes the knowledge of forces acting on the material constitutions of bodies.” (Friedman 2001, p. 110) For describing these forces, it is a necessary a geometry. Essential for the EDWs perspective is Friedman’s footnote on page 55 about Einstein, who adopted a perspective on the relationship between this necessary geometry and the entities as “practically rigid bodies” which ignores the microphysical forces. (Friedman 2001, p. 114) The frames of reference for both theories is given by space, time, and motion, but the theories refer to the same entities, even if we can individuate the empirical objects and their relationship only through such constitutional frameworks. In fact, the spatio-temporal structures of these theories are different mainly regarding their *metric*. Therefore, even if the forces that operate within each theory are different, these theories refer to the same EW, one theory being better than the other one. The empirical test – the perihelion of Mercury – supported Einstein’s theory.

Newton’s and Einstein’s theories offer us different spatiotemporal structures. Do these structures belong to the EDWs or to the same EW? There are different reasons for which we cannot even compare these two theories.[[12]](#footnote-12) Einstein has transformed the light principle (that was an empirical principle for Newton) into a constitutive *a priori* one. “Einstein has ‘elevated’ an empirical law to the status of a convention or to the status of a coordinating or constitutive principle”. (Friedman 2001, p. 88) Friedman illustrates the interesting debates referring to space (and spacetime) among the members of “Vienna Circle” (logical positivists/empiricists). (Friedman 1999) The logical empiricists (Reichenbach, Schlick, and Carnap) reject the Kantian synthetic a priori judgments. (Friedman 2001, p. 60) The development of modern geometry in the late 19th century (Riemann, Helmholtz, Lie, Klein and Hilbert), Poincare’s “conventional geometries” (i.e., neither Kantian, nor empiricist physical geometries, Poincare 1902-1905 in Friedman 2001, p. 63), together with the theory of relativity, created the framework for the logical empiricism to reject the synthetic a priori judgments in scientific knowledge. Through Hilbert’s axiomatization of Euclidean geometry, the necessary role of intuition in pure mathematics was rejected. Moreover, through the development of non-Euclidean geometries and the theory of relativity they rejected the Kantian notion of applied mathematics. (Friedman 1999, p. 60) So, Newton’s mechanics and Einstein’s theory of relativity contain two parts: (1) the empirical part containing such laws as universal gravitation or Einstein’s equations for the gravitational field; (2) the constitutive *a priori* part containing both mathematical principles utilized for constructing the theory (Euclidean geometry vs. the geometry of Minkovski’s space-time, the Riemannian theory of manifolds) and fundamental physical principles or the “mechanical part” (the Newtonian laws of motion vs. the light principle, the equivalence principle). (Friedman 2001, p. 71)

Within the framework created by the non-Euclidean geometries and Einstein’s general relativity[[13]](#footnote-13), Reichenbach, Schlick and Carnap, for instance, rejected Kant’s notion about the a priori intuition of space and the Kantian “synthetic a priori judgement”. They tried to replace these notions with different contradictory alternatives (a relativized a priori or Poincare’s conventionalism). (Friedman 1999, Chapter 3, for instance) However, Reichenbach and Schlick accepted one of the main Kantian ideas: there was no direct relationship between the sensory information and our correct knowledge/explanation about/of the world. Thus, they rejected the immediate given and eradicated completely the role of “(pure) intuitions”. Nonetheless, the Kantian notion of the *a priori* is preserved because it creates the “possibility of our experience”. We note that the whole experience belongs to the same unicorn-world. Reichenbach makes the distinction between the “axioms of coordination” (non-empirical principles that are, in Reichenbach’s terms, “constitutive of the concept of the object of knowledge”) and the “axioms of connection” (empirical laws). Such *a priori* principles are not anymore universal and necessary principles. (Friedman 1999, p. 61) Reichenbach claimed that not only the traditional Kantianism was wrong, but also the traditional empiricism. Again, the argument indicates that there is no direct relationship between the mathematical concepts (geometrical concepts) and the physical reality. Analyzing in detail the relationship between Schlick (combining Poincare’s conventionalism and Hilbert’s axiomatization of geometry) and Reichenbach’s approach, Friedman draws the conclusion that for Reichenbach “in the context of general relativity, physical geometry (the metric of physical space) is *no longer* constitutive. …the metric of physical space (-time) is now dependent on the distribution of mass-energy via Einstein’s field equation. …geometry is empirical, and, in fact, Euclidean geometry is now empirically false.” (Friedman 1999, p. 66) Within the general relativity, “geometry is empirical, and, in fact, Euclidean geometry is now empirically false.” (Friedman 2001, p. 66) Because of this reason, in his first works, Reichenbach rejected Poincare’s conventionalism, while Schlick accepted conventional or non-empirical geometry.[[14]](#footnote-14) (Vacariu 2008, pp. 288-9) However, later (after he changed some letters with Schlick), in 1922, Reichenback accepted Schlick’s view and gave up to his “apriorism”. (Friedman 2001, p. 68) Later, with his “linguistics frameworks” (each having L-rules and P-rules which can be revised), Carnap adopted a kind of “arbitrariness”, a kind of relativized Reichenbach’s apriorism, Poincare’s conventionalism (with Carnap’s “Principle of Tolerance”), and Duhem’s holism. (idem p. 68-9) Reading about these debates on the status of “geometrical space” in relationship with the “empirical objects” within particular physical theories, a reader can inquire not only about what kind of geometry can fit with the empirical relationships between objects/entities (“their behaviour”), but also about the ontological status of space (and time or spacetime) itself. All these disputes and different approaches on space (and time) in the history of physics (and philosophy) urged us to think that space (and time or spacetime) could not even have any ontological status!

**2.2 Space, time and EDWs**

Within the EDWs perspective, what is it curved by the mass of a planet? In the macro-EW, the mass of a planet acts on “nothing” which surrounds itself. This “nothing” (which “belongs” to the macro-EW) corresponds to something which belong an EDW, for instance to the electromagnetic field (the field-EW) (or to the microparticles, the micro-EW). However, in any EW, this “nothing” has no ontological status, it is just the human mind illusion of “space”. It means that “nothing” has no ontological status: between two entities, there is not a “space” or an “empty space”, but “nothing” (no ontological status). “Space” has been just the human mind expression for *nothing* between any two entities which belong to the same EW. We cannot claim that “nothing” exists: on the contrary, nothing does not exist, i.e., nothing has no ontological status.[[15]](#footnote-15)

We have to reject another scientific myth: the “geometry of the standard cosmological model predicts the existence not only of a universal time, but also of its beginning. Time emerges in the form of the initial singularity (…)”. (Heller 2009, p. 162) Like “space”, “time” does not exist, it has no ontological background. “Time” is just a description of physical processes added by the human beings in correspondence with the interactions between the body and the “external world”. Why physicists (and the majority of people) have believed that “time” really exist, I.e., it has an ontological status? We correctly believe that there was Big Bang and its effects, i.e., the appearance of plasma and then microparticles (photons, etc.), and later planets/galaxies. Plasma, microparticles, and planets have all ontological backgrounds in EDWs, but “time” itself has no ontological background. It is not about the fact that we can perceive planets and “we cannot perceive time”. The planets have ontological background, while time and space (or spacetime) cannot have any ontological status, especially the existence of space would produce strong ontological contradictions! Our main argument for rejecting the ontological existence of space (and time or spacetime) is that we cannot situate two different objects/entities (for instance, the space and the electromagnetic field) in the same place at the same time. Also, if we can believe that a table (with its own ontology) is situated in the space-time (with its own ontology), we reach an ontological contradiction![[16]](#footnote-16)

It is well know that according to Einstein’s theory of relativity, “spacetime” depends of the presence of mass-energy.[[17]](#footnote-17) Krauss and many other physicists claim that space of the Universe is flat (not open, not closed). BOOMERANG’s and WMAP experiments indicate that space is “flat” and the “Universe” is accelerating. From our viewpoint, the “space” is “flat” just because it does not exist! For us, these are the following *reasons*, space and time (spacetime) cannot even exist:

* The rule of “*ontological contradiction*”: “Two entities/processes cannot exist in the same place at the same time”. Everybody has to accept this rule since, it is very clear, two different objects (or one object and a set of objects) cannot exist in the same place at the same time. Can we put two chairs in the same place at the same time? Can we put two small stones in the same place at the same time? It is really impossible! Also everybody knows that “tautology” means two expressions that refer to the same thing. In other words, those two words are synonyms. We would have an ontological contradiction between the existence of space and the existence of objects “inside” that space. Any spatio-temporal framework does not exist, there are only entities and their interactions but nothing else. Each set of entities and their interactions represent an EW, but in order to avoid any kind of ontological contradiction, we have to accept that these entities are not situated within a spatio-temporal framework. The entities of the macro-EW (for instance) are situated in “nothing” (no ontological status) which corresponds to something (for instance, to the electromagnetic field which belongs to the field-EW).
* If we accept space and time have the same ontological status as other objects, then we reach ontological contradictions. If we believe space and time have different ontological status than any other set of objects (that belong to EDWs), then either spacetime is an EDW (and we are not interested in this topic) or we reach Cartesian dualism in Physics.
* If space exists, for instance, the space of the macro-EW is the same or different than the space of micro-EW? If it is the same, then we reach an ontological contradiction regarding different entities placed within the same space. If there are ED spaces with ED entities, then we have the contradiction between the existence of a space and its entities.
* According to the EDWs perspective, interactions *constitute* entities. Space and time cannot interact with something (there is not even the potentiality of interacting with something), so space and time do not have any ontological background. It would mean that space and time do not exist. We know that two macro-objects, for instance, really (can) interact, but we cannot claim that each macro-object interacts with space in which it is placed.
* We have to clarify the notion of „*nothing*“ in relationship with space and time. We know that space and time do not exist[[18]](#footnote-18): for instance, between two macroscopic objects (the macro-EW), space seems to be “empty”, but we have Higgs bosons (the micro-EW) or we have the electromagnetic waves (the field-EW). The Higgs bosons and the CMBR (Cosmic Microwave Background Radiation[[19]](#footnote-19)) occupy all “space”, but correspond to this “nothing“ (the macro-EW). This is cause for the human beings of having the illusion of the existence of space and time. In reality, “nothing is there” and this „nothing“ has no ontological status: “What exist between two galaxies except the dust”? “Nothing!”. This “nothing” corresponds to the Higgs and other microparticles (micro-EW) and the field-EW. It does not mean that this “nothing“ really exists between two galaxies. Even this expression “nothing exists” is quite fuzzy since it suggests, word by word, that “nothing really exists”, that is “nothing” has an ontological status. However, “nothing” has no ontological status, i.e., “nothing does not exist”. So, we reach this contradictory conclusion: “nothing exists” means “nothing does not exist”! This contradiction is possible just because of a “game of words”: the negation of the existence of something (which has ontological background) is “nothing” which does not have any ontological background. This is the reason, it is quite ambiguous to relate “nothing” with either “exist” or “not exist”.
* “It is now well known that the principles of standard quantum theory and those of general relativity are also incompatible, quantum principles presuming a flat space – time as opposed to the curved space-time of general relativity.” (Giere 2006, p. 33) Can we talk about two space (spacetime) in these cases? The incompatibility between these two theories (quantum mechanics is wrong anyway) is solved through the elimination of space and time (spacetime) and the introduction of EDWs: it is about the “incompatibility” between the micro-EW and the macro-EW, which means, in EDWs terms, one EW does not exist for any other EDW.
* Ontologically, time cannot exist. If time exists, what it would be “yesterday“? Does “yesterday” or “tomorrow” would have an ontological status? Does exist “one minute” or “one second”? Such questions are without any answer because they are meaningless: “time cannot even exist”. We cannot believe that time exists and, ontologically speaking, “time appears and disappears instantly”. What does it mean “instantly”? Also it is wrong to believe that “time exists continuously”. What it would be the ontological substance of “time”? It would be material or non-material? If it is material, it would interacts with all the other entities that belong to the EDWs and this would not be possible. If time is “non-material”, we have to go to church. Exactly as we proved “God cannot even exist” (see Gabriel Vacariu’s webpage), “time” cannot even exist.
* Einstein’s theory of general relativity informs us that the big objects (planets and stars that belong to the macro-EW) curved the spacetime which surrounds them. From the EDWs perspective, if spacetime do not exist, the planets curve “nothing” (no ontology) which corresponds to something which belong to the EDWs (for instance, the field-EW or microparticles-EW). Because of these correspondences, we have the illusions that “spacetime” really exist and according to Einstein’s general relativity, we have believed that “gravity” is due to the “planets which curves spacetime”. In reality, gravity is not the “curved spacetime“, but it is the “curved nothing” (the macro-EW) which corresponds with something (for instance, it corresponds to the “curved electromagnetic field” from the field-EW).
* Not even the EDWs exist. Essentially, only the entities and their interactions which belong to a particular EW really exist, they have an ontological status (the main principle in EDWs perspective: “interactions constitute entities, entities determine interactions”). Therefore, only the entities and their interactions exist and nothing else. We “call” such set of entities and their interactions an “EW”, but except the mind-EW, any other EW in itself does not have an ontological status. However, the mind-EW is and does not exist (it means mind has no boundaries of interactions since existence requires interactions that constitute entities not EDWs). *The elimination of the existence (the ontological status) of EDWs helps us to eliminate the existence of spacetime (space and time).* Some EDWs (like the micro-EW and the macro-EW) have no ontological status, there are just a labels (“words”) that help us to describe some “phenomena”.
* Even if we accept the existence of the “tridimensional space”, one-dimensional space or two-dimensional space does not really exist, these spaces are just human idealizations! For instance, a bidimensional space does not exist on a paper or on a TV screen. A TV screen would always be an object situated in a “tridimensional” space, not in a bidimensional space. However, according to Einstein’s theory of relativity, we cannot separate space from time. The surface of a paper is not bidimensional, but always “tridimensional”! Moreover, we cannot separate any object from “its” spatio-temporal framework (that is, in fact, “nothing” which corresponds to something that belongs to an EDW). In this case, we reach the ontological contradiction between the existence of spacetime and the existence of that object: either spacetime does not exist or that object does not exist. Therefore, the “spacetime” cannot exist.
* Furnishing quantum examples, Presura mentions that the space is plate (Euclidean), at least, at very short dimension (the wavelength of a photon being Planck‘s length of 10˄-35m). From our viewpoint, the space (spacetime) is “plate” just because it does not have any ontology! Even at higher energies, (10˄14 greater that the Planck energy), gravitation cannot be unified with the other three forces. (Presura 2014, p. 544) “In other words, our dream of unifying the general theory of relativity with quantum mechanics (the so-called *quantum gravity*) is possible to be more difficult than we have thought.” (p. 544)[[20]](#footnote-20) Working within the unicorn world, the physicists have had no idea that it would be meaningless to unify these two theories! Because of the ED ontologies of EDWs, it would be quite forbidden to relate the ED entities which belong to the EDWs, i.e., those three “quantum forces” with “gravitation” (which does not exist, anyway). There are neither “gravitons”, nor “curved spacetime”, but only certain correspondences (without any ontological status), no more or less.
* Physicists know that “for photons, time does not exist”. Let us take Greene’s example of clock: a photon between two mirrors. (Greene 1999, 2003) There are two clocks, one static and one in motion. A second is defined as being the movement of the photon between those two mirrors. If the mirrors moves with the speed of light, the photon between those two mirrors will not reach any of them. In this case, the “time” stops running, i.e., the time does not exist. Within the EDWs perspective, we can understand why „time“ does not exist in this case: what really exist for both clocks (for those two mirrors in both cases) are the “motions of photons”, no more or less (time cannot even exist).

We can generalize this observation: for any mechanism (living bodies included), time does not exist; what really exist are their (internal) processes. However, if a living body moves with the speed of light, its internal processes will never happen! This verdict translated in old paradigm means “Time does not exist anymore”, but only the *motions* of particular entities changed their framework, their limits: if the photon will never reach the mirrors, an internal processes of any living or non-living mechanism will never reaches its margins/limits (for instance, blood will never reach the peripheries of the body). This means certain entities in motions would never reach certain “margins”. The self (its unity) corresponds to the body (brain) and its interactions with the environment. The self has no “illusory space” (i.e., a “nothing”) (we cannot claim that space has zero dimension for the mind) but, since we cannot separate space and time and if space does not exist, then time also does not exist. Only the body is relatively separated from the external environment (just because the “empty space” corresponds to something which belongs to an EDW). Moreover, any EW would have no “spatial limits”, therefore we cannot believe space exist only inside an EW (among entities/objects) but not outside that EW (outside the entities from the border of EW). We can think that *nothing has rigorous spatial limits but in reality, being impossible to separate the entities from an EW from their “external space”, space does not exist!* Therefore, time does not exist. We have wrongly believed that “space really exists” only because of the existence of our perceptual mechanisms and this “nothing” (no ontology) between the macro-entities within the macro-EW. For instance, without the light (and without the feeling of touch), it would be impossible for us to claim that the space really exists. However, the perceptual states are just mind-EW. Being, for instance, outside of the “universe”, light does not even exist, and being unable to move and feel our body, could we have the feeling of “space”?

Both space and time are just attributed (invented) by the human mind “to positioned” the objects and their movements somewhere. There have been necessary such “placements” just because the humans have the illusions of “empty space” between the macro-objects, and because of this “empty space”, a human being was able to moves her body! Therefore, someone could claim that the movement of object requires “space”. We reach the ontological contradiction mentioned above. Exactly as the mind cannot occupy the same place as the brain (the identity theory, weak emergence, etc.), space cannot occupy the same place as any other entity (table or the electromagnetic field, for instance). Since space does not exist, any EW has no “spatial limits”. *Therefore, nothing has “spatial limits”.*

“Both Newton and Einstein believed in the laws of physics that transcend the clutches of time and space.” (Mathew 2014, p. 47) From our viewpoint, space and time do not exist for any law of physics, space and time do not exist at all (or better, space-time does not exist at all). Einstein accepted “time” did not exist. (See the motto of this section) From our viewpoint, Einstein’s “spacetime” cannot even exist, i.e, it cannot have any ontological status. As we have indicated above and in our book 2016b, if the “spacetime” existed, there would produced strong ontological contradictions! Einstein’s general theory of relativity without spacetime has to be rewritten in this way: any planet “curves nothing”, but the planet and the “curved nothing” correspond both to the “curved” electromagnetic field which is present everywhere (the planet corresponds to a concentrated part of that electromagnetic field, while the “curved nothing” corresponds to the part of the same electromagnetic field which is more and more straight if the distance is further and further than the corresponding “planet”). Therefore, the beam of light which passes near the Sun changes its trajectory not because the “spacetime is curved” (spacetime cannot have any ontological status), but because “the nothing” which surrounds the Sun “is curved”, and this “nothing” corresponds to the electromagnetic field which is present everywhere (its parts having different values in different parts!). Thus, indirectly (through correspondence), the Sun “curves” this electromagnetic field.[[21]](#footnote-21) Because of these correspondences, we have the illusions that “spacetime” really exist and we believe that, according to the general relativity, the “gravity is the curved spacetime”. Gravity is not the “curved spacetime”, but it is the “curved nothing” which corresponds to something (for instance, within the macro-EW, this “nothing” corresponds to the electromagnetic field from the field-EW).

We have to be aware that, according to the EDWs perspective, the human bodies are placed, among other macro-entities (air, water, cars, buildings, planets), neither in “space”, nor in “spacetime”, but in “nothing” (no ontological status) which corresponds to something that belongs to the EDWs: for instance, to the micro-EW or field-EW (also to the pre-Big-Bang-EW or to the Hypernothing, the EW0). We can imagine, in some wrong view, that a human being moves her body inside the field-EW. In reality, the human body moves in “nothing” (no ontological status) which corresponds to something that belongs to many EDWs and in these EDWs the body does not even exist. The body and the surrounded “space” (i.e., the air) correspond, for instance, to

(1) an electromagnetic field which belongs to the field/wave-EW;

(2) the microparticles which belong to the micro-EW;

(2) the Hypernothing (that is the EW0)!

Also, we have to recall that the field/wave-EW corresponds to the EW0. If the human body is on the Moon, for instance, the body and the surrounded really “empty space” (the macro-EW) correspond to the Higgs particles (the micro-EW), the Higgs field (the field-EW), and the EW0.

Our last argument against the ontology of “spacetime” is through an important analogy: your body enters into the a lake and moves into the water. We say that “the body moves through the water”. What does this expression mean? Does the water passes through your body when you moves in the water? Of course, no: your body “moves through the water”, but the water does not pass through your body, it interacts with your body, it surrounds your body when you move into it. It means, the water and the body do not occupy the same place (at the same moment) (“place” and “moment” are just pragmatical notions). In fact, the expression “the body moves through the water” is not clear.

Let us now make the analogy between movement of “body in water” and the movement of “body in space”. (In order to avoid the interaction between the molecules of the air and the body, we introduce the second example: your body moves on the Moon.) In a classical framework (which presuppose the existence of “space”), everybody would think that the “body moves through space”. Then what kind of interaction would exist between your body and space? Does “space” (with its ontological status) moves “through your body” or surrounds your body (exactly as the water surrounds your body when you move your body through the water of that lake)? In both cases, a positive answer would be quite wrong! Then, where is it placed this “ontological space”? Nowhere: space cannot have any ontological status. We cannot place an ontological space and an ontological body in the same place! Otherwise, strong ontological contradictions would appear. Your body does not move in an “ontological space” (like your body moves in an ontological water). In reality, on the Moon, your body moves in “nothing” (no ontological status) which corresponds, for instance, to the electromagnetic field (the field-EW) or the Higgs particles (the micro-EW). But we have to pay attention that, for instance, your body (which exists only within the macro-EW) cannot even exist in the field-EW, since in this EW, your body corresponds to a “concentrated electromagnetic field” (which corresponds to an amalgam of microparticles in the micro-EW). The movement of the macro-body (in the macro-EW) just corresponds to the activation of some successive parts of the “the electromagnetic field” within the field-EW.[[22]](#footnote-22)

The conclusion of this chapter is the following: space cannot exist “inside” or “outside” of the EDWs. Space and time (or spacetime, as you wish) cannot have any ontological status. If the spacetime would have any ontological status, strong ontological contradictions would appear: space, the electromagnetic field, and the macro-entities, for instance, cannot exist within the same place, at the same moment.[[23]](#footnote-23) So, because of these ontological contradictions, we have to reject the ontology of any kind of space and time (or spacetime)![[24]](#footnote-24) Within the EDWs perspective, we have to understand much better Einstein’s words: “Time and space are not conditions in which we live, but modes by which we think.” (Albert Einstein) From our viewpoint, spaces and times (or spacetimes) are “nothings” which just correspond to “somethings” (which belongs to the EDWs), no more or less!

**Chapter 3**

**Einstein’ special relativity and general relativity without spacetime within the EDWs[[25]](#footnote-25)**

“It is harder to crack a prejudice than an atom.”

Albert Einstein

**3.1 The special relativity without “spacetime”**

In our previous books, we investigated certain theories or even the status of particular sciences: for instance, we showed that quantum mechanics is a wrong theory and cognitive (neuro)science is a pseudo-science. Nonetheless, within the EDWs perspective, only three great theories (from different sciences) are still correct: Darwin’s evolution of species, Boltzmann’s entropy, and Einstein’s relativity. (See our previous works) In 2014, using the EDWs perspective, Gabriel Vacariu offered the ontology of special and general theory of relativity. However, later (in our book 2016b), we show that space and time (spacetime) cannot have any ontological status.[[26]](#footnote-26) The main idea is that if space and time had an ontological status, then there would be strong ontological contradictions. The same conclusion is valid for Einstein’s “spacetime”[[27]](#footnote-27). Under these new circumstances, we have to *rewrite* Einstein’s theory of relativity (special and general) without spacetime. We claim again: even if we eliminate space and time, both special relativity and general relativity are still correct. At the beginning of this chapter, we strongly emphasize that, since “space” and “time” does not exist (do not have any ontological status – see our work 2016), we replace Einstein’s “spacetime” with “motion” of certain entities within the EDWs!

Einstein created the special theory of relativity for phenomena which belong to the inertial frames of reference (uniform and rectilinear motion).[[28]](#footnote-28) The general theory of relativity is an extension of the special theory of relativity from the objects in uniform motions to the non-inertial cases (in which acceleration and gravity of entities are involved).[[29]](#footnote-29) Einstein introduces two postulates[[30]](#footnote-30): (1) the principle of relativity (all the mechanical laws are the same in any inertial system of reference).[[31]](#footnote-31) (2) light is always propagated in an empty space with a definite velocity *c* which is independent from the state of motion of the emitting body.[[32]](#footnote-32) The strongest justification is based on Maxwell’s electrodynamics.[[33]](#footnote-33) (Vacariu 2014, p. 287) Maxwell’s equations of electrodynamics predict a constant speed of light, c, since the electromagnetic properties of vacuum are treated as constant properties. Otherwise, different observers with different speeds will measure different values for the speed of light! It would means that the vacuum has different properties for different observers. Our question is “Do these constant properties of vacuum belong to the Universe/world”? But, as we have seen, the Universe cannot even exist. From our viewpoint, the speed of light is the same just because the electromagnetic wave and the photons belong to the EDWs than the macro-observers (the human bodies and their macro-instruments of measuring). There are the wave-EW, the micro-EW (photons included) and the macro-EW and one EW does not exist for any EDW. From this principle follows the constant velocity of light, c![[34]](#footnote-34) The macro-EW correspond to the field-EW, and any electromagnetic wave (which belongs to the field-EW) has the same speed, c. So, we have to be aware that Einstein created these postulates within the unicorn world. These statements are extremely important for us and therefore we want to investigate them within the EDWs perspective. We have to relate the electrodynamics, time and the particle (the main relationship in quantum mechanics): the “relationship” between the particle and the electromagnetic wave.

We have to recall from our previous chapter, “spacetime” has no ontology. We will apply the framework of EDWs to the “motions” of macro-objects. If spacetime does not exist, then where do these objects move? Our answer is the following: *the macro-objects move into “nothing” (no ontology)!* This “nothing” is the “distance” (an abstract word) between any two macro-objects, i. e., between any two objects there is “nothing”, which has no ontological status. (Regarding “nothing”, see Vacariu and Vacariu 2019) A set of objects belongs to a particular EW. Between these objects there is “nothing”. For instance, between any two planets in our galaxy (or any other galaxy) there is “nothing”. According to the special relativity, because of the motion of an entity, the space contracts and the time dilates. Within the EDWs perspective, if space and time do not exist, what is changed in a particular motion? It is the surface of that object which changes during motion. Also, if the object is in motion, its “internal processes” (which can correspond to that object or to an entity from an EDW[[35]](#footnote-35)) take longer than when it is static (therefore, there is no “time which dilates”). The *motion changes the characteristics of the real objects*, not of something which do not exist (like space and time). According to the special theory of relativity, not only the “clock (and any process) in motion” runs slower than a “clock at rest”, but also “time” itself runs slower. However, from our viewpoint, time does not exist, so there are only the processes relative to that object (all processes, either internal or external to an entity – see our previous footnote) which run slower. Like everybody working within the unicorn world, Einstein included the “motion of objects” within a “spatiotemporal framework”. Having strong arguments, but working within the unicorn world, Einstein related space with time, even if he had quite strong doubts about the existence of time. Anyway, for a scientist, his arguments were quite correct since science does not care about the ontological background of their scientific theories, i.e., in a scientific theory there are quite many abstract notions. However, many scientists have believed that space and time are empirically entities even if nobody could perceive space and time (spacetime).

From our viewpoint, another argument to reject “spacetime” is the relationship between the quantum mechanics and the theory of general relativity. “It is now well known that the principles of standard quantum theory and those of general relativity are also incompatible, quantum principles presuming a flat space-time as opposed to the curved space-time of general relativity.” (Giere 2006, p. 33) Can we talk about two spaces (two spacetimes) in these cases? The incompatibility between these two theories (quantum mechanics is wrong, anyway) is solved through the elimination of space and time (spacetime) and the introduction of EDWs: it is about the “incompatibility” between the micro-EW and the macro-EW. In EDWs terms, one EW (the macro-EW) does not exist for any other EDW (the micro-EW or the field/wave-EW, for instance).[[36]](#footnote-36)

In his special theory of relativity, Einstein showed that Newton was wrong regarding the existence of “absolute space” and “absolute time”. However, nobody has ever thought of the fact that if we eliminate the absolute space and the absolute time, maybe we can eliminate also the relative space and the relative time (i.e., we can eliminate “spacetime” completely). Einstein’s relativisation of spacetime indicated us that the spacetime cannot have any ontological background! In our book from 2016, with the EDWs perspective, we eliminated the existence of “spacetime”. (Also see the previous chapter of this book)[[37]](#footnote-37)

If space and time (spacetime) cannot even exist, Einstein’s theory of relativity (which is a correct theory) has to be reformulated. Let us reformulate it in more details. In Einstein’s thought experiment regarding the special theory of relativity (the man in the train and the man on the pavement), a clock does not measure “time”; a clock is just the movement of a part of an object. The clock in the train is in motion, the clock on the pavement is static.[[38]](#footnote-38) Nothing measures the “time”, there is only the motion of a mechanism (a macro-instrument of measuring “time”, a clock or a “particle between two mirrors”). According to the special relativity, in motion, “time” dilates and “space” contracts: not only the clock (and any process) in motion runs more slowly than a clock at rest, but also „time“ itself runs more slowly for the clock. Since one „second“, for instance, is defined by the movement of certain particular physical elements of the clock (either macro or micro), in motion, all these elements “run slowly”, that is, all these processes need more “time” to be realized!

In this sense, let us take the classical example of „clocks” at rest and in motion represented by the movement of a photon between two parallel mirrors.[[39]](#footnote-39) The perpendicular movement of the photon from the first mirror to the second one and back represents „time” (for instance, one second). The distance traveled by the photon (with the constant speed c) from the bottom mirror to the upper mirror (in motion) and back is longer than the distance traveled by the photon moving between the same two mirrors (at rest). In the second case (mirrors, i.e, the clock in movement), „time” runs slowly for objects (in our case, for the clock) in a moving state just because, if we increase the speed of the two mirrors, the *distance* covered by the photon will also increase and therefore we believe „time” will be dilated (it will run slowly[[40]](#footnote-40)). If the speed of those two mirrors reach the speed of light, the photon will never reach the second mirror. This means, according to the special relativity, “time” does not exist for entities (photons in this case) traveling with the speed of light. So, there are two frames of reference (the clock at rest and, respectively, the clock in motion), which differ in their temporal (and spatial) dimensions. From our viewpoint, it is not „time” which is “longer” for the clock in movement, but effectively the “motion” of the physical elements (either macro or micro) which “composed” (or correspond to) the macro-clock are longer! Again, in the standard interpretation, in motion, „time” runs slowly, but from our viewpoint, only all physical processes (macro or micro) “run slowly” (more exactly, the processes to be accomplished - for instance, the photon to reach the second mirror) are longer). Moreover, it is not „space” and „spatial dimensions” of objects that are “contracted” (in the direction of motion), but their physical properties are effectively contracted.[[41]](#footnote-41)

In our view, if “spacetime” does not exist, certain *processes* that take place in motion are “longer”. What does it mean “longer”? We defined “one second” as being the time necessary for a microparticle (a photon, for instance) to move between two plates (to go and return). If we move these two plates together, “one second” is longer than the static plates just because the distance traveled by the photon is longer. But in both cases, we cannot perceive/observe any “time” or “space” (“spacetime” would be more difficult to be observed!). In both cases, there is only the *motion* of a photon between two mirrors[[42]](#footnote-42) (obviously, for photon, mirrors do not exist, but only two amalgams of microparticles which are “mirrors” for our eyes (body) in the macro-EW: in the first case the mirrors are static, in the second case the mirrors are in motion). We only *define* “time” as the *movement* of the photon between two mirrors. We define “time” using the movement of a photon in “space”; also we define “space” using “time”. The difference between those two cases is the *motion* of the particle, in one case, it is longer than in the other! Anyway, defining “time” as the movement of a photon between two plates, it is quite artificial, it is just a human mind creation using certain macro-instruments. In reality, space and time (or spacetime) do not exist. Moreover, as we emphasized above, if we accept the existence of space and time (or spacetime), we reach certain inevitable ontological contradictions. Nobody can claim that we perceive time. If space and time do not exist, what do we “perceive” or “feel”? It seems that “life” (corresponding to many processes of the organism) requires the notion of time. However, life just *corresponds* to these processes which require movements and surfaces. The movements give us the idea of the existence of “time”, but time does not exist. Human beings attribute time and space to the objects in movement: speed = space x time. If all objects were static, we could not even conceive “time”! From our point of view, “movement” has nothing to do with “space” and “time”. “Movement-in-itself” does not really exist, only an “object in motion” exists, it has ontology. An object which moves really exists in a “scene”/framework, but this “framework” has no ontological status. Classically, within the unicorn world, in order for a “scene” to have an ontological status, it would require a spatiotemporal framework, but such frameworks, within the EDWs perspective, cannot have any ontological status. However, we can talk only about a “perceptual scene” created in our mind, but these perceptual scenes are the Self which is an EW. (See our work 2016b)

With his special theory of relativity, Einstein taught us that we could not separate space from time. However, in his book from 2014, Gabriel Vacariu indicates that if objects are placed within a spatiotemporal framework that really exists, we reach certain ontological contradictions. So where does an object move if not within a spatiotemporal framework? These objects move in “nothing” which corresponds with something from EDWs (for instance, it corresponds to the electromagnetic waves which have always speed c). Maybe, methodologically we can bring the notion of “spacetime” into discussion (it helps us quite a lot), but essentially space and time have no ontological background. More exactly, the object moves in *nothing (no ontology but only correspondence with entities belonging to EDWs).* That object belongs to a particular EW and only corresponds to something else that belongs to an EDW. Essentially, without the notion of *correspondence*, we would not be able to speak about “nothing”. According to the EDWs perspective, the notion of “correspondence” has no ontological background. Therefore “nothing”, as well, cannot have any ontological background. According to the EDWs perspective, the interactions constitute the existence of entities. *But the “nothing” has no interactions with “anything”, so the “nothing” does not exist in any EDWs (i.e. “nothing” has no ontological status)!* The Big Bang did not appear from “nothing”, from that “singularity” (something “infinitely small”). The “infinite” does not exist (see Vacariu and Vacariu 2019) and EDWs (like the field-EW and micro-EW) appeared from “nothing”; however, except for the Hypernothing (see Vacariu and Vacariu 2019), this “nothing” has always corresponded to something which belonged to an EDW. In 2014, Gabriel Vacariu showed that the Big Bang did take place in different places and, in this way, we can reject Guth’s “inflation”. (Vacariu 2014) It is clear that no phenomena could surpassed the speed of light! All the microparticles correspond to the electromagnetic waves with speed c. However, after the Big Bangs, firstly appeared the electromagnetic field (null mass) and in correspondence with these electromagnetic waves, later the microparticles (the majority not with null mass) appeared. Therefore, because their mass is not null, the speed of the majority of these microparticles is less than the speed of light. Only the microparticles with null mass (the photons) have the speed c.

Greene dedicates a sub-chapter to “Motion’s effects space”. Until that sub-chapter, Greene shows that “observers see moving clocks ticking more slowly than their own - that is, time is affected by motion”. (Greene 1999, p. 25; see also Vacariu 2014, last chapter) A moving clock ticks slower than if the same clock were stationary (for instance, in relationship to a human observer). The surface of a moving object (the car) is shortened in the direction of motion. As it is well known, the motion of a car has to be shared in those three spatial dimensions and one temporal dimension. Where is the “time” then?

It is difficult to give an abstract definition of time—attempts to do so often wind up invoking the word “time” itself, or else go through linguistic contortions simply to avoid doing so. Rather than proceeding down such a path, we can take a pragmatic viewpoint and define time to be that which is measured by clocks. Of course, this shifts the burden of definition to the word “clock”; here we can somewhat loosely think of a clock as a device that undergoes perfectly regular cycles of motion. We will measure time by counting the number of cycles our clock goes through. A familiar clock such as a wristwatch meets this definition; it has hands that move in regular cycles of motion and we do indeed measure elapsed time by counting the number of cycles (or fractions thereof) that the hands swing through between chosen events. (Greene 1999, p. 21)

We believe that it is indeed quite difficult to define the “abstract time” just because “time” does not exist, i.e., it has no ontological background. Exactly for the same reason, it is “quite difficult” to define the “empirical time”. The *relativization* of “spacetime” (Einstein’s special relativity) was possible just because the spacetimes did not really exist! “The movement of a clock” means the movement of all its parts (including its arms).[[43]](#footnote-43) In *motion*, the arms of a clock travel more distances. According to Einstein’s theory of special relativity, we believe that “time” is slowed down! But time does not exist, only the arms travel longer “distances”. (But also “distances”, i.e., “space”, do not have any ontological status. We think about time and space/distance, but these notions do not represent entities/processes[[44]](#footnote-44) that have ontological status.) In motion, indeed, “the rate of ticking of the sliding clock becomes slower and slower as it moves faster and faster” but “ticking of the sliding clock” is not time, but only “the notion of certain arms or a photon” and nothing else! Again, we repeat our observation on Greene’s idea that the “preceding discussion reveals that observers see moving clocks ticking more slowly than their own - that is, time is affected by motion” (Greene 1999, p. 25): as we have already showed, the motion does not “affect” time (which does not exist at all), but the motion affects the movement of “sliding clock” and nothing else. The same judgment is also available for “space”: the length of the car becomes shorter due to its motion, but the space is not “contracted” since “space” cannot exist for the car (we recall from our previous chapter, the existence of a car within “space” would produce strong ontological contradictions).

When an object moves through space relative to us, its clock runs slow compared to ours. That is, the speed of its *motion through time slows down.* Here's the leap: Einstein proclaimed that all objects in the universe are *always* traveling through spacetime at one fixed speed—that of light! This is a strange idea; we are used to the notion that objects travel at speeds considerably less than that of light. We have repeatedly emphasized this as the reason relativistic effects are so unfamiliar in the everyday world. All of this is true. We are presently talking about an object's combined speed through *all four* dimensions—three space and one time—and it is the object's speed in this generalized sense that is equal to that of light. (Greene 1999, p. 27)

In the case of an object that is static (in relationship to us), all its movement is used to travel in one dimension of time. What does it mean that “an object is static in relationship to us”? Obviously, according to Einstein’s theory of relativity, we do not have *absolute* space and *absolute* time and we do not even have separate space and time. There are only *relative* “spacetimes”. “If an object does move through space, however, this means that some of the previous motion through time must be diverted.” (Greene 1999, p. 27) More importantly, the “speed of an object through space is thus merely a reflection of how much of its motion through time is diverted”. (idem) Most definitely, it means that the “movement” divides, somehow, the spatiotemporal framework! We really do not understand, ontologically, why the object modifies its spatial dimension “only in the direction of movement”. Can we identify precisely the ontological boundaries of these *dramatic modifications* of the spatial dimensions of the object in the “direction of movement”? From an EDWs perspective, this idea seems to be quite absurd. A framework is an EW (in general, it has no ontological status!) which eliminates the existence of space and time (spacetime). Again, the existence of spacetime is replaced by “nothing” (which has no ontological status[[45]](#footnote-45)) which corresponds to something that belongs to an EDW. In reality, we can talk about certain processes that involve certain entities that represent for us a clock (but not about “time”) or about distance (but not about “space”). There are only our “abstract representations” created in our minds and nothing else. We can talk about the movements of certain objects (for instance, the macro-objects): their “lengths” refer to the lengths of their bodies which really exist (i.e. they have an ontology), but not to the “spacetime”. Moreover, we should always pay attention to the fact that the macro-objects correspond to certain micro-entities and the motions modifies the processes of those microparticles. An object moves not through the spacetime (that has no ontological background), but within a “scene”, which means there are only certain “relationships” between the object which moves and the other objects from that scene (and its correspondences to EDWs, but these “correspondences” are just abstract notions without any ontological status). The space and the time (the spacetime) are just invented “tools” that help us describe certain entities and their interactions.[[46]](#footnote-46) The relativity of “spacetime” is based on “processes”. Greene indicates that

Einstein found that precisely this idea—the sharing of motion between different dimensions—underlies all of the remarkable physics of special relativity, so long as we realize that not only can spatial dimensions share an object's motion, but the *time* dimension can share this motion as well. In fact, in the majority of circumstances, *most* of an object's motion is through time, not space. (Greene 1999, p. 27)

From our viewpoint, the *“sharing of motion between different dimensions” is only a pragmatic idea, but it does not have any ontological background*! Precisely, this pragmatic framework of “spacetime” pushed the human beings to ontologize it! The problem is that we cannot explain this process without space and time (or spacetime): motion is characterized by speed, but “speed is space over time” (v = x/t)! We should not forget that the motion of a particle, for instance, that belongs to the micro-EW corresponds to an electromagnetic wave which belongs to the field-EW. Therefore, the “empty space” in which the particle moves corresponds to a wave or a field which “covers the entire space”, but this “empty space” has n*o ontological status*. For humans, the space which “surrounds” the particle received an ontological status without any real justification, created within the unicorn world. In fact, the particle does not even exist in the field-EW (the particle corresponds to the peaks of the wave and the entire wave!), so why do we consider that the space which surrounds the particle really exists? The particle and the “empty space” in which the particle moves *correspond* to the electromagnetic wave, nothing more and nothing less. The particle can disappear and reappear in the micro-EW just because the corresponding electromagnetic wave changes its frequency. However, in the field-EW, nothing appears or disappears, only the wave changes its “properties”.

Within the unicorn world, Putnam (2005) was quite right arguing that we cannot reject so easily the existence of “absolute time” in quantum cosmology. (Putnam 2005, p. 632) However, the absolute or the relative “spacetime” does not exist at all. Greene provides the example of “muons”: “time elapsing more slowly for the muons in motion” (Greene 1999, p. 24)[[47]](#footnote-47) The muons are not elementary particles, so we can claim that there are only certain “internal processes” of muons which slow down, just because of the “motion” (practical notion) of its internal processes that make the “distances” traveled by these internal processes longer. Basically, Einstein believed that all objects have the speed of light *in time*. When an object moves not only in time but also in space[[48]](#footnote-48), the speed of any object is shared between one dimension of time and three dimensions of space.

If an object does move through space, however, this means that some of the previous motion through time must be diverted. Like the car traveling at an angle, this sharing of motion implies that the object will travel more slowly through time than its stationary counterparts, since some of its motion is now being used to move through space. That is, its clock will tick more slowly if it moves through space. This is exactly what we found earlier. We now see that time slows down when an object moves relative to us because this diverts some of its motion through time into motion through space. The speed of an object through space is thus merely a reflection of how much of its motion through time is diverted. (Greene 1999, p. 27)

Important is that “the maximum speed through space occurs if *all* of an object's motion through time is diverted to motion through space”. (Greene 1999, p. 27) Einstein claims that this is the reason “time” does not exist for any photon (an entity that moves with the speed of light). Furthermore, in order to reach the speed of light, an entity needs to have a mass equal to zero.

For us, essentially in this paragraph is Einstein’s idea that “all objects moves in time with c”. In EDWs framework, all the macro-objects and the microentities correspond to the electromagnetic waves (all having the speed c!). Since neither space, nor time (nor spacetime) exists, within the EDWs perspective, we have to re-wrote Einstein’s theory of special relativity. More specifically, space and time (or spacetime) are just “labels” which have helped the scientists (Newton and Einstein included)[[49]](#footnote-49) explain the behavior of certain entities. These “labels” are helpful in explaining a “scene”: a physical “scene” does not have any ontological status. However, a mental scene (a “perceptual image”) is the “I” which has an ontological status, the mind-EW. There are, in fact, the entities and their interactions that really exist (i.e. they really have ontology). The entities and their interactions represent/form a “scene”, but essentially a scene corresponds to an ED “scene” which belongs to an EDW! The characteristics of the entities which belong to these EDWs are different. There are “different parameters” for the features of an entity in motion and static. The speed of light c is the same, indifferent of the spatiotemporal framework just because the wave (field) has no motion and it “represents” (somehow) a kind of “absolute spacetime” for the ED entities. Since c is constant for all reference frames with constant motion, then the electromagnetic wave is a kind of “absolute frame” which cannot change. If those two lights are not simultaneous for those two persons, then they are in two ED spacetime frameworks, i.e., EDWs. For the person in the train, c is constant, and the distance is the same in both directions (even if, in motion, “space” contracts and time dilates). Those two lights travel the same distance (half train) toward the person situated exactly in the middle of the train. If the lights reach the persons at different times, it means the lights strike the train at different “moments” (not simultaneously)! In our EDWs perspective, those two lights are two entities which belong to the field-EW. These waves do not really exist for (only correspond to) the microparticles which correspond to the bodies of those persons. Each wave is a unitary, indivisible entity. For the person in the train, the lights strike the train at different “moments” (pragmatic notion). The expansion of the “Universe” happens in “nothing” which corresponded to an EDW (the pre-Big Bang EW, etc.) and all these previous Big Bang-EDWs correspond to the Hypernothing. *Within the EDWs perspective,* *without the existence of space and time, in motion, only (a) the objects contract their dimensions and (b) the processes take place slowly.*

In an EDW, an entity (for instance, a photon or a macro-object) corresponds to an electromagnetic wave, a continuous, indivisible entity. A photon corresponds mainly to the peak of an electromagnetic wave (which always moves with the speed of light!), but also to the rest of the wave. According to the special relativity, for an electromagnetic wave, time does not exist, i.e., the wave moves with the speed of light (the electromagnetic field covers the entire “space” – anyway, strong ontological contradiction between placing the field in the space). An electromagnetic wave does not “move” with c, it just increases in its length with this speed (there has to be a correspondence between this process and something belonging to the pre-Big Bang-EW)! With the EDWs perspective, we can understand much better Einstein’s idea that all objects have the speed of light (Greene 1999, p. 27) Within the unicorn world, the “speed” means “an object which has motion” (again, “motion” has no ontological status in-itself) within a “particular spatiotemporal” framework. The photons in their micro-EW (only peaks of the waves in the field-EW) have also the speed of light just because they do not have mass and they “correspond” to (the tops of) the waves. It is believed that the “wave has always the speed of light”, but since time does not exist for waves and it is just the increases of a wave in its length, the wave does not need any “force” to produce its “movement”. Why? Because the *increases* of the length of an electromagnetic wave “correspond” to the movement of a photon! The electromagnetic waves do not need the “first engine” to push them. Each microparticle (that belongs to the micro-EW) corresponds to an electromagnetic wave (which belongs to the field-EW). All objects have the speed of light, but their interactions with the Higgs bosons decrease their speed of light c! Only because photons and the electromagnetic waves do not have mass, just because the Higgs bosons do not interact with them. If the electromagnetic wave does not need any external force to move it, then its “movement” (i.e. increases of length) has to be included in the *definition* of the waves. Exactly as a magnetic piece has a magnetic field, an electromagnetic wave has the standard speed c. There are no static electromagnetic waves! The length of the electromagnetic wave corresponds to the “photon moving in space”, that is, an “electron moving in nothing”. The photon does not exist within the field-EW, in this EW, it is just the activation of a point of the wave (the wave has c), and this point of the wave corresponds to a photon (which has c but no mass!). A table corresponds to an amalgam of microparticles and the “spaces” (nothing) between them. Having c, a photon corresponds to the electromagnetic wave: precisely because of this correspondence, a photon has c without any force being necessary to push it! All electromagnetic waves move with c because they correspond to something that exist in the pre-Big Bang-EW.

To understand better the *illusions* of “space” (and “time”), we have to investigate, more clearly, the notion of “correspondence” in two cases: (1) the correspondence between two particles and a wave and (2) the correspondence between the mind that perceives two objects (the mental image of two objects) and the brain (that has surface and volume). Let us imagine that we situate two microparticles (each particle corresponds to an electromagnetic wave) “spatially” very close to each other. Then, between these two particles, one corresponding electromagnetic wave is established. Ontologically, the “physical space” between any two entities (two particles, for instance) does not exist, but it is just a *correspondence* between those two particles (the micro-EW) and the wave (the field-EW). However, the correspondences do not have any ontological status! The electromagnetic wave (which moved with the speed of light) corresponds to those two particles and the “space” (nothing) between them.

After the first 380,000 years after the Big Bang, the temperature decreased and electromagnetic waves (lights) were able to spread not in “space” (which does not exist, ontologically), but in “nothing” (a notion that has no ontological status, being in fact simply a notion that helps us explain the non-existence of “space”)[[50]](#footnote-50). Essentially, almost always “nothing” corresponds to something which belongs to an EDW. For instance, the entire “space” of the field-EW is completely “filled” with the electromagnetic waves. In fact, the electromagnetic waves are parts of the electromagnetic field, but the waves have different values than the other parts of the field. Within the field-EW, there is no “space” (there is no “space” in general, anyway)! These electromagnetic waves *correspond* to the microparticles and the “empty space” (more exactly, “nothing”) between these microparticles. Exactly in the same situation are the *correspondences* between the mind (particular mental perceptual states) and the brain (neuronal states): *we have the illusion of space between two entities just because (1) those two entities correspond to an electromagnetic wave and (2) the mind corresponds to the brain and body (that has a surface and a volume)*! Because of these correspondences, we have the illusion of the existence of space, but space does not exist, i.e. it has no ontological status. Working within the unicorn world, Einstein needed “spacetime” in his both theories of relativity (with a different ontological status) to describe the motions of entities.

We draw again the attention upon the fact that Einstein’s theory of special relativity does not prove anything *directly* about the existence of spacetime (or space and time). Einstein’s relativity does not indicate/show us the existence of “spacetime”, but only the *movements* of certain objects in the macro-EW (or micro-EW when we talk about “quantum clocks”). In our interpretation, again, these movements (which do not have ontological status in themselves) do not take place in “space”, but in “nothing” which corresponds, for instance, to the waves that belong to an EDW. Einstein showed us that (1) we have to relate space to time (2) spacetime is relativized. By analyzing these two suppositions, we should even reject space and time (or spacetime). Relative spacetime cannot even exist! The epistemologically different entities and their relationships have ontological status but nothing else.

If two clocks were set at the same time with respect to each other, and if one of them separated from the other traveling at a constant speed, they would mark different times, depending on their respective velocities. Although observers traveling with the clocks would be unable to notice any changes in their own system, one of them was slow *in comparison* to the other. Researchers calculated a striking difference between “time1” as measured by a stationary clock when compared to “time2” as measured by a clock in motion. Which of these referred to time? According to Einstein, *both*—that is, all frames of references should be treated as equal. Both quantities referred equally to time. Had Einstein found a way to stop time? (Canales 2015, p. 11)

Einstein believed that the “light clocks” were the best clocks to measure the time.[[51]](#footnote-51) If one clock is in motion (for the person travelling by train, for instance) and one clock is static (for the person on the pavement), then there are two different frameworks of four dimensional “spacetimes”. According to the special theory of relativity, because of the motion, “space is contracting” and “time is dilating”. *However, in this book (as in our book from 2016b), we reject the existence of space and time (spacetime), therefore Einstein’s special theory of relativity (which remains a correct approach) needs a new ontology provided by the EDWs perspective but, in a way, somehow different than what it was written in Vacariu 2014.* Gabriel Vacariu showed in 2014, that in the case of those two persons (one in a train and one on the pavement), we have two EDWs. As he emphasized many times in his works, these EDWs do not have an ontological status. It is in fact the epistemologically different entities and their epistemologically different interactions that are just named “EDWs that really have epistemologically different ontologies”. Then, what can we say about the idea of “*simultaneity*” (changed dramatically by Einstein’s special theory of relativity)?

Relativity scientists argued that our common conception of “simultaneity” needed to be upgraded: two events that seemed to occur simultaneously according to one observer were not necessarily simultaneous for another one. This effect was connected to other aspects of the theory: that the speed of light (in vacuum and in the absence of a gravitational field) was constant. (Canales 2015, 11-12)[[52]](#footnote-52)

To explain better the notion of “simultaneity”, we really need to understand, within the EDWs perspective, why the speed of light (*in vacuum* and in the absence of a gravitational field) is constant. We already know that the electromagnetic wave and the photon belong to the EDWs: the wave does not exist for the photon, the photon does not exist for the wave. The photon only *corresponds* to the wave. Because the photon has no mass but it corresponds to the electromagnetic wave, the photon has also this constant speed c (like the speed of the wave, c). The special theory of relativity explains the motion of any object within a spatiotemporal framework. We believe that Einstein’s spatialization of time was possible just because neither space and time nor spacetime really exist, i.e. space and time (or spacetime) do not have any ontological status. Does anybody perceive time or space (or spacetime)? Between two objects placed in a room, for instance, we perceive “nothing” and behind those two objects, we perceive a wall. Perceiving “depth” distance is a complicated neuronal (or mental process) but, as Gabriel Vacariu showed in 2014, “spatial cognition” is a pseudo-notion in cognitive neuroscience (a pseudo-science[[53]](#footnote-53)).

From the EDWs perspective, in our previous works, we showed that those two observers are in EDWs. Obviously, Einstein could not use EDWs instead of different “spatiotemporal frameworks”. From our point of view, it is not only that those pairs of events do not take place “simultaneously”, but moreover, one pair of events does not exist for the other pair of events, since they belong to the EDWs! Two events that take place simultaneously in the A-EW (which includes A and B from the A-EW) only *correspond* to two non-simultaneous events in the B-EW (which includes A and B from the B-EW). As we already know, it is not only wrong, but *meaningless* to think that the epistemologically different events that involve epistemologically different entities and/or processes situated in the EDWs “occur in the same spatiotemporal framework”. Einstein’s classical example with those two persons (one in a train and one on the pavement) clearly indicates the existence of EDWs (see Vacariu 2016), but now we can conclude that the “spacetime” does not exist for either of them. From all of the above, we conclude that Einstein’s special theory of relativity is a scientific argument which clearly indicates the existence (or, more exactly, the being) of EDWs: absolute space and absolute time do not exist, but also relative “spacetime” does not exist at all, i.e., it does not have any ontological status! There are just the epistemologically different entities and their interactions (motions) that really exist and nothing else. Even if there are notions such as the “world” or the “universe” or “reality”, which were created by human beings in the dawn of our history, the “world”, in fact, does not exist.

We can talk about the “speed” of an entity only as an extrinsic property of that entity, that is, in its constitutive interactions with the external environment. In order to measure the speed of any entity, we have to use certain conditions of observation and certain theoretical, abstract notions (like space and time) that can help us accomplish this job. Space and time are just abstract notions that help us describe certain entities exactly as “colors” (which do not exist as “real properties of an object”) help us describe certain macro-entities. Ontologically, neither spacetime, nor color exist. According to the special theory of relativity, motion changes the spatiotemporal framework. In this context, again we strongly emphasize that “motion” is illusory for the electromagnetic field! (Return to our analogy with the movie on the screen.) What really exist in the electromagnetic wave/field is the changes of its parameters, no more or less. The electromagnetic field and its changes (the field-EW) correspond to the motions of the corresponding photons and other microparticles (the micro-EW).

Why a table (a macro-object) (or any other entity except the photon) can never reach c? The table (the macro-EW) corresponds to an amalgam of microparticles and their interactions (the micro-EW); if the table had the speed of light c, the interactions between those microparticles of that amalgam would not take place! Thus, if the corresponding amalgam of microparticles had the speed c, the table would not exist. Since a planet corresponds to an amalgam of microparticles and *their interactions*, if the corresponding amalgam of microparticles had the speed of light, that planet would not exist in the macro-EW. It would be just an amalgam of microparticles in the micro-EW and their corresponding electromagnetic waves in the field-EW. A photon corresponds to a wave; the photon and “its” wave belong to the EDWs. The physical features of the wave correspond to the physical features of the photon (among other features, the photon has no mass). Very possibly, the features of the electromagnetic wave (which corresponds to the photon) determine, **indirectly** (through correspondence), the null-mass of the photon. Other microparticles have mass just because the corresponding electromagnetic wave is more concentrated in that point which corresponds to the microparticle.

The “twin-paradox”[[54]](#footnote-54) can finally be explained only within the EDWs perspective: because of the speed, the biological processes “within” a living body really take place more slowly; therefore, it is not about the “dilation of time” (Einstein’s special relativity), but about the fact that the “distances” traveled by the motions of entities “inside the organism”[[55]](#footnote-55) (which describe the biological processes) are longer. Exactly as the mind cannot occupy the same place with the brain (the identity theory and other theories, weak emergence and other notions are all wrong theories and notions), space cannot occupy the same place with other entities (a table, for instance). Since space does not exist, any EW has no “spatial limits”. “Both Newton and Einstein believed in the laws of physics that transcend the clutches of time and space.” (Mathew 2014, p. 47) In reality, space and time do not exist for any law of physics since space and time do not exist. Space and time only help us explain the laws of physics, but the “nature” (i.e. the EDWs) has no idea about our explanations, i.e. about the space and the time! In reality, there are no “laws” but only correspondences between entities which seem to follow certain laws (that transcend “spacetime”). The special theory of relativity refers to an object in a uniform motion (inertial reference frame) or at rest. In this case, the framework of thinking is the “nothing”, not the “spacetime”.

The general theory of relativity refers to all states, including accelerating frames of reference, or gravitational fields (in other words, non-inertial frames). Einstein replaced the Euclidean geometry of special relativity with the non-Euclidean geometry of general relativity. Just like in the special theory of relativity, in the general theory of relativity, we have to replace the spacetime of both geometries with “nothing”. According to the general theory of relativity, “gravitation is the curvature of spacetime”[[56]](#footnote-56): the presence of mass (for instance, the presence of the sun) warps the “space” that surrounds it (which remains flat in the absence of massive objects) and “time” runs more slowly in the gravitational field than in an almost empty space (where there is no gravitation). So, in Einstein’s general relativity, Newton’s gravity is replaced by this warped space. Einstein’s equation indicates the geometry of curved spacetime under the influence of mass and energy in the macro-world. However, if the space (ontologically) does not exist, then it is the “nothing” within the macro-EW which is “warped” by the “mass of planets”. This “nothing” of the macro-EW (no ontological status) corresponds to “something” (which has an ontological status) of an EDW. For instance, this “something” can be the electromagnetic field (which belongs to the field-EW). We recall that the speed of light c is constant just because of the correspondence between the electromagnetic wave and the photons. The speed of light is the maximum speed just because chronologically after Big Bangs, the first appeared the field-EW (the electromagnetic waves having the constant speed of light, c). Later, the microparticles and the macroparticles appeared within the micro-EW and macro-EW, respectively, but in correspondences with the electromagnetic waves (speeds c!) and the microparticles, respectively. Everything in the EDWs has a correspondence to an electromagnetic wave (speed c). Therefore, the speed of the microparticles and the macroparticles could not be greater than the speed of the electromagnetic waves, the speed of light c! The speed of light is “force free motion” (nothing pushes the photon) just because the photon corresponds to the oscillations of the wave. No forces act on the movement of photons, no forces act on the electromagnetic field (only changes of its characteristics take place)![[57]](#footnote-57)

For Einstein’s special relativity, there are two principles: (1) relativity (2) the constant speed of light. Let us introduce some paragraphs from Greene about Einstein’s special relativity and the speed of light, c. An object which moves in space, moves also in time. An object which does not move in space (in relationship to an observer) moves only in time.[[58]](#footnote-58)

A big clue for how to do this comes from a central piece of information we have already encountered. When an object moves through space relative to us, its clock runs slow compared to ours. That is, the speed of its *motion through time slows down.* Here's the leap: Einstein proclaimed that all objects in the universe are *always* traveling through spacetime at one fixed speed—that of light. This is a strange idea; we are used to the notion that objects travel at speeds considerably less than that of light. We have repeatedly emphasized this as the reason relativistic effects are so unfamiliar in the everyday world. All of this is true. We are presently talking about an object's combined speed through *all four* dimensions—three space and one time—and it is the object's speed in this generalized sense that is equal to that of light. To understand this more fully and to reveal its importance, we note that like the impractical single-speed car discussed above, this one fixed speed can be shared between the different dimensions—different space *and* time dimensions, that is. If an object is sitting still (relative to us) and consequently does not move through space at all, then in analogy to the first runs of the car, all of the object's motion is used to travel through one dimension—in this case, the time dimension. Moreover, all objects that are at rest relative to us and to each other move through time—they age—at exactly the same rate or speed. If an object does move through space, however, this means that some of the previous motion through time must be diverted. … (Greene 1999, p. 27)

From this paragraph, for us it is very important this sentence: “ Einstein proclaimed that all objects in the universe are *always* traveling through spacetime at one fixed speed—that of light”. (Greene) Obviously, for Einstein, the motion of an object is diverted in those four “spacetime” dimensions. However, if spacetime has no ontology, light and all electromagnetic waves (within the field-EW) have the speed c, while the photons (without masses, within the micro-EW) have the same speed just because with their correspondence with these waves. Why the electromagnetic waves have the speed c? Probably, the electromagnetic waves correspond to something from the pre-Big-Bang-EW and because of this correspondence, the light has always the speed c in “empty space”. Within the unicorn world, we can say that the appearance of particles having mass means that (in the micro-EW), a part from the corresponding speed of the wave c moved from three dimensions (space, but no time for the wave) to other dimension, time for the microparticles. So, the photons moves in a spatiotemporal framework (without time but only space), the other microparticles move in a spatiotemporal framework with certain values for space and time dimensions (neither being zero). When, in relationship to something, an object is static, then, in that spatiotemporal framework, the object moves in time with speed c, and the spatial dimension is null. Therefore, in “spacetime”, all objects move with speed c! Some of their motion is moved from one dimension to other dimensions (either from space to time (decreasing the speed) or from time to space (increasing the speed)). The appearance of microparticles with masses meant the appearance of entities with their speed in space less than c, i.e, in their motion, not the entire time-dimension is diverted into “space” dimensions (like in case of photons for which there is not “time”-dimension).

We now see that time slows down when an object moves relative to us because this diverts some of its motion through time into motion through space. The speed of an object through space is thus merely a reflection of how much of its motion through time is diverted.10 We also see that this framework immediately incorporates the fact that there is a limit to an object's spatial velocity: the maximum speed through space occurs if *all* of an object's motion through time is diverted to motion through space. This occurs when all of its previous light-speed motion through time is diverted to light-speed motion through space. But having used up all of its motion through time, this is the *fastest* speed through space that the object—any object—can possibly achieve. (p. 27)… Thus light does not get old; a photon that emerged from the big bang is the same age today as it was then. There is no passage of time at light speed. (Greene 1999, p. 28)

A very important observation from the EDWs perspective: let us imagine, in the night, using a lantern (flashlight), we turn on the light in a room with a table and a chair. We cannot see the light (!), i.e, we cannot see the electromagnetic waves and the microparticles, but we can see the macro-objects (the table and the floor of that room) “lighted” by that light. The problem is that neither the electromagnetic wave, not the photons interact with the macro-objects (there are three EDWs). There are interactions between “light” as:

(1) electromagnetic wave and the electromagnetic waves corresponding to those macro-objects and corresponding to our eyes and the brain (also macro-entities).

(2) microparticles (photons) and the microparticles which correspond to those macro-objects and those microparticles corresponding to our eyes and the brain.

(3) In her mind (which is an EW), a human perceiving will have a “visual scene” (part of her mind) which will contain the representations of those macro-objects. This visual scene (related to spatial cognition, see Vacariu and Vacariu 2012) (which is part of the mind-EW) corresponds to a network neurons (the most activated would be neurons from the occipital area) and to the entire brain (in the macro-EW)

A human being perceives the table because of the correspondences between entities/processes from EDWs! There are no causalities between the EDWs, in any directions! There would be the question: “What does produce the movement of this amalgam of microparticles?” The answer would be “nothing” (no ontological status) from the micro-EW which corresponds to the movement of the arm which corresponds to the movement of the mental image (internal with closed eyes or “external” with open eyes) within the self. It is quite wrong to believe that the mind or the brain moves the microparticles! This is the eternal mind-brain problem, i.e., the illusion that the mind acts somehow on the body, or the illusion the mind is identical to the brain. In our previous works, we indicated that it is quite wrong to believe that the mind is identical or different (epistemological or ontological or dualism property or any other alternative) than the brain, to believe that the mind acts somehow on the brain, or the mind is produced by the brain (Searle 1992), etc.

The same observation is available for the micro-macro relationship or the wave-micro relationship. Obviously, the movement of the arm cannot be explained by the micro-entities and their interactions, but it does not mean we have to introduces the downward causation or any kind of “emergence”. From a microparticle’s viewpoint, the process of suddenly raising of an amalgam of microparticles (which corresponds to the macro-arm) simply cannot be explained using the micro-forces and the micro-entities! Working within the unicorn world, it is quite clear why Leibniz needed to introduce God in the mind-brain equation… The same mistake is the introduction of “quantum gravity” in micro-EW and searching for the “tachyon”. The same situation is for explaining the “entanglement” (the “nonlocality”) between two microparticles. This phenomena cannot be explained with entities and processes belonging to the micro-EW, but only using those two microparticles and their *correspondence* with an electromagnetic wave: the entanglement is the indivisibility or rigidity of electromagnetic wave with two peaks/nodes (these two peaks correspond mostly with those two microparticles - even if the entire wave corresponds to the two microparticles).[[59]](#footnote-59) (For more details, see next chapter) Corresponding *directly* to the brain/body (that belongs to the macro-EW), the mind-EW corresponds *indirectly* (through an EDW) to an electromagnetic wave (the field-EW) with the speed c. According to Einstein’s special relativity, the speed of light is the same in all inertial frames. The electromagnetic waves have c and nothing else can surpass this speed just because an entity from the micro-EW and macro-EW *corresponds* directly (the micro-EW) or indirectly (the macro-EW) to the field/waves-EW. It is this correspondence that establish the limit of the speed, c, for all ED entities that belong to EDWs!An electromagnetic wave has no mass, the photon has no mass, and this is the reason these entities have the speed c. If an entity has mass, then its speed cannot reach the speed of light, c. The first EW that we know after the Big Bangs was the field/wave-EW. The electromagnetic wave has always the speed c. Therefore, what did it correspond to electromagnetic waves could not passed the speed of light c. Otherwise, something passing the speed of light c, would have produced strong ontological contradictions! Therefore, “tachyon” cannot even exist. Its existence would produce strong ontological contradictions.[[60]](#footnote-60)

In this context, we can explain the “expansion of the Universe” in a totally new manner: it takes place just because of the correspondences between the macro-entities, the microentities and their correspondences electromagnetic waves (that have the speed c)! Since the the electromagnetic waves have all the speed c, then all the ED entities that belong to the EDWs increase constantly their speed toward c, because of their correspondences with the electromagnetic waves. The macroparticles “tend to reach” the speed of their corresponding “grand-mother”, the field-EW (their corresponding electromagnetic waves). However, because of their mass, these ED entities cannot reach c only in “space”, anyway. According to Einstein, “all objects have speed c” in “spacetime”: the motion of any macro-entity is shared in “space-time” dimensions. In the motions of the electromagnetic waves/field (field-EW) and photons (micro-EW), there is no time dimension. All their motion is shared in those three spatial dimensions.[[61]](#footnote-61) From the EDWs perspective, there is no “spacetime” dimensions. Again, the motion of a particle corresponds to the activation of successive parts of the electromagnetic field (being already everywhere)*.*This is the main reason, “space” cannot even exist! It is “nothing” which corresponds to the electromagnetic fields which correspond to the micro- and macro-entities. The activation of these successive parts corresponds to something that belong to an EDW, the pre-field-EW (or pre-Big-Bang-EW). So, there is only activation of parts of the field (in the field-EW) that creates the corresponding photon moving at the speed c (in the micro-EW).

With the special relativity (relativizing spacetime to motion), Einstein unifies time, space, motion, and energy. With the EDWs, we push Einstein’s movement of thinking further: rejecting relative spacetime (spacetime frameworks become so relative that they lose their ontological status)[[62]](#footnote-62), we relate the entities and their interactions with “nothing” and all these elements corresponding to an EDW. It means that we extend Einstein’s unification of space and time (4D) in unifying everything in one EW or an EDW. In the macro-EDWs, particular entities, interactions, and their motions are an EW! Obviously, “motion” is directly related to the ontology of entities, their interactions and the “nothing” between them (which corresponds to something that belongs to an EDW). Without “nothing” there would be no interactions between the entities which belong to the micro-EW or the macro-EW, for instance. The “relative motion”[[63]](#footnote-63) and the relationships between entities determine the being of EDWs: the woman in the train (and the man on the pavement for her) and the man on the pavement (and the woman in the train for him) are in the EDWs! The woman and the man are ED entities, i.e., their bodies have different ED “structures” (ontologically, the body of the woman is thinner in the direction of motion than her static body on the pavement or the static body of the man also on the pavement). That is, the “motion” in “time” is diverted not only in “space”, but also in the change of the matter that constitutes the body.[[64]](#footnote-64) In the field-EW, the photon corresponds to the wave (within the unicorn world, it is the peak of the wave). This is the main reason we have to extend motion to everything and everything to motion! An EW is its entities, their interactions and the “nothing” (no ontological status) among them, and all these elements correspond to an EDW, at least to the Hypernothing!

**3.2 The general relativity without “spacetime”**

In order to develop the special relativity, Einstein came up with a thought experiment: “What would I perceive if I were riding a photon?” For the general relativity, he had another thought experiment: a man falling off the roof would not feel his weight (this was, he said, the “happiest thought of his life”).

The breakthrough came suddenly one day. I was sitting on a chair in my patent office in Bern. Suddenly a thought struck me: If a man falls freely, he would not feel his weight. I was taken aback. This simple thought experiment made a deep impression on me. This led me to the theory of gravity. I continued my thought: A falling man is accelerated. Then what he feels and judges is happening in the accelerated frame of reference. (Einstein 1982, p. 47 in Greene 1999)

This falling man,

does not feel his weight because in his reference frame there is a new gravitational field which cancels the gravitational field due to the Earth. In the accelerated frame of reference, we need a new gravitational field. (Einstein 1982, p. 47 in Greene 1999)

In this way, Einstein moved from the particular case of inertial motion (rectilinear and uniform motion) to the general cases of motion (including accelerated motion - curved motion - gravitation[[65]](#footnote-65)). Einstein needed to replace the Euclidean geometry with the non-Euclidean geometry[[66]](#footnote-66) and to introduce the “principle of equivalence”[[67]](#footnote-67) between acceleration and gravitation which was illustrated by a thought experiment.[[68]](#footnote-68) (Greene 1999) More important is the following paragraph:

Wolfson observes that, for Einstein, simultaneous events are in one frame of reference, but not in another, therefore time has no objective reality (the spatio-temporal framework becomes relative); similarly, in general relativity, if acceleration exists in one frame of reference, but in another frame it is gravity, not acceleration, then acceleration/gravitation are relative – more precisely, gravity does not exist. There has to be something that replaces gravity, something that is constant and has a continuity. According to Einstein, this has to be not another force, but the geometry of space-time, i.e. the fourdimensional non-Euclidean geometry. (Wolfson 2000, episode 13) This idea is related to Riemann’s idea of force as equivalent to geometry (see later the footnote about this notification.)[[69]](#footnote-69) (Greene 1999)

Even if it is very correct in the macro-EW, Einstein’s equation from his general theory of relativity reflects the domination of the unicorn-world: Rμν − ½ gμνR = − 8π/c2 GTμν, where Rμν is the contracted Riemann curvature tensor, Tμν is the energy-momentum tensor that measures the matter-energy content. The equation shows how the matter-energy determines the curvature of space-time. Einstein’s himself was not content with all the terms of the equation. He compares his equation to the parts of a building: the left part that describes the curvature of space-time is made of “marble” “because of its beautiful geometric structure” the right part is made of “wood” and it describes the matter-energy that is a mixture of atomic particles, atoms, rocks, trees and planets. (Kaku 1994, p. 98) Evidently, from an EDWs perspective, the mistake is the same: the introduction of all ED entities into same “unicorn-world”. On the same page of one of Einstein’s articles, we can find two things:

(a) Einstein considers that the whole mechanics of gravitation is reduced to solving a single system of partial differential equations, but his theory is sufficient for the representation of observed phenomena of *celestial* mechanics. (Einstein (3), p. 118) Thus, he limits this general theory to planets and stars.[[70]](#footnote-70)

(b) Einstein indicates that the energy-momentum tensor is a “phenomenological representation of matter” that is only an “imperfect substitute for a representation” that would correspond to all known properties. (Einstein (3), p. 118) We have here “matter” in general that includes atoms, trees, stars and so on. Obviously, even Einstein worked within the unicorn-world. Nevertheless, Einstein was convinced that the theory of general relativity does not offer a complete and satisfactory foundation to physics because of two elements:

(1) The total field is composed of two parts non-logically connected: gravitational and electro-magnetic fields. (Einstein (4), p. 141) In the theory of electrical fields, the points have a meaning. The lines of the electric field pass through a point. On the contrary, in the general theory of relativity, we can only talk about the relationship between lines of fields. (Smolin, p. 34) This is another reason for which we cannot relate Maxwell and Einstein’s theories. H. A. Lorenz tried to unify Newton and Maxwell’s theories combining both types of equations (total with partial differential equations), i.e. the particles and the fields. But he had to admit finite dimensions for a particle, otherwise the associated electromagnetic field would be infinite! He was aware of these limits. (Einstein (3), p. 113, p. 169) The problem is that, in such cases, the theories of the field are full of infinities that appear just because a particle is “surrounded” by a field and the power of the field is greater if the distance to that particle is closer. If the particle is infinitesimal, then the power of the field would be infinite![[71]](#footnote-71) (Smolin, p. 139) Mathematically, the problem is that *partial* differential equations for fields cannot include *total* differential equations which grasp the particles, i.e., they do not have “singularities”. The idea was that a singularity has to represent a particle in a field. Einstein underlined this problem in his articles many times. He spent his last thirty years of life tying to solve this problem through a “total theory of field” (extending Maxwell’s framework) without any singularity. Such a “complete theory” – which would combine all fields, including the gravitational one – has to contain certain equations for the “total field”, but the particles have to be solutions without singularities to these equations. (Einstein (5), p. 189)

(2) The general theory of relativity does not explain the atomic structure of the matter. This failure is related to the fact that this theory could not explain “quantum phenomena”. (Einstein (4), p. 141) As we saw above, since 19th Century, the physicists have been aware of the controversy produced by two elementary concepts: the particle and the field (in reality, entities belonging to EDWs).[[72]](#footnote-72)

As we have already noticed in the previous section (or in our book 2016), the “time” and the “space” cannot have any “objective reality”, i.e., the spacetime cannot have any ontological status. Otherwise, certain strong ontological contradictions would appear. Also, if Einstein replaces the “continuity of gravity” with the “continuity of spacetime”, we replace the continuity of “spacetime” with the “continuity of nothing” which corresponds to something which belongs to an EDW (for instance, the “continuity of the field-EW”). Also, in the last quoted paragraph, we see that Einstein’s general relativity replaced the gravitational force with the four-dimensional non-Euclidean geometry. From all these paragraphs, we clearly understand that the “force of gravity” does not really exist.[[73]](#footnote-73) Also, according to the general relativity, gravity is equivalent to acceleration. What really exists there is “nothing” which corresponds to something which belongs to an EDW!

Through its principle of relativity, the special theory of relativity declares a democracy of observational vantage points: the laws of physics appear identical to all observers undergoing constant-velocity motion. But this is limited democracy indeed, for it excludes an enormous number of other viewpoints—those of individuals who are accelerating. Einstein's 1907 insight now shows us how to embrace *all* points of view—constant velocity and accelerating—within one egalitarian framework. Since there is no difference between an accelerated vantage point *without* a gravitational field and a nonaccelerated vantage point *with* a gravitational field, we can invoke the latter perspective and declare that *all observers, regardless of their state of motion, may proclaim that they are stationary and "the rest of the world is moving by them," so long as they include a suitable gravitational field in the description of their own surroundings.* In this sense, through the inclusion of gravity, general relativity ensures that all possible observational vantage points are on equal footing. (Greene 1999, p. 32)[[74]](#footnote-74)

The main problem with both Einstein’s relativities is the concept of different “spacetime frameworks”. As we saw in the previous section and also in this section, it is quite impossible to realize a demarcation between these spatiotemporal frameworks (which cannot have any ontological status). Therefore, we have to replace them with the EDWs. We do not need to delineate the EDWs, since one EW does not exist for any EDW and, anyway, the entities and the processes of one EW correspond to all ED entities and ED processes of EDWs. Therefore, we replaced Galileo and Einstein’s principles of relativity with the **principle of “loneliness” of any EW**:

*One EW corresponds to the EDWs. Since one EW does not exist for any EDWs (any EW is “lonely”), that is “only one EW is” and it is meaningless to relate two EDWs. Therefore, it is quite wrong to try to make a “spatial demarcation” between any two EDWs.*

It is quite wrong, for instance, to delineate the train-EW and the pavement-EW, since one EW does not exist for any EDW. The train-EW in motion includes the pavement in its EW, the static pavement-EW includes the train in its EW, but these EDWs do not exist one for the other! We recall that the “correspondence” has no ontological status and it refers to the existence of ED entities which belong to the EDWs. Here, we introduce a very important paragraph from Greene’s book (1999):

In fact, accelerated motion not only results in a warping of space, it also results in an analogous warping of time. (Historically, Einstein first focused on the warping of time and subsequently realized the importance of the warping of space.16) On one level, it should not be too surprising that time is also affected, since we have already seen in Chapter 2 that special relativity articulates a union between space and time. This merger was summarized by the poetic words of Minkowski, who during a lecture on special relativity in 1908 said, “Henceforward space on its own and time on its own will decline into mere shadows, and only a kind of union between the two will preserve its independence.” (Greene 1999, p. 34)

So, we find the same idea: if “gravity is acceleration”, then there are no forces, but only “relative motions” of ED entities which belong to some EDWs (there are some EDWs in which motion does not exist, like the field-EW and the mind-EW). In our EDWs perspective, the acceleration of an entity means that the entity continuously passes through many EDWs, but all these EDWs correspond to one EDW without motion, the field-EW. Within the unicorn world (in which we cannot accept both the microparticles and the waves – and therefore some physicists accept the existence only of the waves), we can return to Parmenide and believe that any kind of “motion” is illusory. Within the general relativity, Einstein related the gravity to the “curved spacetime”: the planet curves “spacetime” and this means “gravity”. However, since “spacetime” does not really exist, the planet curves “nothing” which corresponds to something that belongs to an EDW. (We applied the same principle to the spacetime in the special relativity.) “Nothing” does not exist, but the Hypernothing hyperis and it is not composed, it cannot interact with something else, it was not produced by something.

Let us investigate the “*rotating rigid disk*” in the general relativity. If the rigid disk is static to the Earth, a person measures a flat Euclidean disk. However, if the disk is in a rotational motion, the space and the time are warped, that is, the disk is in a Euclidean format: the time runs faster for a person measuring from the center of the rotational disk than for a person measuring the time at the circumference of the disk. If those two persons have different “spatiotemporal frameworks”, it means, for our perspective, that they are in EDWs (not that they belong to the EDWs)! With different motions (they have the same speed - exactly as two persons in two trains with the same constant speed) within the same direction, in parallel - and acceleration which covers different spacetime, those two persons are equivalent the wagon-EW: their bodies (and their clocks and meters) are in EDWs. That is, within their bodies, all entities (the cell of the bodies, the blood cells in motion that follow the inertial principle, etc.) are in the EDWs! Also, the clocks in their hands follow the same motions as their bodies, so the clock in the circumference moves much slower that the clock placed in the center of the rotating disk. Their clocks belong to the same EDWs as their bodies just because one clock is static in relationship to the respective body. Let us take another example of the general relativity (introduced by Einstein): the classical example of two individuals, one being in the center of a plane circular disc which rotates uniformly in its own plane around its center, the other at the margin of the disc.[[75]](#footnote-75)

An observer who is sitting eccentrically on the disc *K'* is sensible of a force which acts outwards in a radial direction, and which would be interpreted as an effect of inertia (centrifugal force) by an observer who was at rest with respect to the original reference-body *K*. But the observer on the disc may regard his disc as a reference-body which is "at rest" (…). (Einstein 2008, p. 44)

Each individual has a clock, the same type of clock. Those two identical clocks will measure different times.[[76]](#footnote-76) Also, the length of a ruler is shortened along the circumference in comparison to the same ruler measured near the center of rotating disc. (Einstein 2016). More exactly, there are some “uncountable” changes of spatio-temporal framework from the center to the periphery of the rotating disc. The acceleration modifies the spatio-temporal framework. Therefore, according to the equivalence principle, the gravity also modifies the spatio-temporal framework. In fact, we also have here some uncountable changes of EDWs. A person situated at the periphery of the disc, not situated on the disc but above the rotating disc (not touching the disc, therefore without rotating) is in an EDW than the person situated on the periphery of the disc and rotating.[[77]](#footnote-77) We recall that the EDWs require not “different entities” (for instance, objects) and their relationships, but epistemologically different entities and their epistemologically different relationships. The human observer A in the train, for instance, cannot perceive that she is in an EDW than B.

If a person moves continuously from the center to the circumference of a disk, the “spacetime” of that person is *continuously* warped, that is, the person continuously changes the “spatiotemporal frameworks” in which she is “placed”. However, this “continuous changes” have great ontological problems: are these changes infinitesimal small or not? But the “infinite” (small or large) does not really exist (i.e., it has no ontological status). So, can we make a distinction between one spatiotemporal framework and the next one? Obviously, we cannot. It means that the continuous “spatiotemporal frameworks” do not really exist. In reality, if a person moves continuously from the center of the disk to its circumference, the person moves *continuously* from one EW to an EDW. However, each EW contains the entire disk and the external environment in that moment, otherwise, we would be in the same very problematic situation as the “continuity of the spatiotemporal frameworks”. Exactly in this manner, we can avoid the separation of one EW from an EDW (one EW does not exist for any EDW)! There is no “spacetime” which changes continuously just because we cannot draw a “line” between its two components. There is no delineation between two EDWs since one EW does not exist for any EDW. Also, the body (and the clock and the matter in his hand and the external environment relative to the body in motion) is an EW which changes continuously in many EDWs. This situation is analog to the person which moves on a motorbike in the train with constant speed: the person, the motorbike and the entire wagon (from his perspective) are an EW, while the woman and the entire wagon (from her perspective) are an EDW. However, in the case of the person moving from the center to the circumference of the “rotating rigid disk”, the person is an EW that changes *continuously* through the EDWs.

It has to be very clear what „gravity“ is: obviously, we agree with Einstein, gravity as a „force“ does not exist. However, since the „spacetime“ does not exist (space and time do not exist), then it is not „spacetime“ that is curved, but „nothing (no ontological status) is curved by the planets in the macro-EW“ which corresponds to „something“ that belongs to the EDWs. For instance, larges parts of the electromagnetic field (the field-EW) is curved, *directly*, by a “large concentrated electromagnetic part” (“in the center” which corresponds to a planet). In fact, within the electromagnetic wave-EW, there is a „curved part of the electromagnetic field“ (which corresponds to the planet) with different properties than the rest of the electromagnetic field (the surrounding electromagnetic field) which corresponds to the “space” that surrounds the planet). The falling down on the planet of a stone means the changes of the properties of a part of the field (which correspond to the planet) to the other parts of the field in one direction (which correspond with the direction of falling stone in the macro-EW).[[78]](#footnote-78) The Earth and the curvature of „nothing“ correspond to the curvature of the electromagnetic field from the field-EW, for instance. Also, when a macro-stone moves toward the Earth, correspondingly, something happens in the EDWs!

**Chapter 4**

**Quantum mechanics and the EDWs**

“I am now convinced that theoretical physics is actual philosophy“. (Max Born)

“I think it is safe to say that no one understands quantum mechanics.” (Richard Feynman)

“If you think you understand quantum mechanics, you don't understand quantum mechanics.” (Richard Feynman)

“Quantum mechanics is very impressive. But an inner voice tells me that it is not yet the real thing.” (Albert Einstein)

“It seems clear that the present quantum mechanics is not in its final form. Some further changes will be needed, just about as drastic as the changes made in passing from Bohr's orbit theory to quantum mechanics. Some day a new quantum mechanics, a relativistic one, will be discovered, in which we will not have these infinities occurring at all. It might very well be that the new quantum mechanics will have determinism in the way that Einstein wanted.”

(Paul Dirac) [https://en.m.wikiquote.org/wiki/Paul\_Dirac](https://en.m.wikiquote.org/wiki/Paul_Dirac?fbclid=IwAR2W-7RVCVJcVDJU9SokxNU3U6UZ-F9QSWJyT8HD4zW_ggRzViCtQBQohIk)

**4.1 Quantum mechanics has no ontological background**

At the end of his book, Friedman speculates about the application of his approach to quantum mechanics. (Friedman 2001, pp. 120–4) He suggests, as a constitutive principle, Bohr’s correspondence principle which is strongly related his idea of “complementarity”. Friedman’s suggestion is that a better understanding of this principle would guide us to a better comprehension of how a mathematical framework (a noncommutative algebra of Hermetian operators on a Hilbert space) represents a system of physical entities. We will see in this section that the relationship between Bohr’s correspondence principle (the relation between micro- and the macro-particles) and the idea of complementarity (the relation between the wave and the particle) is indeed the key element in quantum mechanics. However, we will try to show that the “superposition” of wave and particle, the relationship between micro- and macro-objects, and Hilbert space which represents the superposition of several positions of a particle before measurement are the main interrelated problems imposed by the unicorn-world on quantum mechanics. Other related features give the conundrum of quantum mechanics. For instance, if the notions of complementarity and non-locality or even if certain empirical notions like “matter” and “energy” are only theoretically characterized, then quantum mechanics has great empirical application. The main problem consists in the unification of the conceptual framework of quantum mechanics with the “best contemporary space-time theories (both the special and general theories of relativity)”. (Friedman 2001, p. 120) In a speculative manner, Friedman considers von Neumann’s idea of classical logic’s revision for understanding Bohr’s complementarity as a viewpoint from a philosophical or meta-scientific level. However, he concludes by accepting that this idea has to be further verified. (Friedman 2001, pp. 122–3)

The constitutive *a priori* principles “secure the empirical content of each theory”. What does “empirical content” mean for the general theory of relativity and quantum mechanics? The classical answer is that these theories refer to different “*local* empirical aspects” of the “same world” or different “levels” of reality. What does “different aspects of the world” or “levels of reality” mean? From an EDWs perspective, these questions are pseudo-questions because they involve the unicorn-world error. Notions like “aspects of the world” or “levels of reality” pose no problems to the scientific theoreticians because their theories are “local”. Friedman remains a prisoner of this scientific framework. In fact these notions are empty concepts, in Kantian sense. Friedman is missing one more step to achieve the right approach, the EDWs perspective. He applies these conceptual frameworks to the same unicorn-world, even if each scientific theory has certain relative *a priori* principles, a constitutive framework that “secures the empirical content of the theory”! (Friedman 2001, p. 83) For Friedman there is only one world, or more precisely one “external space with empirical possibilities”. (Friedman 2001, p. 84) Obviously, working within the unicorn world these “external space with empirical possibilities” can produce strong ontological contradictions.

We wrote about the great problems of quantum mechanics and the EDWs perspective in our previous works (2006, 2007, 2008, 2009, etc.) and we emphasized that the great problems of physics have always been philosophical problems, in essence![[79]](#footnote-79) The discovery of EDWs by Gabriel Vacariu has changed completely the view on quantum mechanics. In fact, the EDWs perspective introduced a new view of quantum processes in such away that all great problems of quantum mechanics have been dissolved! Also, the EDWs perspective indicates that, constructed within the unicorn world, all alternatives which have tried to solve all the great problems of quantum mechanics have been quite wrong![[80]](#footnote-80) These “great problems” have been created within the unicorn world, therefore, changing this wrong paradigm of thinking (the unicorn world) with the EDWs perspective, we dissolved all of them. Even if such change is, historically, the task of a philosopher, it can be done by a scientist only if that scientist possesses philosophical thinking (a particular case, for instance, being Einstein). A “philosophical thinking” means the ability to change a paradigm of thinking. We strongly emphasize that the change from the unicorn world (the Universe/world) to the EDWs framework has been the greatest challenge in the history of human thinking until now! In fact, the EDWs perspective is the greatest Copernican revolution in the history of human thinking!

A combination between a theory and some experiments furnishes the best view of modern science. McEvoy and Zarate introduce six assumptions about modern science: (1) the classical image of the Universe-machine within an absolute space and time (2) all motions have a cause (cause and effect relationship) (3) determinism for motion (4) light is described by Maxwell electromagnetic wave theory confirmed by Young’s double slit experiment (1802) (5) energy is described either as particle or as wave (mutually exclusive alternatives) (6) the properties of the system could be measured. (McEnvoy and Zarate 2013[[81]](#footnote-81), pp. 8-9) There are certain phenomena that belong to a particular EW, but certain behaviors of this phenomena can be explain only through correspondence with phenomena which belong to an EDW! Therefore, “determinism” and “causality” are available only for certain phenomena which belong to the same EW. Light is both an electromagnetic wave and some particles (photons), but these set of entities belong to the EDWs. (We will investigate more details below) “Energy” (like “light” and many other phenomena, i.e., entities and processes) is also a “label” for entities and processes which belong to the EDWs! Anyway, we recall that there is no “cause-effect” between the entities which belong to the EDWs. Moreover, for explaining certain phenomena from a particular EW, we have to introduce the idea of “correspondences” with phenomena from an EDW. The EDWs perspective furnishes neither a classical view, nor a quantum view (both constructed within the “unicorn-world”) about quantum processes, but a new perspective on the eternal classical problems of quantum mechanics (QM)!

McEnvoy and Zarate present the “thermodynamics” before the “quantum mechanics”. Among other things, they write about the “principle of conservation energy”. (McEnvoy and Zarate 2013, p. 17) Within the EDWs perspective, we have to be aware that the principle of conservation energy has to be somehow changed. In a particular EW, a system can loose some energy in that EW, but this energy can correspond (in other format) to something else which belongs to an EDW! Also, the essential notion of “entropy” (a particular case being about heat: heat transferred from a hot body to a cold one) (McEnvoy and Zarate 2013, p. 18) has to be explained within the EDWs perspective. (See our work from 2017)

The entropy of an isolated system always increases, reaching a maximum at thermal equilibrium, *i.e.* when all bodies in the system are at the same temperature. (McEnvoy and Zarate 2013, p. 18)

This famous law has to be re-interpreted within the EDWs perspective. We can consider a particular case just a system formed by the macroscopic bodies. The second thermodynamic law (“the heat flows from the hot body to the cold body”) has to be translated within the EDWs perspective. We explain the “entropy” for the electromagnetic waves (the field-EW): the electromagnetic waves (speed c, always) tend to become straighter and straighter because a straight electromagnetic wave is natural, while a curved electromagnetic wave needed a cause to become “curved”! Probably, there is a phenomenon from the pre-Big-Bang which corresponds to the straight electromagnetic wave. Between these EDWs, there is also the micro-EW. The behavior of the microparticles correspond to the behavior of the electromagnetic waves (the field-EW) and the macro-bodies (the macro-EW). Thus, the correspondences have to be equivalent to some previous scientific laws constructed within the unicorn world... About J. C. Maxwell (an atomist) referring to his atomistic view about “kinetic theory of gases”, we have these two statements:

- “But Maxwell’s analysis, based on Newton’s mechanics, showed that temperature is a measured of the microscopic **mean squared velocity** of the molecules.”

- “Heat is thus caused by the ceaseless random motion of atoms.” (McEnvoy and Zarate 2013, p. 22)

From our viewpoint, the temperature is a feature of the macroscopic bodies (human body has a temperature!), while the motions of microparticles (for instance, “atoms”) belong to the micro-EW.[[82]](#footnote-82) The “fire” and the body belong to the macro-EW, but in the same “place”, at the same “time”, there are the microparticles (the micro-EW) and the radiations (the electromagnetic field-EW).[[83]](#footnote-83) The authors introduce the section regarding “The Thirty years war (1900-30) – Quantum Physics versus Classical Physics”, with three steps which we would like to investigate them here. Introducing three points (Planck, Einstein, and Bohr contributions – the “*Old Quantum Theory*”, see below), this chapter starts with a very problematic sentence: “Each involved the interaction of radiation and matter as reported by reliable, experimental scientists. The measurements were accurate and reproducible, yet paradoxical…” (McEnvoy and Zarate 2013, p. 26) Obviously, we have to strongly emphasize that “radiation” and “matter” belong to the EDWs, and even “matter” in general belongs to the EDWs! With this wrong sentence (constructed within the unicorn world), we can understand the wrong way of QM, even at the beginning!

(1) The black-body radiation

“When an object is heated, it emits radiation consisting of electromagnetic waves, i.e., light with a broad range of frequencies.” (McEnvoy and Zarate 2013, p. 27) We have again, the wave-EW (the field-EW), the object (the macro-EW) and the correspondences between different phenomena which belong to these EDWs![[84]](#footnote-84) Importantly, it is Planck’s discover according to which an entity (“oscillator”, the atoms were not discovered) absorbs and emits energy not in a continuous but “in a discontinuously way” (in small indivisible units of **e = hf**, which Planck called “energy quanta”) (McEnvoy and Zarate 2013, p. 40):

The classical approach of Rayleigh-Jeans works fine at low frequencies, where **all**, the available vibrational modes can be excited. At high frequencies, even though plenty of modes of vibration are **possible**,…, not many are excited because it costs too much energy to make a quantum at a high frequency, since **e = hf**. (McEnvoy and Zarate 2013, p. 41)

We have to recall that the electromagnetic field (the field-EW), as a whole, is a continuous field and not “composed of entities”. This field just *corresponds* to the microparticles (the micro-EW).

(2) The photoelectric effect

We do not investigate in detail the framework in which Einstein developed his “heuristic approach” about the existence of “photons” (based on Boltzmann’s form of the second law and Wien’s law - high frequency), but we introduce the conclusion from this book:

With the validity of the Wien law (i.e., high frequency), radiation behaves thermodynamically as if consists of mutually independent energy quanta of magnitude k β f. in other works, like light particles… (p. 51) all light and electromagnetic radiation travels in bundles of energy equal to **hf**.” (McEnvoy and Zarate 2013, p. 52) …

So, the ejection of the electrons by “light” is possible because

the energy quanta penetrate the surface layer of the metal of the target electrode, their energy is transferred, at least in part, into the kinetic energy of the electrons and some are ejected. (McEnvoy and Zarate 2013, p. 53)

The “ejection of electrons” is possible because of their interactions with photons. “The energy quanta penetrate the surface layer of metal of the target electrode” is a statement constructed within the unicorn world: “energy quanta” is, in reality, the electromagnetic wave, surface layer of the metal (electrode) is a macro-entity, the “energy that is transferred” is the electromagnetic field and this is “transformed into the kinetic energy” of the electrons (the micro-EW). These are “ejected” from where? From a huge amalgam of microparticles which corresponds with the macroscopic electrode (the macro-EW).[[85]](#footnote-85) At the end of XIX century, J. J. Thomson discovered the existence of “electron”[[86]](#footnote-86) and Rutherford introduced the idea of “nuclear atom”.

(3) Bright line spectra and Bohr

Based on the works of Melvill, Kirchhoff, Balmer, Thomson, Rutherford, J. W. Nicholson, Planck/Einstein relationship between the “energy of a light photon and its frequency E = hf”, and others, Bohr introduced the “stable orbits” for the revolving electrons around the “nuclear atom”. The “quantum orbital states” of atoms are given by their correspondences with the electromagnetic waves (having particular features as wavelengths and frequencies). From our viewpoint, the “jump” of an electron from one state to another state is neither a “classical”, “realistic” movement, nor a “quantum jump”, it is an EDWs’ “movement”, i.e, it refers to the correspondence between the wave and the particle (the EDWs):

A sudden transition of the electron between two stationary states will produce an emission or absorption of radiation with a frequency given by the Planck/Einstein relation h f = Ei – Ef. (McEnvoy and Zarate 2013, p. 88)

Let us translate this statement within the EDWs perspective:

A sudden transition of the electron between two stationary states (these states correspond to certain frequency to the corresponding electromagnetic wave) will correspond to an emission or absorption of radiation given by the Planck /Einstein relation. (electromagnetic wave).

The “sudden” transition means exactly the disappearance of the electron from an “one stationary state” and its appearance in the “other stationary state” based on the *correspondence* between the microparticle and the electromagnetic wave! More exactly, the transition of the electron from one state to another correspond to the sudden changes of the electromagnetic wave in different parts. The same observation is available for the “Zeeman effect” (later, “Anomalous Zeeman effect”, AZE): more extra spectra lines appear when the atoms are placed in a magnetic field. (McEnvoy and Zarate 2013, p. 92) We have to recall that the electric and the magnetic fields are EDWs, i.e., the magnetic field corresponds to the electric field, and this is the reason, the magnetic field “influences” (in reality, it is about “correspondence”, no more) the electric field (and vice-verse). Anyway, AZE is related to the Pauli’s “hidden rotation” which produces an “extra angular momentum responsible for the AZE”: “the electron itself is spinning” (McEnvoy and Zarate 2013, p. 97), but Pauli indicated that the angular momentum of the spinning electron is “**one-half of the normal value h/2ℼ of atomic orbits**, so-called **spin 1/2**”. (McEnvoy and Zarate 2013, p. 98) In reality, this kind of “spinning” is due to the *correspondence* between the electron and the wave. There is a direct correspondence between a “rigid” electromagnetic wave and the electron, and the electron has very small dimensions in correspondence with particular features of the wave, and this is the reason the electron cannot have the “spin 1”. A planet (a macro-object) can rotate completely (spin 1) just because of its mass and because of the “weak correspondence” between the mass of the planet and that “rigid and continuous” electromagnetic field. Obviously, a planet corresponds to many electromagnetic waves (better, to an electromagnetic field), but exactly because of its mass and dimension, a planet can rotate completely (the spin is 1), while because the electron is quite small (a “strong correspondence” with the wave), the microparticle cannot have the spin 1. *Essentially, there are different “degrees of correspondences” between the planet-wave and electron-wave!*

There are various approaches to the quantum measurements problem, but the main approaches are Copenhagen interpretation (with Bohr, the leader), the many-worlds approach (Everett, Deutch, etc.), Bohm’s approach, and Girardi, Rimini & Weber’s approach. (See Putnam 2005[[87]](#footnote-87); Greene 2004) Trying to save the phenomena (the “empirical”), different researchers introduced certain “Ptolemaic epicycles” in constructing various alternatives to the quantum mechanical-world, but working within the unicorn-world, all approaches explaining quantum phenomena are quite wrong. In support of the EDWs approach, in this section we will continue analyzing certain notions and alternatives from quantum mechanics. We want to show, in detail, that working within the unicorn-world, the physicists have not been able to explain certain “spooky” problems or “mysteries” of quantum mechanics in the last 100 years. With the existence of EDWs, we clarify or reject these “mysteries” and (thought) experiments from the quantum mechanics.

**4.2 Particles vs. fields (waves)**

The 19th century brought about several great disputes on particles and fields (electric and magnetic fields). These problems followed the strong debate regarding the nature of the light (particles or waves). Using elementary particles from mathematics, Newton embraced an atomistic view about matter: light is composed of particles. Huygens thought that light was a wave and the movement of the waves was possible because of the “ether”. In the history of physics, we can find many problems in understanding the nature of light and phenomena like “electric field” and “magnetic field”. About the “interference”, there was the famous Young’s “double-slit experiment” (1801) which indicated that the light was a wave (see below). Maxwell’s electromagnetic waves theory (1865) indicated the light was a wave. (McEnvoy and Zarate 2013, p. 108) Einstein argued for the light was made of particles (photons). (McEnvoy and Zarate 2013, p. 109) In the first half of 20th Century, in different articles, Einstein pointed out that from one side, Newton (light as particles) and Leibniz (Faraday, Huygens, Maxwell and Hertz) (light as manifestation of a field) represented two scientific theories that used two *incompatible concepts*! Neither the concepts of one theory can explain the notions of the other theory. (Einstein (5) in McEnvoy and Zarate 2013, p. 165 or p. 169) Obviously, because of the the unicorn-world, the framework of thinking which has dominated all philosophers and scientists until the discovery of the EDWs perspective by Gabriel Vacariu, we can clearly understand the great debates on this famous scientific experiment. In reality, the microparticles and the electromagnetic fields belong to the EDWs and this is the reason for such noticeable “incompatibility”!

As we will see below, using the field theory and the geometry of space and time, Einstein tried to construct a “marble” theory about the “world”/“Universe”. Few years later, in opposition to his view, it was quantum theory, a theory of “wood” (Kaku). Quantum theory indicated that Einstein’s general theory of relativity was just “approximations” about something (the “planets”) which really did not exist. However, in quantum theory, the main problem has been the “incompatibility” between a particle and a wave (which was produced through particular changes in the features of the electromagnetic field which covered everything that has been observable until our days). As it is showed in other works (Vacariu 2005, 2006, 2008), this problem was generated by the mixture of EDWs, the particle-EW and the field/wave-EW.[[88]](#footnote-88) Obviously, as we have seen in the previous chapter, Einstein’s general relativity refers to the macro-EW. Quantum theory refers to the EDWs than the macro-EW, i.e., to the micro-EW and the field-EW.

If we have to investigate the relationship between electromagnetic waves/field and microparticles, we want to see what does it mean an electromagnetic field/wave for the EDWs perspective. It is well known that the “electric charges” generate the “electric fields”, and the “magnets” generate the “magnetic fields”. Also, the “electric charges” in motion generate the “magnetic fields”. The magnetic force (of a magnetic field) “acts” on the electric charge which moves inside that magnetic field. (Presura 2014, p. 54) Essentially, it is that, according to Ampere, the electric fields generate the magnetic fields which generates the electric fields, and so on.[[89]](#footnote-89) Also, “Faraday law” indicates that the variable magnetic fields generates the variable electric fields. (Presura, p. 68) We have to explain this phenomena within the EDWs perspective. The magnetic field and the electric field (the electromagnetic field which belongs to the electromagnetic field-EW) are two faces of the same phenomena which belongs to an EDW, an EW that is neither the field-EW, nor the micro-EW![[90]](#footnote-90) An physicist believes that the magnetic field, for instance, “acts” on the trajectory of electric charges (microparticles) in motion through the magnetic force. (Presura 2014, p. 67) From our viewpoint, the field and the particle exist in EDWs, therefore, the magnetic field “acts” not on the particle, but on a part of the electromagnetic field (the field-EW) which corresponds to that particle (micro-EW). The microparticle does not exist for the electromagnetic field, therefore a direct “act” of the (electric or magnetic) field on the microparticle is quite impossible! Moreover, the “quantum particle” is not like a “ball”, but something totally different. We have NOT to imagine that the microparticle corresponds to a “part of the wave/field” which rotates completely and this “rotating energy ball” would correspond to the “rotating completely particle”! Why? Because there is no “part of the wave” which completely rotates (380º) since, in its ontology, the electromagnetic wave/field is an *indivisible* entity (having particular properties). More exactly, the entire wave (not only that small “enfolded”/coiled up/wrapped part of the wave) corresponds to a microparticle.[[91]](#footnote-91) In this context, we recall Maxwell’s equations which unifies the electric and magnetic field in the “electromagnetic field”. These equations are about:

1. The electric charge generates an electric field.

2. There are no magnetic charges associated with the magnetic field (there are no magnetic monopoles).

3. A variable magnetic field generates an electric field. (Faraday’s electromagnetic induction law).

4. A magnetic field is produced either by the electric charges in motion or by the variations of electric field. (Presura 2014, p. 69)[[92]](#footnote-92)

Again, within the EDWs perspective, there is no problem in interpreting Maxwell’s equations. For instance, referring to the first equation, we have to consider that the electric charge (a microparticle) does not “generate” an electric field since these entities belong to the EDWs. It is about the “coiled up/wrapped” electromagnetic wave (which corresponds, in the micro-EDW, to a microparticle) which generates the electromagnetic “field”. Regarding the third law, the magnetic field and the electric field are two faces of the same phenomena which belongs to an EDW than the electromagnetic-field-EW![[93]](#footnote-93) The same observation is available for the fourth laws. Interestingly, if the electric charges generates the electric field which generates the magnetic field which generates the electric field (and so on), this process continues even if the electric charges disappear![[94]](#footnote-94) (Presura 2014, p. 70)

We have to investigate a very important detail of quantum mechanics: the energy takes only *discrete* values (not continues values). In order to explain the “black body radiation” Planck, one of the father of quantum mechanics, quantifies the quantum energy (i.e., the energy can take only discrete values). (Presura, p. 214)[[95]](#footnote-95)

For us, in our macroscopic world, the levels of energy seems to be continue, and not discrete values. Therefore, in classical physics, the energy of a body will evolve continuously. In reality, however, the evolution takes place through jumps from one level to another. Because the difference between discrete levels of energy is very little, we do not perceive this evolution in jumps. (Presura 2014, 215)[[96]](#footnote-96)

Let us explain this paragraph within the EDWs perspective. Presura writes here about the macroscopic “level” (“world”) and the microscopic level, but he forgets to introduce the field/wave in this equation! The electromagnetic field/wave is *continuously* (it has no “discrete” values), and we have to recall that a microparticle (“discrete” entity) corresponds to a wave/field (“continuously” entity). There are “discrete values” for the energy at quantum “level” only when we refer

(1) to different parts of the continuous field having different values

(2) to the microparticles.[[97]](#footnote-97)

From the electromagnetic wave/field[[98]](#footnote-98) viewpoint, “directness” would be a wrong notion, exactly as for a macroparticle, such “discreteness” is also a wrong notion.[[99]](#footnote-99) In 1923, de Broglie discovered that the microparticles needed to be *associated* with the electromagnetic waves:

A photon with measurable frequency (wavelength) interacts with a single electron…

“It seems certain to me that the propagation of a wave is associated with the motion of a particle of any sort… photon, electron, proton or any other.” (de Broglie) (in McEnvoy and Zarate 2013, p. 111)

Obviously, in the micro-EW, each microparticle corresponds to a particular wave (all waves represent the field, that is the field-EW). Important is that, the next section has the title “An associated wave”. Within the unicorn world, this expression has no meaning! De Broglie believes that these “waves I call ‘pilot’ waves which guide the particle in its motion” (McEnvoy and Zarate 2013, p. 112), but there are the “phase velocity of wave” and the “group velocity of wave packet” (McEnvoy and Zarate 2013, p. 113).[[100]](#footnote-100) A wave cannot “guide” the particle since the wave does not exist for the particle. Obviously, the correspondence between the wave and the microparticle (in EDWs) indicates that the “wavelength of a light is **decreased**, the momentum of the individual light photons is **increased**.” (λ = h/p) (McEnvoy and Zarate 2013, p. 114) Essentially, all the particles were associated with the electromagnetic waves (proved using diffraction experiment) demonstrated by G. P. Thomson (the wave property of electrons) (30 years after his father, J. J. Thomson proved that electrons were particles). (McEnvoy and Zarate 2013, p. 117) De Broglie introduces the “pilot wave” that is always “attached” to or “associated” with a microparticle (an electron, for instance). (Presura 2014, p. 223) That is, a microparticle has to always to be “associated” with an electromagnetic wave. What does it mean “attached” or “associated”? Both notions are wrong terms used by physicists working within the unicorn world! In reality, the notion has to be the “correspondence” between the electron and the pilot wave. Presura writes that “de Broglie furnished a physical justification of the selection of Bohr’s particular orbits: there are ‘auto-selected’ those orbits of the electron for which the wave attached to the electron is in resonance on orbit.” (p. 223)[[101]](#footnote-101) Again, in this sentence, there is a mixture of EDWs: we have to replace “attached” with “correspondence”. Presura indicates that the same de Broglie’s relationship between the impulse and the wavelength is available for the impulse of a photon. That is, both the electron (described by its pilot wave) and the photon (described by its pilot wave) have the same relationship between the impulse and the wavelength. “The coincidence is not random. An electron has to be described not only by its corpuscular properties, but also by its undulatory properties” furnished by the “correlations with the wave pilot”. (Presura 2014, p. 224) Of course, there are EDWs here: a microparticle has certain micro-properties and it *corresponds* to an electromagnetic wave. There are some physicists who, working within de Broglie’s approach, have used the notion of “correlation” or “association” between the wave and the particle. Nevertheless, all of them have been working within the unicorn world!

We introduce now the “Triple birth of the New Quantum theory”: Heisenberg’s “matrix mechanics”, Schrödinger’s wave mechanics, and Dirac’s quantum algebra” (McEnvoy and Zarate 2013, p. 120)

(1) Heisenberg’s “matrix mechanics” (“the energy levels of atoms” are “described purely in terms of numbers” (McEnvoy and Zarate 2013, p. 131) corresponds to Schrödinger’s “wave equation” (“that described in some magical way the quantum aspects of the system… He had taken de Broglie’s idea of the wave description of matter very seriously indeed.”[[102]](#footnote-102)) (McEnvoy and Zarate 2013, p. 134) Thus, the “integers called quantum numbers bu Bohr, Sommerfeld and Heisenberg were now related in a natural way to **the number of nodes in a vibrating system**.” (McEnvoy and Zarate 2013, p. 137) Obviously, “related in a natural way” means the correspondences between the “nodes” of waves and the microparticles! It was time for Max Born to use the “probability” for interpreting wave function, i.e., the probability interpretation of Schrödinger’s wave equation. Born’s thought was this one:

Ψ is the **probability amplitude** for an electron n the state n to scatter into the direction m. It is, in a sense, its own wave. When it is squared and the absolute value is taken, it turns out to be a **physical probability** of the associated particle’s presence.” (McEnvoy and Zarate 2013, p. 144)

It is clear, from the EDWs perspective, that the electromagnetic wave just corresponds to the microparticle. The physical probability is just an explanatory tool for human being in explaining the correspondences between ED entities which belong to the EDWs!

(2) During a decade, Born’s probability superposition of quantum states was quite accepted, but Schrödinger introduced his famous “cat experiment” in which, because of probability of radioactive source to decay is 50% yes, 50% no, than the cat is alive and dead before the radioactive decay to take place. So, Born’s interpretation of quantum mechanics was the following: before we open the box, the cat is neither wholly alive nor wholly dead but a mixture of the two states, the superposition of the two wave functions.” (McEnvoy and Zarate 2013, p. 147) Schrödinger could not accept the “probability interpretation of his wave function! “Yet today, 60 years later, his so-called *paradox* is used to teach the concepts of quantum probability and the superposition of the quantum states.” (McEnvoy and Zarate 2013, p. 147) Clearly, working within the unicorn world, there are certain “paradoxes” which could not have been explained by anyone! For Born, our “act of observation collapses the superposition of the two wave functions to a single one, making the cat definitely dead or alive.” (McEnvoy and Zarate 2013, p. 147)[[103]](#footnote-103) Only within the unicorn world, we could imagine such “superposition”! Moreover, Wigner’s “consciousness role in collapsing wave function” (p. 148) is even more absurd, since there are at least three EDWs: the mind-EW, the micro-EW and the field-EW!

(3) The third interpretation was furnished by Maurice Dirac (an English mathematician). Based on the “non-commuting quantities” (AxB not equal BxA) (McEnvoy and Zarate 2013, p. 150), Dirac constructed his “transformation theory” in which Heisenberg and Schrödinger interpretations were “special cases” of his “own more general formulation”, *all the interpretations were equivalent*! (McEnvoy and Zarate 2013, p. 151) “By consistently applying quantum mechanics to Maxwell’s electromagnetic theory, I constructed the first know specimen of a **quantum field theory**.” (McEnvoy and Zarate 2013, p. 152) So, using both Faraday’s notion of “continuous field” and discrete entities (microparticles), Dirac interpreted “light” as “waves **or** particles”! (McEnvoy and Zarate 2013, p. 152) “Dirac’s was well understood formalism which if interrogated in a particle like way gave particle behaviour and it interrogated in a wave-like way gave wave behaviour.” (Polkinghorne, in McEnvoy and Zarate 2013, p. 153) In other words, if we use a particular instrument of observation, we “observe” a wave, if we use another instrument of observation, we “observe” a particle. Working within the unicorn world, some physicists (including Bohr) believed that there was a kind of “noumena” which we could never observe and what we observed were just “phenomena” (given by using one or the other instrument) of this “noumena”. In our terms, there are EDWs (= the phenomena belonging to the EDWs) and the Hypernothing (the noumena).

In quantum mechanics, the notion of “probability wave” is very important: “… we will interpret the pilot wave of an electron as a *probability wave* for electron which gives us the probability to find the electron in one place or another.” (Presura, p. 229) From our viewpoint, this “probability” was introduced just because the microparticle and the wave are in the EDWs and the microparticle corresponds to the entire electromagnetic wave, even if it is the greatest probability for the microparticle to be in a place which corresponds to the “node” of the electromagnetic wave. The “probability” has to be understood as a pragmatic tool, but without any ontological commitments (as it has been interpreted until now!)!

The experiments of diffraction show that also the electron behaves as a particle, exactly as the light behaves like a particle. Somehow, there is a *unification*: both behaves also as wave and as particle. Some physicists interpret the results of interference saying that the electron is both wave and particle…. They say: the electron is particle because we detect it only as individual *particle*. On the other side, it is wave because it has to pass through both slits for creating the interference.” (Presura 2014, p. 229)

Obviously, there is no “unification” since there are two EDWs. Only using different apparatus of measuring, we can detect the electron in the micro-EW and the wave in the field-EW. Many physicists have believed that “the electron is *both* wave and particle”, but this description has been constructed within the unicorn world and it has lead to certain strong ontological contradictions![[104]](#footnote-104)

Duality wave-particle

A particle is described between the measurements only by its probability wave. The wave can have a process of interference with any other wave. At one measurement, we will find the particle localized in one place or another, with a probability furnished by its probability wave. Now there it is its corpuscular manifestation. (Presura, 229)[[105]](#footnote-105)

With the EDWs perspective: the microparticle is not “described between measurements” “only” by its “probability wave”. It would means that the particle does not exist between these measurements. Within the unicorn world, if the particle “exists between measurements”, there would be obviously a strong ontological contradiction! Within the EDWs perspective, the “microparticle” is just a microparticle between our measurements because the microparticle has always been a microparticle before and after our measurements in its EW, the micro-EW.[[106]](#footnote-106) The “probability wave” refers just to the electromagnetic wave, no more or less. The particle is not localized by our measurement since it has always been *localized* somewhere, independently of our measurements. “...the pilot wave tells us where the electron can be find, with certain uncertainty which became, today, a principle…” (Presura 2014, p. 229). The correspondence between the microparticle and the node of the wave cannot be establish perfectly, therefore, the probability is just a tool of our observation but no something which has an ontological support. This is the reason the “pilot wave” is the “probability wave” or “wave function”. From our viewpoint, the wave-pilot does not “guide” the movement of the electron since the particle does not exist for the wave and the wave does not exist for the particle. Indeed, there is a *correspondence* that we can think as being a “guidance”, but no more. That is, there is not a “direct guidance” between the wave and the particle just because such “direct guidance” would presuppose a contact between the wave and the particle and this “contact” leads to strong ontological contradictions. We recall that the correspondences between the entities which belong to the EDWs do not have any ontological status. Why the wave pilot does not “guide” the electron? Since one EW does not exist for any EDW, then we cannot talk about such “guidance” between two entities which belong to the EDWs. Also, we cannot talk about the “identity” between a part of the wave (that is the “wrapped wave” which corresponds directly to the electron) and a microparticle, just because there are EDWs. We can talk about a guidance of the “node” of the electromagnetic wave by the rest of the wave, no more or less!

From our viewpoint, there were two reasons for the “fathers” of quantum mechanics (great physicists, anyway) for introducing the “probability wave”:

(1) They were working within the unicorn world.

(2) In reality, a particle is *associated* with the *entire* electromagnetic wave.

More exactly, here it is about the “*nonlocality*” of the microparticle.[[107]](#footnote-107) This “nonlocality” is furnished exactly by this fact: a particle corresponds to the entire wave! These two entities belong to two the EDWs and, only because of this reason, we can “associate” a microparticle with the “entire” wave. If Maxwell’s equations are for the photon, Schrödinger’s equation is the for the electron and it describes the evolution of the “probability wave”. (Presura, p. 234) Also, the equation describes the discrete “levels of system” (in Hilbert space). (p. 235) From our viewpoint, Schrödinger’s equation mirrors the *correspondence* between the electron and the electromagnetic wave. It is supposed that the electron has a greater probability to be in place then in another, but it can be everywhere with less and less probability. Since the electron corresponds to the entire wave, than indeed, the electron can be found in any point which corresponds with the electromagnetic wave, but it has the greatest probability to be found in the point which corresponds with that “node” of the electromagnetic wave. Since there are many points of any electromagnetic field, the electron corresponds to any of these points with different probabilities (greater the distance of a point from the node of the wave, less probability the microparticle to be there). We repeat, all these probabilities are, for us, just pragmatic instruments to describe phenomena from the EDWs and not a strange “ontological framework” (accepted by many physicists, following Born). Again, working within the unicorn world, the physicists have been forced to introduce the “superposition states”! The “quantum superposition” is a wrong notion since, within the EDWs, there is no “superposition” of states because one EW does not exist for any EDW.[[108]](#footnote-108)

For explaining the “quantum tunneling” (an effect of the evolution of “probability wave”), Presura introduce the analogy with a macroscopic “ball” hitting a macroscopic wall: always a ball which hits a wall will return back (it is quite impossible for the ball to pass through the wall). If we send an electromagnetic wave through the wall, a part of this wave will be reflected, a part of it will pass “through the wall”. Essentially, it “has to be remarked that the wavelength of the packet of the wave transmitted (which give us the impulse of the ball, that is its energy) remains unmodified.” (Presura 2014, p. 238) This process can be described much better using the EDWs perspective. In reality, there are the micro-EW, the macro-EW, the wave-EW and their ED entities/interactions:

(1) the ball interacts with the wall (both macroscopic entities),

(2) the microparticle (which correspond to the ball) interacts with an amalgam of microparticles (which corresponds to the wall),

(3) the packet of the wave (which corresponds to the microparticles which correspond to the ball) interacts with an amalgam of waves (which correspond to the microparticles which correspond to the wall).

The wavelength of the “packet of the wave remains unmodified” just because the wave does not exist either for the wall or for the microparticles (which correspond to this wall). The microparticle can be found everywhere because of its probability wave. (Presura, p. 295) “If, for instance, the probability wave is beyond the door, then the particle can be found in the other room, in the next moment.” (idem) This is “the effect of quantum tunneling”. If there is a “probability wave” between the Earth and the Moon, it is possible a particle to be found, in the next moment, either on the Moon or on the Earth, with the same probability. (idem) From our viewpoint, essentially, the electron, for instance, *corresponds* to the entire electromagnetic field which is spread in the entire “universe”. Moreover, the electromagnetic wave is an *indivisible* entity, therefore, the electron corresponds to something which exists in the entire universe. Because of its correspondence, we can find the particle either on the Earth or on the Moon, with different probability (obviously, there are greater probability the microparticle to be in the place where it is the corresponding “node” of the wave). Presura emphasizes an essential detail: an electromagnetic field can be *associated* with more particles (not only one), but these microparticles are not classical balls, but discrete packets of energy placed in different places. (Presura 2014, p. 334)[[109]](#footnote-109) From the “theory of the field”, we move to the “theory of particles”. (p. 336)

In reality, however, the particle is just a packet of energy of the field which represents it, the packet of energy that moves from one place to another… If we look with more attention, the “movement” of the particle does not happen, it is, better said, an illusion! The “movement” of the particle is then, in reality, the successive observations of the energy of this field in different places in space. All that exists is the field, according to Steven Weinberg…”. (Presura 2014, p. 338)

Obviously, Weinberg and all other physicists have been working within the unicorn world. According to their reductionist viewpoint (see also Penrose’s reductionism at section 4.8.5), the human being/body of Weinberg is neither a mind, nor a body, his “personal identity” is given not by the mind or by his brain/body not even by an amalgam of microparticles, but by an amalgam of electromagnetic waves! If true, (in other words, if “strong reductionism” is true) Weinberg has, of course, to change his card identity! If a policeman (an amalgam of waves) see Weinberg’s photo in his identity card (a false document, anyway), he cannot compare the photo with Weinberg’s body (a false entity!). Let us suppose the policeman asks Weinberg to tell him his name. Weinberg would use false entity (his mouth, part of the body that belongs to the macro-EW + his mind, an EW) to tell to the policeman false information (his name), since his “name” would describe nothing like a “person” (false entity). So, this discussion would be between two “illusory entities” (Weinberg and the policeman) within the wave-EW.

Let us summarize some classical steps of the development of quantum mechanics: Young's two-slit experiment.[[110]](#footnote-110) Schrödinger, the inventor of wave function, believed that it described the electrons. Born introduced the probability interpretation that became, under de Broglie’s duality of wave and particle, the association of the wave with a particle. Following Heisenberg’s uncertainty relations, Pauli proposed the wave function as the “probability amplitude” for the positions or momentum of the particle. Zeh supports Pauli’s idea that “the appearance of a definite position of an electron during an observation is a *creation* outside the laws of nature”. (Pauli in Zeh 2004, pp. 104-5, Zeh’s translation and his italics).[[111]](#footnote-111) The last steps are Bohm’s perspective (both electron and wave exist) and Bell’s approach (the global wave function has to be regarded as real). The “entanglement” (according to Schrödinger, “the greatest mystery of quantum theory” – Zeh, p. 106) involves the “superposition” of different quantum states. There are two classical examples of superposition: the spin of a particle can be spin-up and spin-down simultaneously, and the superposition is of wave and corpuscle. We recall Bohr's “principle of complementarity” (see section 4.8.1): we cannot observe the wave and the particle using the same measurement apparatus at the same time. Obviously, the phenomena belong to the EDWs, therefore we need different kinds of measurement apparatus!

Other developments showed that the main idea of the quantum mechanics (Standard Model) is that “*All matter consists of quarks and leptons, which interact by exchanging different types of quanta, described by the Maxwell and Yang-Mills fields.* (Kaku 1994, p. 124, his italics) Different forces are created through the exchange of different “quanta”! The Yang-Mills fields are just a generalization of Maxwell’s electromagnetic field. (Kaku 1994, p. 118) Oerter believes that according to quantum mechanics,

which was developed to deal with the new phenomena, particles sometimes behaved like waves, as if they were not small and hard but spread out like a field. At the same time, fields could behave like particles. The two entities, particles and fields, that had seemed so different were starting to show a family resemblance. (Oerter 2006, p. 17)

This paragraph reminds us about Wheeler’s famous dictum: “mass grips space by telling it how to curve, space grips mass by telling it how to move”. All sentences are constructed within the unicorn world, space and time do not exist, therefore all these statements are quite wrong: the particles and the fields belong to the EDWs and we have to replace “spacetime” (having an ontological status since Newton and illustrated by Einstein’s general relativity) with “nothing” (no ontological status). Unfortunately, Oerter furnishes a wrong example of this non-existing relationship:

Objects that display electric or magnetic properties are said to have an *electric charge.* This charge produces a field, rather like the barbecue produces an aroma. The larger the charge, the larger the field. A distant object doesn’t need to be told of the presence of the charge, it only needs to sniff out the field in its immediate neighborhood, just as your neighbors sniffed out your barbecue. (Oerter 2006, p. 25)

The “barbecue” (particle) does not exist for the “aroma” (field) since the particle and the field are just “complementary” (constructed within the unicorn world, Bohr’s notion of “complementarity” has no ontological background, see Vacariu 2008 and section 4.8.1 of this book), or much better they belong to the EDWs. Moreover, in the past, there was another major mistake: everyone believed that the macro-objects were “composed” of microparticles (within the identity theory!). Ontologically (that is, hyperontologically), to avoid any hyperontological contradictions, we cannot assume that both the macro-objects and the micro-objects exist within the same place, at the same moment. However, we cannot *reduce* the macro-objects to the micro-objects, since, for instance, we cannot explain the gravity by the non-existing “gravitons”. Also, we cannot explain Weinberg’s body through the corresponding electromagnetic waves! So, if we want to maintain the existence of our bodies and our minds, we have to maintain the existence of all sets of entities (the electromagnetic fields, the macro-entities and the micro-entities) not within the unicorn world, but within the EDWs. Let us offer more details about the (un-)famous relationship between the particles and the electromagnetic waves (this very problematic “relationship”). For Close,

an electromagnetic wave acts like a burst of quanta – photons. The energy of any individual photon is proportional to the frequency (*ν*) of the oscillating electric and magnetic fields of the wave. This is expressed in the form *E* = *hν.* (Close 2004, p. 25)

What does the author mean by “act”? Does Close speak about the electromagnetic wave or the particle? We can use this expression only in a theater and the unicorn world is indeed a “theater” with an “ideal scene” created by the human beings when they had just begun to think, before the discovery of the EDWs! Obviously, the electromagnetic wave does not “act” like photons, since the waves and the photons belong to the EDWs. The energy of any photon corresponds to the frequency (*ν*) of the oscillating electric and magnetic fields of the wave”. However, the fields/waves belong to the field-EW.

Think of the magnetic field like a field of wheat: Each wheat stalk is an arrow, and the “field” is the entire collection of arrows. Unlike the wheat field, which only has a stalk every few feet or so, the magnetic field has an arrow at every spatial point. That is, to specify the magnetic field completely, one must give the strength of the field (length of the arrow) and direction of the field (direction of the arrow) *at every point in the entire universe.* Obviously, it would be impossible to experimentally determine the magnetic field at every point, even for a limited region, as it would require an infinite number of measurements. In real life, physicists must be content with having a pretty good idea of the field values in some limited region of space. To a physicist, the field is everywhere: in the air around you, penetrating the walls of your house, inside the wood of your chair, even inside your own body. (Oerter 2006, p. 26)

Working within the unicorn world, if the”field” is present “at every point in the entire universe” and, at the same time, the particle has to be present somewhere (“here”, for instance), we reach certain (hyper)ontological contradictions, since two entities/processes cannot be present in the same place, at the same moment. The field or the wave cannot “penetrate” the “walls of your house”, since the walls and the wave belong to the EDWs. Within the unicorn world, almost everybody (recall Bohr’s complementarity) believes that a particle and a small part of the field occupy the same place, at the same time. This is a clear ontological contradiction. Therefore, we either give up an entity/process or we change the framework with a new one which avoids this contradiction: we replace the unicorn world with the EDWs.

In classical physics, the universe is composed of particles and fields. A complete description of the world at any instant must specify the locations of the particles, the values of the fields, and how both are changing. From this information and the laws of interaction between particles and fields, the complete future of the universe can be predicted. In quantum mechanics, the basic picture is radically different: a. The motion of any particle is described by a wave, known as the *wave function* or *quantum field.* b. The probability for the particle to be detected at a given point is the square of the quantum field at that point. c. The quantum field changes according to a mathematical law known as the Schrödinger equation. In (A), we have the first hint that particles and fields are not such wildly different entities as they appear in classical physics. The full realization of this wave-particle duality comes in relativistic quantum field theory, where particles and fields are treated identically. Relativistic quantum field theory is, then, a unification of particles and the forces acting on them. The terrible price we have to pay for the unification of particles and fields is revealed in (B). The laws of quantum mechanics are *random;* only probabilities can be determined. (Oerter 2006, p. 61)[[112]](#footnote-112)

Being constructed within the unicorn world, both the classical and the contemporary physics have been wrong. It is completely mistaken to believe that the “universe is composed of particles and fields”: the notion of “universe” is wrong (the “unicorn world”) and even the notion “composed” is wrong. The planets, for instance, are not “composed” of microparticles, since these entities belong to the EDWs and, more importantly, the planet does not exist for the microparticles so how is it possible to relate one word with another? (a) The “motion of a particle” is described, indeed, “by a wave” (wave function or quantum field), but there is a “corresponding” description! (b) “The probability for the particle to be detected at a given point” is given by the corresponding place where the node of the wave is placed. It is meaningless to talk about the “interaction” between the “particles” and the “fields”. The motion of a particle is not “described” by an electromagnetic wave, but *corresponds* to that wave! When we consider the “forces” as being “waves”, then the “unification” of particles and “forces acting on them” is quite wrong since we talk about two EDWs. A “complete description of the world” does not exist, since the “world”/“Universe” does not exist at all.

Apparently, there are two reasons for the use of “probability” in describing the microparticles: (1) the dimensional relationship between us (our macroscopic apparatus) and the microparticles (2) the correspondences between a particle and an electromagnetic wave. The macro-apparatus does not exist for the microparticles (or waves) anymore. Also, the wave does not exist for the microparticle. Only within the unicorn world, it was possible to consider the relationship (including the identity theory and the “property dualism”) between the micro-particles and the macro-particles, between the electromagnetic waves and the particles, the mind and the brain or the organism and life. Oerter draws the attention upon the fact that nothing is

logically wrong with an interpretation that avoids the electric field concept entirely, in which energy leaps into and out of existence like this. However, the electric field concept is so useful, and the conservation of energy so compelling theoretically and so well established experimentally that it seems eminently reasonable to consider both energy and electric fields as real in the same sense that atoms (and cars) are real. (Oerter 2006, p. 82)

Within the unicorn world, this statement leads to certain ontological contradictions: how is it possible to place the microparticles and the fields in the same space, at the same time? In reality, the microparticles and the fields belong to the EDWs. Oerter wonders:

What about quantum mechanics? Is the quantum field real? True, it describes the motion of matter (the electron, say) and therefore energy (the electron’s kinetic energy, for example) from one place to another and so, like the electric field, would seem to be real enough. But the probability interpretation makes this view difficult to maintain. The main question in this information interpretation of the quantum field is this: How does the electron know where it should be? If the quantum field is not a physical object, why is the electron’s probability always governed by the quantum field? (Oerter 2006, p. 83)[[113]](#footnote-113)

As every competent physicist, within the framework furnished by “probabilities”, Oerter asks how the electron “knows” where it should be. He believes that maybe “there is a deeper theory of the electron. Perhaps the electron has some unknown properties that determine its motion, or perhaps it interacts with a guiding wave that tells it where to go.” (idem) Obviously, there is no interactions between the electron and the wave. The quantum “enigma” (non-locality or probability) appears again. As a guiding line, Oerter introduces Bell’s inequalities.[[114]](#footnote-114) (p. 83) (For these problems, Vacariu 2008, Vacariu and Vacariu 2010, Vacariu 2016) But writing Schrödinger’s equation, as usually in quantum mechanics area, Oerter believes that the electron “knows where it should be”. From our EDWs perspective, this opinion is wrong. It is only about the correspondence between the electron and the electromagnetic wave. At page 85, Oerter, writes that “the quantum field ψ, apparently does not correspond to any known physical quantity.” (2006) Obviously, working within the unicorn world, Oerter is wrong. The “clockwork universe” (everything being determined in this universe full of banal causalities) is rather strange in quantum mechanics:

Because of the strange, non-local nature of the quantum field that we saw earlier, any two electrons that interact carry a strange sort of correlation, an instantaneous connection that can be ascribed neither to a property that the electron has of itself nor to a communication (in the usual sense) between the electrons. (Oerter 2006, p. 85)

Here we have the un-famous “entanglement” between two particles. In reality, there is a *correspondence* between the continuous wave (with two peaks/nodes) and those two microparticles.[[115]](#footnote-115) The entanglement cannot be explained within the micro-EW (where those two microparticles are placed), but it is does not mean we have here only a “dual aspect” of the “real nature”/noumena or “dual property”/property dualism. There are EDWs, no more or less! Oerter believes that the electrons are caught in a “web of interactions” and any electron has a “kind of mystical instantaneous connection with every object in the universe”. (p. 86) We can give up this “mysticism” only by accepting the EDWs perspective. Let us investigate quite a long paragraph about quantum mechanics related to the particles and the fields:

In nineteenth-century physics, the universe contained two things: particles and fields. Particles were tiny and hard, like small billiard balls. Fields were elastic and spread throughout space. Particles produced fields according to their electric charge and their motion, and particles responded to the fields of the particles around them. Relativistic quantum field theory completely eliminates the distinction between particles and fields. Matter (the electrons and positrons) and forces (the photons) are both described in the same way—by quantum fields. Quantum fields combine particle nature and field nature in a single entity. The quantum field spreads out through space, just like a classical field, but it is *quantized:* When you try to measure the field, you always find a whole particle, or two particles, or none… This dual nature of quantum fields is reflected in the two descriptions physicists employ when working with them. Feynman diagrams picture the field as a dense mesh of tiny interacting particles. Schwinger instead pictured the field as a continuous collection of harmonic oscillators, spread throughout the universe. Both pictures are useful in their own way. Schwinger’s field picture makes the symmetries of the theory apparent and emphasizes the continuous nature of the quantum field. Feynman diagrams are easy to visualize, they emphasize the particle aspect of the theory, and they greatly simplify the process of calculation. (Oerter 206, pp. 121-122)

Again, in this paragraph, we clearly see the “dual aspect” of “universe”, which is, at least, two EDWs. Both Feynman and Schwinger are right, but within the EDWs: there are particles as well as fields there, but in the EDWs! Again, it has to be very clear that the particle does not exist for the field and the field does not exist for the particle. Therefore, Feynman handled the particles, Schwinger coped with the fields, but both were right only within the EDWs just because, within the unicorn world, there would be strong ontological contradictions. Later, at page 124, Oerter writes that the light “was something completely new—a quantum field, neither particle nor wave, but with aspects of both. But the revolution in thought goes deeper than that. Matter, too, can be described by a quantum field.”[[116]](#footnote-116) Obviously, as Gabriel Vacariu showed in his book from 2008, light is both photons and waves but in the EDWs.[[117]](#footnote-117) This complementarity (see Bohr’s idea of complementarity in Vacariu 2008) was extended to all microparticles, but the framework was wrong: the unicornworld.[[118]](#footnote-118) We think that the EDWs perspective could be a much better alternative for explaining Bohr’s complementarity and superposition, entanglement, nonlocality and nonseparability.

Taking the “collapse” as a criterion, Putnam makes a classification of different interpretations of quantum mechanics. (Putnam 2005) He replaces the “measurement problem” from quantum mechanics with the “collapse problem”. For him, the question is “Do we or don’t we need to postulate a ‘collapse’ and if we do assume a ‘collapse’, what should we say about it?” (Putnam 2005, p. 624) The collapse problem refers to the relationship between the waves and the microparticles or between the micro the and macro-observables. From the EDWs perspective, these kinds of interactions are certain “Ptolemaic epicycles” within the unicorn-world. Physicists believe that the “collapse” of the electromagnetic wave takes place when we measure the position of its “associated” microparticle. Before measuring the position of the electron, the wave is continuously becoming delocalized (i.e., its wavelength continuously increases, its amplitude continuously decreases). When, using a special apparatus for the microparticle, we

measure the position of the electron, its probability wave will have a quantum collapse, and it will suddenly change, it will be localized. Then, however, it will evolve from the last position until the next measurement. If nobody from the universe would measure the position of the electron, then its probability wave will delocalize on huge distance... (Presura 2014, 240)

In fact, there is no such “collapse” or “delocalized” processes, there are only correspondences between the wave and the particle. Presura indicates the “third postulate” of quantum mechanics:

At each measurement of electron, its probability wave has a quantum collapse (a sudden change). In the case we measure the position of the electron, the probability wave becomes, after measurement, localized in the area where the electron was found. (Presura, p. 240, his italics)

We have to translate this postulate in our language. The “collapse” means the indirect intervention of our apparatus (which does not exist either for the wave or for the particle) on the wave (in reality on “nothing” which corresponds to certain a certain electromagnetic wave/field) which corresponds to the electron.[[119]](#footnote-119) Moreover, if we stop measuring the position of the electron, the electromagnetic wave reappears in the same position as *before* our measurement. Why? Because our apparatus does not act (indirectly) on either the electromagnetic wave or the microparticle, but it “acts” on “nothing” (no ontology) which corresponds to both the wave/field and the electron! From our viewpoint, in reality, there is no collapse at all! The electromagnetic wave did not “disappear” when we take the measurement (with our macroscopic tools of measurement) and appears after we stop taking the measurement. In reality, with our apparatus, we localized (indirectly) the “position” of the electron, but the wave did not disappear, it is still “there”, not in the entire “universe”, but in an EDW than the microparticle and our tool of investigation, a macroscopic entity! More exactly, without collapsing, the wave always remains as part of the the field-EW. We recall that a microparticle corresponds to an electromagnetic wave (the “node” of the wave and the entire wave), while a macroparticle (a planet, for instance) corresponds to an electromagnetic field (a huge node of the wave which corresponds to a huge amalgam of microparticles).

A thing is clear: the quantum collapse happens at each measurement and not between measurements. Between measurements, the probability wave evolves continuum according the Schrödinger equation. At measurement, however, it suffers the process of quantum collapse, in the way in which at the next measurement we get the same result…

But what does it happen, in reality, with the electron before measuring it?” “Should I have to consider only its probability wave, which evolve according to Schrödinger’s equation? Contemporary quantum mechanics gives us the following answer: the electron cannot be consider like a ball between the initial moment and the that after measurement, but only as being a probability wave. Except the fact that it exists between those two moments, the electron has no property (form, dimension, etc.) excepting of course its probability wave which evolves. When we want to see if it is a place, we “look” there, and the probability to find it there is given by its probability wave. If the electron is there, then the probability wave suffers a quantum collapse, the electron falls practically “like from the sky” in that position where we finds it. (Presura 2014, p. 241)

What does it mean “collapse”? Does it mean “disappearance”? That is, when we measure the electron, does the wave disappear? Obviously, the answer is negative. Then what does it mean “collapse”? From our viewpoint, it means the observational change from one EW to an EDW! The wave does not collapse when our special measurement revels the existence of the electron. If the electron were existing only when we would measure it, then any human being would not exist (we are “made” of microparticles, don’t we?) until someone measure that body! If the electron has no properties until it is measured, then any human body has no properties until someone measure (“look at”) that body. The reductionists would believe we, humans (the human bodies), do not really exist. Then who is writing this sentences? An amalgam of microparticles? Or certain electromagnetic waves? Or a macro-object, the human body? We recall that the reductionist physicists believe that when we measure the particle, wave collapses, and when we stop measuring the microparticle the wave reappear! From the “sky”, of course...[[120]](#footnote-120) Surprisingly, isn’t it? Within the unicorn world, it has been quite unexpected such processes. However, within the EDWs perspective, it is a different framework that explains completely all “mysteries” of quantum mechanics (created within the wrong framework, the unicorn world!). The wave does not collapse at all. Our observation is moved, indirectly, from an EW (wave-EW) to an EDW (micro-EW), and this is all. Nothing disappear, nothing appear from the sky...

The “non-locality” (that is in fact the continuity) is a property of a wave which belongs to the EW2. Again, we strongly underline that the “space” of this EW2 is also the “whole of cosmic space” (“space is just a pragmatic word)! The difference between two EDWs is given not by their “spatiotemporal frameworks” (pragmatic words) (that is the same with different metrics for all EDWs except the mind-EW), but by their entities and the interactions among them. It is completely wrong to assign the property of non-locality to the relation between objects which belong to the EW1. All we can say is that the wave *corresponds* to the system of particles. Both Einstein et al.and those supporting the Copenhagen interpretation were mistaken because they introduced epistemological properties (which belong only to the EDWs) into the unicorn-world. Thus, the so-called “hidden variables” and “non-locality” or “non-separability” introduced to “save the phenomena” of the unicorn-world are just “empty concepts”![[121]](#footnote-121) Only the unicorn-world and a one-to-many relationship have forced us to even consider von Neumann’s idea of classical logic’s revision (a pseudo-alternative among others) for understanding Bohr’s complementarity.

In their famous paper, Einstein, Podolsky and Rosen concluded that quantum mechanics is an “incomplete” description of reality.[[122]](#footnote-122) From our viewpoint, the mixture of two EDWs cannot furnish any “complete” image! From an EDWs perspective, we can explain the “nonlocality” of the microparticles but only using the “correspondence” between entities/processes belonging to the EDWs! The main idea is that, following Einstein’s idea above of the “rigidity of objects”, we have to accept that the entities of each EW are “rigid”, i.e., any entity − except the “I” − exists only at its “surface”. Epistemologically different interactions represent the synthetization of the manifolds into epistemologically different entities. However, the difference is that, in analyzing the macro-objects, we do ignore the micro-forces/microparticles because these two kinds of entities belong to the EDWs. For instance, the planets, the microparticles and the electromagnetic waves are “rigid” objects. Their interactions determined their own existences only at their “surface”! The quantum states are all “rigid” objects. A quantum wave and a quantum particle are rigid entities. *The “non-locality” of two electrons corresponds in fact to the “rigidity” of a wave.* The “rigidity” means the indivisibility of the wave (which belongs to the EW2) and the fact that the wave is not composed of (but corresponds to) various microparticles (which belong to the EW1). The movement of an electron corresponds to the movement of the wave. In the EW1, action upon one electron does not act simultaneously on the other electron, because in any EW there is no signal that passes the speed of light. But acting on an electron, we act on the corresponding waves, even if we do not observe this process. Only the “rigidity” (indivisibility) of the wave (which belongs to EW2) means that the signal takes place simultaneously at both particles! We strongly emphasize that the “EDWs” are completely different than “parallel worlds”, “many-worlds” or “multiverse” from the theoretical physics. (Anyway, about this difference, see below)

**4.3 Young’s experiment and Wheeler’s delayed-choice experiment (1980)**

We have to remember that before, during and after our “measurements” of the whole experiment of observation, there are the EDWs and not the “unicorn-world”. In the hyperverse (all EDWs), there are always waves and particles, but in the EDWs. Our observation depends on our tool of observation at a particular moment. Within the unicorn world, we could not understand why we observe the “interference on a screen”, if we fire electrons. We can now understand the *interference pattern* of waves “produced” by the “electrons”. In fact, in the double-slit apparatus in Young’s experiment, even if we fire electrons (the micro-EW), the screen measures the interference of two waves (the field-EW). When one slit is closed, the screen can measure only the electrons, but not the wave. In this case, the very troubling question in quantum mechanics of the last century, “Does this electron know whether the other slit is open or closed?” is a pseudo-question. In fact, the wave passes through both “slits” and the electron through only one “slit”.[[123]](#footnote-123) We fire both electrons and waves (in EDWs) and, depending if one slit or both are open, Young apparatus measures either microparticles (one slit open) or waves (both slits are open). However, there is only a correspondence between the wave and the electron.

We can say that the electromagnetic wave of light (the oscillation of electric field) is, in fact, a wave of probability for photons. There where the amplitude of oscillation of electric field is greater (lighter areas), we will find more photons, while where the wave is smaller (dark areas), less photons. We have to notice that *not t*he values of electric field in one point determines this probability, but the amplitude of oscillation. In other words, the electric field can have null-value, during the oscillation, because it is the size of oscillation (amplitude) which determines the number of photons we find there. (Presura 2014, p. 226)

According the EDWs perspective, the “probability wave” (with an “ontological status” in quantum mechanics) is the result of a mixture between the field-EW and the particle-EW. Essentially, it is the relationship between the photon and the wave:

the photon has no dimension (it depends on measurements). For instance, the photon can be considered as being a point particle (if we measure exactly its position). We associate the electromagnetic wave, in this case, to the probability wave to find the photon in one place or another.” (Presura 2014, p. 227)

The “probability wave” indicates exactly the *correspondence* between the electromagnetic wave and the photon! Moreover, Presura indicates that “the probability wave (electromagnetic wave) split in two when it passes through those two slits” but what does it happen with the photon? (Presura 2014, p. 227) “The photon can be regarded as a particle, but its behavior is not classical, but described compulsory by a probability wave (electromagnetic wave).” (Presura 2014, p. 227) Also we have to remember that Feynman’s approach considers that the photon passed through both slits (and may other routs). Again, we see here the importance of the EDWs perspective: we do not need to eliminate the existence of photon; the photon does not pass through both slits. Only the electromagnetic wave passed through both slits (the field is spread in the entire “Universe”), while the photon passes only through one slit! If we use a measurement apparatus for the microparticles, we will identify the microparticle passing through one slit. (In reality, the microparticle passes not through a “slit”, but through an amalgam of microparticles that is, for us as observer, a “slit”!) If we use an apparatus for the waves, we will identify the electromagnetic wave passing through the both slits! (In reality, the “slits” belong to the macro-EW, while the microparticles belong to the micro-EW). This is the correct explanation of the so (un)famous Young’s experiment within the EDWs perspective!

One of Wheeler’s main concepts is the *mutability* of laws. Following Wheeler, Davies emphasizes the role of the experimenter (observer) in determining the “nature” of quantum reality in Young’s experiment. Davies asks “When, exactly, did nature ‘decide’ to opt for wave or particle?” (Davies, 2006) “Nature” does not decide only because we are the observers and “nature”, i.e., the unicorn-world, does not exist! Although available for the majority of physicists, Davies’ inquiry is possible only within the unicorn-world. Someone can talk about the “decision of nature” only when nature is the unicorn-world! The main idea of Wheeler’s delayed-choice experiment is that the past depends on the future. (Greene 2004, p. 186) In the split-beam experiment a new photon detector is inserted immediately after the beam splitter. (p. 187) When the new detector is switched off the photons produce interference patterns on a photographic screen. When the new detector is switched on, it indicates which path each photon travels. “Such ‘which-path’ information, as it’s called, compels the photon to act like a particle, so the wavelike interference pattern is no longer generated.” (idem, pp. 187-8) If the distance between the beam splitter and the new detector is much larger, “the new weirdness comes from the fact that the which-path measurement takes place long *after* the photon had to ‘decide’ at the beam splitter whether to act as a wave and travel both paths or to act as a particle and travel only one.” (Greene 2004, p. 188) The “anomaly” seems to be that the which-path measurement influences the past, i.e., the status of whatever entity passed through the beam splitter. Again, within the unicorn-world, we can find many anomalies! It is quite natural to consider that the wave and the particle cannot be both in the same place, at the same time. In fact, the photon does not “decide” its situation before passing the slit at all! Depending on our conditions of measurement, we can observe either the wave or the particle that exists in the EDWs even before our observations take place.

Davies presents Wheeler’s experiment in its original format. After the two slits, there is a “Venetian blind” followed by a pair of telescopes, each directed at one of these slits. In Davies’ words, the conclusion of the experiment is as follows:

The experimenter can delay the choice – wave or particles – right up to the moment the photon arrives at the Venetian blind. The mystery we then have to confront is *when* the photon adopted the form – wave or particle – chosen by the experimenter. How could a photon know, in advance of the measurement, whether the blind would be opened by the experimenter or not? Does it defer a decision – wave or particle – right up until the experimenter makes the choice? That can’t be quite right, because if the photon is a particle it passes through only one slit, whereas if it is a wave it passes through both. (Davies 2006, pp. 278–9)

Within the unicorn-world, the majority of scientists have been disturbed by such questions. To explain this strange situation, Davies considers that

... we have to regard the photon as in some sense less than real in the absence of an observation. I don’t wish to give the impression that the photon doesn’t exist at earlier times; the point is that, in the absence of an actual observation or measurement process, its state – which can be precisely specified by quantum mechanics – does not define a wave or particle nature or even a “bit of both”. The particle/wave designations come only in the context of an actual experiment. (Davies 2006, p. 280)

More than this, Davies emphasizes that the action of the experimenter influences the past. It has been compulsory for the researchers from physics to believe that the which-path measurement influences the past. However, there are no such influences at all, but only a mixture of measurements that take place within the EDWs: the EW of the wave and an EDW of the particle. Within the unicorn-world, Davies is right in writing that, before our observation, we cannot “define a wave or particle nature or even a ‘bit of both’” (p. 280) and “we have to regard the photon as in some sense less than real in the absence of an observation”. Again, within one unique world, we cannot define and accept the existence of both entities, the wave and the particle. The wave and the particle are not given by the “context of an actual experiment”, since it is about the EDWs.

This idea is related to “parallel universes” or “multiverse”. In order to avoid such kind of “possibility” the proponents of the multiverse introduced the notion of “parallel universes”. Deutsch believes that the single-particle interference experiments illustrate that the “multiverse” (i.e., “parallel universes”) exists. (Deutsch 1997, p. 96) To explain Young’s experiment, Deutsch introduces the distinction between the “tangible or real” and “shadow” photons24 that exist in the parallel universes. These “shadow” photons are “affected by tangible particles only through interference phenomena”. (Deutsch 1997, p. 405) In what sense? In the split-beam experiment, before the single photon enters the interferometer, the photon and its “shadow” travel the same path, so the universes are identical. However, after the tangible photon passes through a special mirror, the “initially identical universes become differentiated”. (Deutsch 1997, p. 205) Then each photon (one tangible and one shadow from the parallel universes) bounces off the next ordinary mirror and finally both photons simultaneously reach the semi-silvered mirror. So, “... the detection of interference between any two universes requires an interaction to take place between all the particles whose position and other attributes are not identical in the two universes.” (p. 49) We want to emphasize that we have to avoid confusing EDWs with “parallel universes”, since there are completely two different notions. (see last section) To explain the split-beam experiment, we do not need any “shadow” particles belonging to some “parallel universes”. We can see that Deutsch (and other physicists who follow Everett) are working within the unicorn-world, even if they “create” “many worlds” or “parallel universes” (which are totally different than the EDWs). For Deutsch, these parallel universes exist at the same time in the unicorn-world. As we saw above, we explained this experiment considering that the wave and the particle belong to the EDWs not to the “parallel universes”.

Wheeler extended this delayed-choice experiment to the whole “Universe”. Almost like a science-fiction story, Wheeler’s main idea is that we, as “*participators* in shaping physical reality”, influence the past that created us![[124]](#footnote-124) There is a loop of cosmos→life→mind→cosmos. (Davies 2006, p. 281 or Greene 2004) He believes that “only a universe containing observer-participators could exist – a version of the strong anthropic principle.”[[125]](#footnote-125) (Davies 2006, 291) Regarding the wave-particle duality, Wheeler considers that the human observer “*participates* in deciding whether light is made up of waves or particles”. (Davies 2006, p. 9) From an EDWs perspective, we replace “observing” with “interacting” and can say that an EW exists only where there are epistemological-ontological interactions. As observers or participants, we are just particular entities among others from the same EW and nothing else. We just observe the entities from EDWs and this is the reason why Wheeler’s anthropic principle, and many other notions like “many worlds” or “parallel universes”, become meaningless…

**4.4 The “electron spin”**

It is well known that the matter particles have all “spin-1/2” (“the value ½ is, roughly speaking, a quantum-mechanical measure of how quickly electrons rotate.[[126]](#footnote-126) Moreover, the “nongravitational force carriers—photons, weak gauge bosons, and gluons” have spin-1. The graviton is supposed to have spin-2. As in indicated in our previous works and this book, the graviton cannot even exist.[[127]](#footnote-127)

Some hundred years earlier, the Frenchman André-Marie Ampère had shown that magnetism arises from the motion of electric charge. Uhlenbeck and Goudsmit followed this lead and found that only one specific sort of electron motion could give rise to the magnetic properties suggested by the data: *rotational* motion—that is, *spin.* And so, contrary to classical expectations, Uhlenbeck and Goudsmit proclaimed that, somewhat like the earth, electrons both revolve *and* rotate.

Did Uhlenbeck and Goudsmit literally mean that the electron is spinning? Yes and no. What their work really showed is that there is a quantum-mechanical notion of spin that is somewhat akin to the usual image but inherently quantum mechanical in nature. It's one of those properties of the microscopic world that brushes up against classical ideas but injects an experimentally verified quantum twist. For instance, picture a spinning skater. As she pulls her arms in she spins more quickly; as she stretches out her arms she spins more slowly. And sooner or later, depending on how vigorously she threw herself into the spin, she will slow down and stop. Not so for the kind of spin revealed by Uhlenbeck and Goudsmit. According to their work and subsequent studies, every electron in the universe, always and forever, *spins at one fixed and never changing rate.* The spin of an electron is not a transitory state of motion as for more familiar objects that, for some reason or other, happen to be spinning. Instead, the spin of an electron is an *intrinsic* property, much like its mass or its electric charge. If an electron were not spinning, it would not be an electron. (Greene 1999, p. 80)

From the EDWs perspective, the electron, for instance, does not have a “pure”, real spin just because it corresponds to an electromagnetic wave. This correspondence blocks the electron to have a real spin like a macro-entity (because of its mass, in the rotation of a macro-entity, the influence of an electromagnetic waves can be ignored!). Why does a macro-entity (the spinning skater) can have a real spin and a microparticle cannot? Because the correspondence between the macro-entity (the “spinning skater”) and the electromagnetic wave is very week, while the correspondence between a microparticle (the electron) and the electromagnetic wave is much stronger, i.e., “different degree of correspondences”. That is, indirectly (through correspondence), the electromagnetic wave has a “stronger correspondence” for the microparticle (the electron) than for the macro-entity (the “spinning skater”) just because of the dimensions between the microparticle and the macro-object! The correspondence between the electromagnetic wave does not “influence”, *practically*, at all the rotation of a spinning skater.

In the case of a particle without spin, the probability wave is given by a complex number for each point of space ψ(r). The module square of the complex number (the intensity of the wave) |ψ(r)|² is proportional with the probability of finding the particle in that point. If the particle has a spin, there are more quantum states for the *same* spatial position, depending of the values of spin. For instance, the electron has two different quantum states in the same position. (Presura 2014, p. 257)

From the EDWs perspective, the electron has one state in one position, no more or less. There are no “more quantum states for the same spatial position depending on the value of spin” at all! In reality, when we measure the electron state, there is the corresponding electromagnetic wave, and this is the reason the electron can appear in a state or in another. Actually, the electron is in one spatial position, but our measurement can, instantaneously, change (indirectly through correspondence) the position of the microparticle (essentially, our measuring apparatus for the electron influences, indirectly, also the wave!) and, therefore, it can appear in another spatial position.

Let us take the example of measuring the spin or polarization of two particles that both belong to the EW1. These particles that initially represent one system are later *separated*. According to the Copenhagen interpretation, the spin of particle 1 has no value until it is measured. Before measurement, there is a superposition of various states of that particle “produced” by the “unitary” evolution of the wave function which corresponds to that particle. The act of observing produces the collapse of the wave function and the observer “measures” the particle in one definite classical state. In fact, there is no “superposition” at all. There are only those two particles, the corresponding wave, and our intervention with measuring apparatus (a macro-instrument). There are ED entities which belong to three EDWs: the macro-EW, the micro-EW and the wave-EW and their correspondences. (Recall SP)

In this context, let us furnish more details about EPR paradox (Einstein-Podolski-Rosen) referring to the spin of two particles. These two particles moving in two different directions, but their probability waves are strongly correlated. The measurement of the spin of the first particle (let us say, “up” state) that produced a collapse of the wave function has an instantaneous effect on the spin of the second particle (“down” state). Under the “Copenhagen interpretation”, this instantaneous effect represents “action-at-a-distance” or “faster than light transmission” which, according to Einstein’s special theory of relativity, is not possible. Einstein and his colleagues claimed that quantum mechanics would be “incomplete” because it does not take into account certain “hidden variables” of reality. On the other side, the Bell’s inequality assumes Einstein’s condition of “locality” as true. The experiments which involve the measurement of correlated photons (their polarization is detected) show that Bell’s inequality is violated. The consequence of these experiments is that the system of those two particles has a *nonlocality property*. The EPR paradox is that the “multiparticle probability wave” (associated with those two electrons, for instance) collapses instantly in the entire Universe. (Presura 2014, p. 291) The measurement on one particle influences the probabilities of the second measurement instantly at thousands of light-years (which would contradict Einstein’s principle, the maximum speed is c). The most important aspect is here the *indivisibility* (rigidity) of the electromagnetic wave/field. According to the EDWs perspective, those two particles are in EW1 (the micro-EW or the quantum-EW). We strongly emphasize here that the “space” of this EW is the whole of cosmic “space” (space is just a pragmatic notion)! In this “space”, the micro-particles interact/“observe” other micro-particles and nothing else. In EW1, the property of the non-locality of those two particles does not exist. However, there has to be a correspondence between those two particles and the wave. The nonlocality is exactly the *correspondence* between those two particles and the wave. The “space” between those two particles is “nothing” (the micro-EW) which corresponds to an indivisible electromagnetic wave (the field-EW). The “multiparticle probability wave” of those two microparticles is an indivisible entity (its has no components). Acting on it, the collapse does not spread step-by-step in the entire “space” (“Universe”), but it happens simultaneously in the entire “universe” just because the field-EW corresponds to the particle-EW, i.e., a part of the wave (two nodes) (more exactly, the entire wave) correspond to those two particles!

As many other scientists, Krauss clearly makes a wrong combination of Einstein’s theory of relativity and quantum mechanics. Dirac combined quantum mechanics with Einstein’s special (not general) theory of relativity in 1927. Thus, Dirac discovered the “electron spin”.

This was a property already known to experimentalists, and tentatively interpreted in terms of an electron spinning on its axis like a spinning top, much as the earth rotates on its axis as it orbits the sun (see Figure 2). But this was another visual metaphor that was quickly found to have no foundation in reality. Today, we interpret electron spin as a purely ‘relativistic’ quantum effect, in which electrons may take up one of two possible ‘orientations’, which we call spin-up and spin-down. These are not orientations along specific directions in conventional, three-dimensional space, but orientations in a ‘spin-space’ which has only two dimensions – up or down. (Baggott 2012, p. 17)[[128]](#footnote-128)

Today indeed, we “interpret” the “electron spin” as a “purely ‘relativistic’ quantum effect” with its spin-up and spin-down[[129]](#footnote-129) just because the electron corresponds to the electromagnetic wave, and the electron and the wave belong to the EDWs. We recall, our instruments of measuring are macro-tools which interact with “nothings” which correspond with the wave and those two microparticles. These two “possible orientations” (with only two dimensions) are due to this correspondence! Obviously, we should not confuse electron spin with the “old planetary model”). (Baggott 2012, p. 17)[[130]](#footnote-130) Within the EDWs perspective, the electron spin is a property of microparticles (which belong to the micro-EW) and has nothing to do with the macroparticles like stars or planets (which belong to the macro-EW) just because there is a *correspondence* between the microparticles and the electromagnetic wave.

Today we think of electron spin simply in terms of its possible orientations – spin-up and spin-down. It is wise to resist the temptation to imagine what these different orientations might actually look like. Their effects are real enough, however. Spin determines the amount of angular momentum carried by the electron – the momentum associated with the ‘rotational’ motion of its spin. Spin also governs how the electron interacts with a magnetic field, effects that can be studied in detail in the laboratory. But in quantum mechanics we appear to have crossed the threshold between what we can know of the origin of these effects, and what we cannot. (Baggott 2012, p. 18)

Since the electron has an “electric charge”, it will produce an “electric field”; since it moves around the nucleus and around its axes, its motion will generate a “magnetic field”.[[131]](#footnote-131) The “magnetic field”, the “electric field” and the electron (as a particle) belong to the EDWs. There are only correspondences the between electromagnetic fields/waves and the microparticles. We attest *Einstein’s absolute revenge*: his theory explains some real phenomena/processes, which belong to the EDWs that really exist. Quantum mechanics does not explain “reality”, since the “unicorn world” does not exist and, moreover, the wave and the particle are not even *complementary,* as Bohr thought, since these phenomena belong to the EDWs, but one EW does not exist for any EDW![[132]](#footnote-132) So, there are not even “complementarity” here! Indeed, physicists need to change their framework of thinking so as to avoid “empty” results in the future.[[133]](#footnote-133) We believe that now is the time to change the old paradigm of the unicorn-world with a new one, the EDWs paradigm, not only in philosophy, but also in science.

Quite interesting for our EDWs perspective, it is the situation with more particles (not only one) and their relationship with the “multiparticle probability wave”. For instance, we have a proton and an electron. (Presura 2014, p. 255) We have to write the totality of classical states for all possible combinations of these two particles. (idem) Each combination is associated with a complex number. The totality of these complex numbers is the “multiparticle probability wave” (those two particles), i.e., the wave function of the system. (idem) This multiparticle wave is not, in general, the sum of two probability waves, it is “something more”![[134]](#footnote-134) (idem) Since there is a superposition of two probability waves (that are associated with those two microparticle, we cannot identify the correspondence of one wave for a particle. The microparticles are “indiscernible”. (Presura 2014, p. 255) “It is not better to look at the ensemble of the electrons as a kind of manifestation of the entire function of multiparticle wave, and not as a sum of the individual electrons that form it?” (Presura, p. 257) It would be here a kind of “holism” which indicates that a system cannot be reduced to the sum of its component parts. (idem) This holism questions the “identity of a single electron, since it is only a label for a particular state of the multiparticle universe as a whole, a useful approximation in some particular cases”. (p. 257) Indeed, within the field-EW, the particles do not exist, there are only the electromagnetic waves (parts of the field-EW) interacting everywhere! Then, who is writing on computer this book? From a reductionist viewpoint, an electromagnetic wave is writing this text. The microparticle has to exist (in the micro-EW), otherwise neither macro-object would not exist. The text on the laptop (a macro-entity) is writing by a human body (the macro-EW) through correspondence with a human mind (an EW), and these macro-entities correspond to some (a) sets of microparticles (the micro-EW) and (b) electromagnetic waves (the field-EW). The computer and the human body do not exist for the microparticles, the microparticles do not exist for the computer and the human body. (Recall SP)

**4.5 Heisenberg’s uncertainty principle**

The *Heisenberg’s principle of uncertainty*, the essence of quantum mechanics (Greene 1999, p. 135) that is “by far the most controversial aspect of the theory, but one that has resisted every challenge in the laboratory for half a century. There is no experimental deviation to this rule.” (Kaku 2005, p. 114) In 1927, Heisenberg indicated his “uncertainty principle” for position and momentum[[135]](#footnote-135) (no-commutative variables) of a particle (∆x∆p ≥ h): we cannot measure exactly simultaneously these parameters.

To locate or “see” precisely any object, the illuminating radiation must be **significantly smaller than the object itself**. For an atomic electron, this means waves much small than the ultraviolet, as the diameter of the entire hydrogen atom is only a fraction of the wavelength of visible light. (McEnvoy and Zarate 2013, p. 156)

We have to be aware that, for such kinds of measurement, we use entities which belong to the EDWs (their correspondences), and therefore, this is the main reason the measurements cannot be, in principle, precise! It is very important here the “degrees of correspondence”: there is no problem to measures certain big atoms comparing with small microparticles just because of their relationships (correspondences) with the “illuminating radiation”! The uncertain principle indicates that the “uncertainty in a simultaneous of momentum and position is always greater than a fixed amount approximately equal to Planck’s constant h.” (McEnvoy and Zarate 2013, p. 158):

- Less intensity of light, less interactions between the microparticle (an electron, for instance) and the photons: we cannot clearly see the “position” of microparticle, but we can measure, with some approximations, electron’s speed (momentum). Less position, better speed!

- If we want to “see” clearly the position of the electron, we need to increase the intensity of light, therefore it will be more interactions between the electron and more photons. We will see better the position of the microparticles, but because of those interactions, we will measure less its momentum (speed). Less speed, better position!

From our viewpoint, these measurements do not employ, as many physicists and philosophers believed (based on the “uncertainty principle”), the “breakdown” of Laplace’s “principle of determinism” in the “Universe”. (McEnvoy and Zarate 2013, p. 159)! There are, using the correspondences of entities which belong to the EDWs, just *approximate, indirect corresponding measurements,* no more or less! Obviously, we cannot use other instruments of measurement, but it does not mean that, ontologically, the “quantum world is uncertain”.

We will inquiry about an essential consequence of this principle: the quantum fluctuations at subatomic scale (below Planck’s scale). Heisenberg’s principle of uncertainty is constructed within the unicorn-world and tells us that we cannot measure “position” and “velocity” of a particle at the same time. “Uncertainty is built into the wave structure of quantum mechanics and exists whether or not we carry out some clumsy measurement.” (Greene 2004, p. 99) The “uncertainty principle” is constructed within the unicorn-world. “Uncertainty is built into the wave structure of quantum mechanics and exists whether or not we carry out some clumsy measurement.”[[136]](#footnote-136) (Greene, p. 99”) Following Heisenberg’s uncertainty principle, but working within the unicorn world, the physicists have ontologized the “quantum world”, but they accepted the identity theory referring to the “quantum world” (in this “world” there were mixed waves and microparticles, therefore a mixture of EDWs!) and the “macroscopic world”. This principle is more than a consequence of the fact that each electron (microparticle) is described “by a probability wave and the probability wave suffers a collapse (a sudden change) at each measurement.” (Presura 2014, p. 246) There is a “quantum superposition” which evolves following Schrödinger’s equation. If the “wave structure” or the “wave probability” is involved, then the particle is also involved and, therefore, there is a mixture of two EDWs. Measuring the location of an electron depends on the magnitude of “its” wave function.

Each classical state has a complex number which it is related to the probability to find the system in that state. The set of the numbers forms the probability wave of the system called the wave function… When we do not measure the system, it will remain in a quantum state described by this set of complex numbers (the probability wave) which it will change in time. If we measure in what state the system is, the quantum state will collapse in the classical state in which we measured. (Presura 2014, p. 246)

This paragraph mirrors exactly the standard view of quantum mechanics of the last 80 years! If we accept this view, we have to believe that the planets did not exist until the first human observer “measured” them! “If we have a localized electron and we measure its speed, after measurement, the probability wave will have a quantum collapse (sudden change). The probability wave necessarily will become a plane wave”, and we can find the speed of the particle. “Paradoxically, however, the amplitude of a plane wave is constant in all space which means that we have the same probability to find after this the electron in any point in space!”. So, we know the speed of the particle, but we don’t know its position. (Presura 2014, p. 247) In this context, we will try to find the position of the electron. We already have a “plane wave” (which inform us about the speed of the particle). With a new measurement for its position, we will find the electron now in a place. However, the probability wave (which it was a “plane wave”) will suddenly change (the quantum collapse), and we get the position of the electron, but the probability wave will become “very localized” (not a plane wave!). Therefore, we have the position, but we cannot have a “precise speed” of the electron, since each plane wave describes a particular speed. (Presura, p. 247)[[137]](#footnote-137) We cannot measure the position and the speed of the particle in the same time. If we try to do this, we will have an uncertainty regarding the value of one or the other. (Presura 2014, p. 247)[[138]](#footnote-138) If a wave has an uniform succession of peaks and troughs, then the particle has a definite velocity. Nevertheless, its position is completely undetermined. However, the “probability” of a particle’s position is to be anywhere. We need to use the “probability calculus” because of several reasons:

(1) The particle and the wave are in the EDWs for relating the *correspondence* between the wave and the particle. From this viewpoint, the EDWs perspective is quite close to Bohm’s theory that follows the earlier “pilot wave” interpretation of De Broglie. Putnam mentions that this approach is the classical example of “hidden variable” theory. (Putnam 2005, p. 622) Within this approach, the particles have definite positions and momenta at all times. The particles have continuous trajectories determined by a “velocity field” and the initial positions and the momenta of the particles are randomly distributed. We can identify the positions of these particles only using the quantum mechanical probability. (Putnam 2005, p. 622) This approach seems closer to the EDWs perspective: indeed, the particle has a clear position and impulse (velocity), only our tools of investigation create the conditions of this “uncertain principle”.

(2) Different degrees of correspondences between the waves, the microparticles and the macro-instruments of measuring, indirectly, these “quantum processes”.

(3) Our macro-instruments influences, indirectly, both the waves and the particles.

Using the EDWs perspective, we can explain very clear there is no ontological “uncertainty” regarding “speed” and “position” of a microparticle:

* Sending many photons toward a microparticle, we can see its position, but we cannot identify its speed (the photons will hit the microparticle which will move in different directions).
* Sending few photons, we can identify the speed of microparticle (the particle will be hit only by few photons therefore its movement will be quite slow), but we cannot identify its position very clear (just because it is too “dark” there).

The uncertainty principle is just an epistemological principle, NOT an ontological one. It is not a surprise, working within the unicorn world, the majority of physicists transformed these epistemological principles in ontological principles! These paragraphs offers us a standard view about the quantum mechanics. The probability wave with its “complex numbers” mirrors those two EDWs involved in these processes. When we do not measure the “system”, there would be two states, but in the EDWs. *It seems that the uncertainty principle is based on our tools of measuring: even if, in principle, we will not be able to have better tool, from the viewpoint of the particle, it has determined position and speed.* In an ontological frame, the particle has determined position and speed. Only because of our “tools of observation”, we cannot determine exactly the position and the speed of the particle. Therefore, from this ontological viewpoint, the conclusion that “between the measurements, the particle is the probability wave and when we measure, there is the particle” is false (this judgment has been created within the unicorn world!).

Baggott explains the “uncertainty principle” through the correspondence between the properties of particle and wave. It is important to know that, within the field-EW, the electromagnetic wave can be localized “here” only by combining “a large number of wave forms of different frequencies” in order to get a wave “which is large in one location in space and small everywhere else”. In the micro-EW, this “large form” of the electromagnetic wave *corresponds* (mostly) to the microparticle. In the field-EW, with this form, we get the position, but we lose the wave frequency (since we have many waves with different frequencies). (For more details about the uncertainty principle, see Vacariu 2008, Vacariu and Vacariu 2010) Baggott’s paragraph continues with the following one:

But in de Broglie’s hypothesis, the inverse frequency of the wave is directly related to the particle momentum. Uncertainty in frequency therefore means uncertainty in momentum. The converse is also true. If we want to be precise about the frequency of the wave, and hence the momentum of the particle, then we have to stick with a single wave with a single frequency. But then we can’t localize it. The wave-particle remains spread out in space and we can no longer measure a precise position. This uncertainty in position and momentum is the basis for German physicist Werner Heisenberg’s famous uncertainty principle, discovered in 1927. It is a direct consequence of the duality of wave and particle behaviour in elementary quantum objects. (Baggott 2012, pp. 29-30)

More specifically, the frequency of the electromagnetic wave corresponds to the particle momentum. Therefore, the “uncertainty in frequency” corresponds to the “uncertainty in momentum” and the vice-verse is also true. A single frequency of a single wave corresponds to the momentum of the particle, but we cannot localize the electromagnetic wave since it spread out in “space”. So, Heisenberg’s “uncertainty principle” is a direct consequence of the *correspondence* between the wave and the particle which belong to the EDWs!

Again, only within the EDWs framework, we can really understand what it means that the “electron *is*” both the particle “here” and the electromagnetic wave “there and everywhere”: the electron (which is a particle localized “here” and belonging to the micro-EW) corresponds to the wave (which is spread “there and everywhere” in the field-EW). We should not forget that an EW does not exist for any EDW, therefore the particle does not exist for the electromagnetic wave, and the wave does not exist for the particle! Moreover, the “inverse frequency of the wave” is indirectly (through *correspondence*) related to the particle momentum, i.e., the “uncertainty in frequency” corresponds to the “uncertainty in momentum” (the vice-verse is also true).[[139]](#footnote-139) Again, this principle is based on the relationship between a wave and a particle and therefore it is constructed on a mixture between two EDWs. For us, the measure of the location of an electron depends on the magnitude of “its” wave function. For instance, if a wave has a uniform succession of peaks and troughs then the particle has a definite velocity. Nevertheless, its position is completely undetermined. The probability (about the probability and a related notion – Feynman’s “sum over histories” – see below*)* of a particle’s position is to be anywhere. The particle and the wave are in EDWs and if we want to get some information about the particle, we need to use probability calculus for relating the correspondence between the wave and the particle. Again, from this viewpoint, the EDWs perspective is quite close to Bohm’s theory that follows the earlier “pilot wave” interpretation of de Broglie. Within this approach, the particles have definite positions and momentum at all times. The particles have continuous trajectories determined by a “velocity field” and the initial positions and momentum of the particles are distributed randomly. As limited entities, we can identify the positions of these particles only by using the quantum mechanical “probability”. (Putnam 2005, p. 622) The superposition of the wave and the particles in the unicorn-world has created this infamous “nonlocality”.[[140]](#footnote-140) From our viewpoint, the “nonlocality” is represented by the correspondence between the particle and the entire wave/field. In this context, let us analyze the “*quantum superposition*”, a very important notion in quantum mechanics.

For any system, the probability wave is a set of complex numbers, each being attached to each possible classical state. We can say that the quantum system is in a state of quantum superposition of its classical states, or the quantum system is, in the same time, in all its classical states. (Presura 2014, p. 243)

Working on quantum mechanics within the unicorn world, the physicists have been able to introduce such statements (in fact, there were just the correspondences between the particle and the wave). Again, the “complex numbers” were necessary just because the physicists have been working within the unicorn world. From the EDWs perspective, the quantum system is not a “superposition” of “its classical states, but it is just a *correspondence* between the electron and the wave (we saw above that “association” and “complementarity” are quite unclear notion[[141]](#footnote-141)). The “quantum system” is, at the same time, “in all its classical state” means that the electron just corresponds to the entire wave. Therefore, there is the probability to find the electron on the Moon because the electromagnetic field is present everywhere!

Let us see “the postulate of quantum collapse”:

At one measure of classical characteristic of a quantum system, it can be found in one of its classical states. Moreover, following the process of quantum collapse, the system instantly reaches one of these classical states. (Presura 2014, p. 244, his italics)

Presura indicates that “we cannot measure completely the probability wave directly under any circumstance. … we can never ‘see’ the superposition” (Presura 2014, p. 245) of these “classical states”. Obviously, from our EDWs viewpoint, the system is always in a classical state! Only if we work within the unicorn world, it appear the “superposition” of states, i.e., a mixture of EDWs!

Let us see the famous “Schrödinger’s cat” experiment: in the box, the cat is in a “superposition state”, both “alive” and “death”. Opening the box, this “superposition state” collapses in one state or the other. Important for us is Presura’s indication that through our measurement, we “destroy” the initial “superposition state”, we find one of those two states (for instance, “cat alive”), but we will not be able to find completely which was the “entire initial” quantum state of the system! From our viewpoint, the wave does not collapse, and the system “does not reach one of its classical state”, since before our measurements, the cat is either alive OR death (but not in both states, since it would produce strong ontological contradictions). In other words, the cat is not in a “superposition states” (the cat is neither “death and alive”, nor “neither dead, nor alive”) before our measurement at all. The cat is in a classical state, but we don’t know which one just because we have not opened the box. This is all! The particle just corresponds to the wave, but the particle cannot be found, with different probabilities, everywhere where the field is present, the particle will be found where it is really placed at one moment! Maybe our measurements influence, instantaneously, the creation of a particle (through its correspondence with the wave), but it does not mean there is a “superposition” there of the wave and the particle (which would be “present” everywhere).

Because making a measurement of one state of the quantum superposition, we will find the system in one particular classical state, with a particular probability, but we will not exactly know from which quantum superposition state the system comes. (Presura 2014, p. 297)

This statement mirror exactly the real quantum situation: there are the EDWs and not a “quantum superposition”! Obviously, we will not be able “to know” which quantum state disappeared, since there is no superposition of two states in the box. The cat (and the atom) is in one state which corresponds to the probability wave, but this is all which exists there. “The cat is in the box” are just corresponding to two amalgams of microparticles. Also, there is a multiparticle probability wave which corresponds to these two amalgams. All these “sub-systems” that are in classical states create a system in a classical state, “the cat in a box” is “either alive or dead”, but not in both states!

From the viewpoint of a particle (its “personal identity”), there is no “uncertainty” regarding its position and impulse (speed) (or energy and time). Thus, we have to apply Heisenberg’s principle only from our *epistemological viewpoint* (created by the ontological limits of our conditions/tools of observing the photons) in order to get certain “information” about the particle. This principle is just an epistemological tool for us even if, within the EDWs perspective, we can say that epistemology = ontology meaning that Heisenberg’s principle is “somehow” ontologized, but only for the human body (a macroscopic object which corresponds to the human mind, an EW). In quantum mechanics, to get “information” about the micro-EW, we really need to mix the information regarding the field-EW and the particle-EW. There are no other possibilities for us to get information about the particle because, due to its characteristics, the photon is the smallest particle that can provide information about either the position or the speed (not both at the same time) of any particle. Thus, we have built “Physics as Science” within the unicorn-world (“there are no experimental deviations to this rule”), but not “reality”, i.e., the EDWs. We emphasize that we have to avoid the transformation of an epistemological principle into an ontological one: we cannot extend our viewpoint to the viewpoint of a particle or of a planet (it would mean the hyperontologization of our macro-EW), as for those quantum fluctuations, we cannot apply Heisenberg’s principle to the nature of “space” and “time” (that is to the “nothing”). By applying this principle to the subatomic scale (below Planck’s scale), the physicists have *postulated* the existence of some *quantum fluctuations* (the non-local correlations – or the relationship between the energy and the impulse/time – require fluctuations). Moreover, some physicists believe that even space and time have these fluctuations at this scale. We have, again, a kind of hyperontologization of an epistemological principle available only for us as the observers of microparticles. From an EDWs perspective, there is no uncertainty regarding the position or the impulse of a particle. Because of our limits, we can equalize the epistemology with the ontology in really *describing ever* certain phenomena from the EDWs (the macro and the micro-EWs) and thus elaborating “Physics as Science”, but we cannot (definitively) replace for good the epistemological-ontological status of a particle or planet with our epistemological-ontological status of observers.

We have to extend the famous question “What is it like to be a bat?” to another question: “What is it like to be a particle or a planet?” According to the principle of objective reality, the planets, the microparticles and the human beings have the same right regarding their epistemological-ontological conditions of observation/interaction. The entities determine their interactions which constitute the particles. We emphasize that each set of entities which belongs to a particular EW has a particular status of interactions. We can apply Heisenberg’s principle when we observe a microparticle only from *our* epistemological-ontological viewpoint! At the same time, the conditions of interactions/observations generate our epistemological limits of knowledge and thus we construct our physics as science. Heisenberg’s principle is just an epistemological tool for us and we cannot define the ontological status of microparticles from our viewpoint but only from their viewpoint! The “Heisenberg’s cut” means the separation between the observer and the observed entity. Nevertheless, the electron does not “observe” (interact with) us or the classical measuring apparatus, but only some huge amalgams of micro-particles which correspond to the human beings and the “measuring apparatus”. Again, imagine that you are the electron...

“Of course, measurement is one of the great mysteries of the modern physics (in the end, it is the direct consequence of the collapse of the probability wave)…” (Presura 2014, p. 248) This statement is quite right since it refers, from an EDWs perspective, exactly to the correspondences between ED entities which belong to the EDWs! Presura introduces the example of “seeing” where the electron is with an electronic microscope. A photon from the microscope light interacts with the electron; the photon is reflected back to “us”, but the electron will have a new impulse given by this interaction. We will know where the electron is (we see from where the photon is coming to our eyes), but we will not know its impulse (because of the interaction between the electron and the photon). More exactly, if we want to see clearly where the electron is, we have to send many photons toward the electron. In that moment, we can see clearly the position of the electron, but we loose its impulse (speed), since it will be hit by many photons. If we want to get the speed, we send few photons, therefore only these few photons will hit the electron, the impulse of the electron will be quite low (we can get the speed of the electron), but because there are only few photons, we will not see clearly the position of the electron.

Importantly, Presura indicates that Heisenberg’s principle has serious philosophical implications: it mirrors “a fundamental limitation of our process of knowing the Universe”. (Presura 2014, p. 248) Presura continues: in the classical physics, in a measurement, there was a subject of observation and an object of observation which they were separated and the characteristics of the object being independent of our observation. In quantum mechanics, the properties of the observed entity depends on the observer-object relationship. We do not agree with this viewpoint which has only an epistemological status, but not an ontological one. Nobody can guarantee that, in the future, we will not be able to find certain tool of observation which can help us in determining exactly both the position and the speed of the particle.[[142]](#footnote-142) We have to remember the strong debate between Heisenberg and Schrödinger. (For the relationship between Schrödinger’s theory and the EDWs perspective, see again Vacariu 2008) According to Whitaker, for Schrödinger, the electron is identified with the wave or the density distribution or the “wave-packet”. Moreover, Schrödinger restored the notion of “continuity”! In contrast, Heisenberg struggled for a theory of particles and “discontinuity”! (Whitaker 1996, p. 143) Within the unicorn-world, we can easy understand this conflict; in fact, the wave and the particle belong to the EDWs. The “rigidity” of the wave reflects its continuity.[[143]](#footnote-143) The equivalence of the formalism of both theories (that was showed by Pauli, Schrödinger and Carl Eckhart – Whitaker 1996, p. 145) indicate us, from the EDWs perspective, only the *correspondence* between the wave and the particle. Between Heisenberg (particles) and Schrödinger (wave) is Bohr1 with his “complementarity” (Whitaker, p. 152-53), but all of them are situated within the unicorn-world and this is the reason of so many debates and controversies during many decades… This is the reason that the EDWs perspective has to be understand as the greatest Copernican revolution in human thinking (not only in Physics!).

In his paper from the 1960’s, (the paper from 2005 is a new version of this old article), quoting his teacher, Reichenbach (1944), Putnam indicates some “causal anomalies” (Bohm’s potential) in Bohm’s theory. (Putnam 2005, pp. 622–3) Because these causal anomalies (the non-locality) really occur, Putnam considers (in his paper from 2005) that these anomalies cannot be rejected. Bohm introduced “potential” or “field” to explain “non-locality”. In Maudlin’s interpretation, this notion can be a kind of *mathematical representative of non-locality*, so we do not have any reason to reject this theory. (Putnam 2005, p. 623) As we saw above, from an EDWs perspective, Bohm’s “potential” that represents the non-locality of particles from the EW1 is in fact given by the wave from the EW2. Bohm is right in considering that the particles have positions and momenta all the time and continuous trajectories. We already know that the superposition of the wave and the particles in the unicorn-world has created this “non-locality”. In fact, it is about the correspondence between the wave and the particles (two EDWs).

**4.6 Schrödinger’s cat and “decoherence”**

Some physicists believe that the collapse of the probability wave happens continuously because of its interactions with the external environment, and we only notice the selection already made by the environment. (Presura 2014, p. 261) Because of these continuously interactions, the probability wave evolves continuously and fast and it becomes localized. (Presura, p. 262)

In the theory of decoherence, the macroscopic objects, a grain of sand or a ball, have apparently classical and not quantum behavior just because their probability wave was localized continuum through their interactions with the environment. Or, in other words, even if we close the eyes, the probability wave suffers continuous and fast processes of evolution which determine its localization. When we open the eyes, we will just make a notification of the probability wave already localized. (Presura 2014, p. 262)

Obviously, there is a mixture of EDWs here, even if the EDWs perspective supports the idea that there have always been interactions between the ED entities and their environment, i.e.: (1) waves in the field-EW (2) microparticles in the micro-EW and (3) macroparticles in the macro-EW. After furnishing more details about Zurek’s approach on decoherence theory, Presura indicates that if we can generalize the “localization” process from the microscopic to the macroscopic objects, then “at the macroscopic level, the world remains quantum”. (Presura 2014, p. 263) Only because of such interactions with the environment, we cannot notice the quantum processes: the macroscopic objects are localized immediately, continuously through their interactions with the environment. (Presura 2014, p. 263) From our viewpoint, there is no such “decoherence” processes, since there is no real “collapse” (it would be available only within the unicorn world). In our previous works, we indicated that we could judge the similarity between the *human vision* of the external environment and the *interactions* between two entities from that environment. A human being “seeing” an entity in her environment is quite similar with the interaction between two particles. (See Vacariu 2005, 2007, 2008, for instance) Before “our measurements”, other entities from its environment observe/interact with the electromagnetic wave or with the particle. Therefore, when we observe the particle, the “collapse” of the wave does not even exist. Bohr believes that the laws of the micro-cosmos and the macro-cosmos are different because the sizes of their entities are different.[[144]](#footnote-144) (Greene 2004, p. 2003) Greene’s question is “Where exactly is this border?” Placing both kinds of micro and macro-particles within the same world, you cannot answer to this question. However, the “*decoherence”* is the “bridge between the quantum physics of the small and the classical of the not-small by suppressing interference – that is, by diminishing sharply the core difference between quantum and classical probabilities.” (Greene 2004, p. 209) The initiator of decoherence is Zeh (1970)[[145]](#footnote-145) followed by Joos, Zurek, etc. Before our observation, there is a superposition of various states for a particle (let us say, the spin of a particle is “up” and “down” simultaneously). So there is a quantum uncertainty regarding the spin of that particle.

Tegmark and Wheeler explain how “the quantum gets classical”. (Tegmark and Wheeler 2001, p. 73) In their example we replace the quantum card with a microparticle, its spin being either “up” or “down”. Quantum uncertainty is given by the superposition of the position of two states (“up” and “down”) of a particle and their corresponding wave. Schrödinger’s equation predicts this coherent superposition which is mathematically illustrated by a “density matrix”. The wave function of the particle corresponds to a density matrix with four peaks (two peaks indicate 50% probability of the particle to be either “up” or “down”, the other two peaks indicate the interference of these two states). In other words, the Schrödinger’s equation describes both the classical states (alive and dead) of the cat using the probability for each state x.

… in the quantum case, we have to consider both classical states and we need to construct a probability wave which is the quantum superposition of these both states. The wave of probability would contains two complex numbers, one for each classical state… The quantum superposition is necessary if we realize that the atom itself is in a quantum position (being a microscopic system...) (Presura 2014, p. 245)[[146]](#footnote-146)

In this state, “[t]he quantum state is still coherent”. (Tegmark and Wheeler 2001, p. 73) According to Tegmark and Wheeler, the quantum uncertainty is different from the uncertainty of classical probability, for instance a coin toss. The density matrix of a coin toss has only the first two peaks which represent the fact that the coin is *either* “tail” *or* “head”, but we have not looked at it, yet. There are no peaks for the interference process. The tiniest interaction with the environment transforms the coherent density matrix into the “classical” density matrix with only two peaks that represent either “tails” or “heads”. The interference pattern of those two states (”up” or “down”) or the “coherent” state accomplishes decoherence. “The Schrödinger equation controls the entire process.” (p. 73) Again, we have here a “superposition” of the EDWs, not of “quantum states”! Regarding Schrödinger’s box,

when we close the box, the system is in the situation |atom-nondisintegrated; cat life>. In other words, the first complex number of the probability wave is *one* and the second is *zero,* which corresponds to the situation |atom-nondisintegrated; cat death>… In time, however, the probability wave evolves (through a Schrödinger’s equation that fits the context), while the second number becomes non-null, increasing the probability of finding system in the second state, |atom-nondisintegrated; cat death>. (Presura 2014, p. 245)

If we open the box, we realize a measurement, the probability wave will “collapse” in one of those classical states. One complex number will be equal to 1, the other to 0. Therefore, the cat will be in *only* in one state, alive or death. (Presura 2014, p. 245)

The paradox appears if we inquire what does it happen with the cat between our measurements. Is the cat dead or alive? This is Schrödinger’s question. It is a question for which the quantum mechanics has no classical answer, because between two measurements we have to take into account only the probability wave. From the viewpoint of quantum mechanics, the cat is in the box in a superposition quantum state of those two states (alive and death) and only our measurement have brought in one of those states, alive or death. (Presura 2014, p. 246)

The “paradox appears” for someone working within the unicorn world: it is the result of the “association” between the wave and the particle, that is a mixture of two EDWs. In reality, the particle just *corresponds* to the entire wave and there are two EDWs not the unicorn world![[147]](#footnote-147)

The standard interpretation is that the measurement process means an interaction between the observer and the observed particle. At this moment, the person cannot perceive this superposition because the interference pattern accomplishes “decoherence”. Within the unicorn world, we can suppose that the macro-things that we encounter in our daily life are not isolated but interact with other entities. For example, the book that you read now is struck by photons and air molecules. Those microparticles disturb the “coherence” of the big objects’ wavefunction and thus interference effects are not possible. (Greene 2004, p. 210) “Once environmental decoherence blurs a wavefunction, the exotic nature of quantum probabilities melts into the more familiar probabilities of day-to-day.” (Greene 2004, p. 210) Obviously, this thought was constructed within the unicorn world. Because of decoherence, Schrödinger’s cat cannot be both dead and alive! However, Greene and other physicists are not content with this alternative, their question being “how one outcome ‘wins’ and where the many other possibilities ‘go’ when that actually happens.” (Greene 2004, p. 212) Since the debate between Newton and Leibniz, the question “What really exists, the particle or the wave?” has not received a decisive answer. And this situation has been quite normal because of the framework of thinking which dominated human thinking until now: the “unicorn-world framework”. From an EDWs perspective, we strongly emphasize that the “superposition” of various states of a particle before measurement is a mistake created by extending the “superposition” of a wave and a particle. Putnam reminds us that Schrödinger’s equation shows us a state given by the “vector sum” or “superposition” of a vector which represents both states of a particle (in our example, “up and “down”) mathematically expressed by an abstract space called “Hilbert space”.

And Problem One is what are we to make of a state which is a superposition of two states like this, two states in which a macroobservable has different values? ... If we never observe such a state, why don’t we? All interpretations of quantum mechanics are required to give an answer to that question. (Putnam 2005, p. 620)

Because the wave and the particle belong to the EDWs, there is no superposition of them and, consequently, no superposition of various states of that particle. The abstract space, “Hilbert space” was necessary for those physicists working within the unicorn world! Also, there is no “decoherence” of the wave in measuring the characteristics of the particle. Working within the unicorn-world***,*** the physicists in the 1920’s created the “unobservable” superposition of two states of a particle before our observation.[[148]](#footnote-148) Putnam relates the above “Problem One” with “Problem Two”, “the problem of Einstein’s bed”, the existence of superposition of states in which macro-observables have different values. Einstein’s words are: “Look, I don’t believe that when I am not in my bedroom my bed spreads out all over the room, and whenever I open the door and come in it jumps into the corner.” (Einstein in Putnam 2005, p. 624) It means that Einstein rejected von Neumann’s “collapse” hypothesis.

We return to the “Young’s experiment”. From the EDWs perspective, we do not have any superposition of two states of a particle. Nevertheless, there is a superposition of two waves. In Young’s experiment, the wave crosses those two slits and produces the interference of two waves. As we saw at point (1), these two waves belong to the EW2. The screen “measures” the interference of the two waves. The particle which corresponds to the wave before the two-slit screen enters only through one slit, but not both. There is no interference of two particles, since we have only one particle. There are no “shadow” particles or superposition of two states of a particle at all. The density matrix of a “coherent superposition” after the double-slits screen can represent the superposition of the two waves but not the superposition of two states of one particle. In the Copenhagen interpretation, the measurement produces the collapses of the wave function in violation of the Schrödinger equation. (Tegmark and Wheeler 2001, p. 71) In both Bohm’s and “many worlds” interpretations there is no collapse: the state evolves following the Schrödinger equation. From our perspective, there is no collapse of the wave function, either, but the wave and the particle belong to the EDWs and not to the “parallel universes” (for tangible and “shadow” particles).

Let us analyze in detail one article written by Zeh about the nature of the wave function. (Zeh 2004) This analysis can be extended to the majority of papers from quantum mechanics. Following Wheeler (“it” means a physical reality and “bit” is a kind of information – Zeh 2004), the title of his article offers us the topic: “[T]he wave function: it or bit?” Because of the unicorn-world, in Wheeler’s framework, we can see an amazing turn in physics (that is usually characteristic to some philosophers): the use of metaphor. Wheeler is forced to introduce a metaphorical dualism: “physical reality” and “information”. This metaphor is just to avoid the contradiction created by the existence of two entities within the same world and the same spatio-temporal framework. Zeh has no other alternative. The introduction of Zeh’s paper consists of very short “historical remarks about the wave function”. (Zeh 2004, pp. 104–6) The inventor of wave function, Schrödinger, believed that it described electrons.[[149]](#footnote-149) Born introduced the probability interpretation that became, under de Broglie’s duality of wave and particle[[150]](#footnote-150), the association of the wave with a particle. Following Heisenberg’s uncertainty relations, Pauli, proposed the wave function as a “probability amplitude” for the positions or momenta of the particle. Zeh supports Pauli’s idea that “the appearance of a definite position of an electron during an observation is a *creation* outside the laws of nature”. (Pauli in Zeh 2004, pp. 104-5, Zeh’s translation and italics)[[151]](#footnote-151) After mentioning Bohr and Wigner, Zeh denies Ulfbeck and Aage Bohr’s approach from 2001. These two authors consider that when the wave hits the counter of the measurement apparatus, the wave function “loses its meaning”. (Zeh 2004, p. 105) Accepting the decoherence process, Zeh contests this affirmation, replacing it with “[T]he quantum state changes rather than losing its meaning”. (Zeh 2004, p. 105)

From an EDWs perspective, in both cases the authors are forced to reduce the existence of wave or particle to one quantum state either through losing its meaning or changing its state (decoherence). The short story finishes with Bohm’s perspective (both electron and wave exist) and Bell’s approach[[152]](#footnote-152) (the global wave function has to be regarded as real). The “entanglement” (according to Schrödinger, “the greatest mystery of quantum theory” – Zeh, p. 106) presupposes the “superposition” of different quantum states. We recall, there are three classical examples of superposition: the spin of a particle can be “spin-up” and “spin-down” at the same time, the superposition of the “wave” and the “corpuscle”, the particle is in many places at the same time (superposition of many places for the particle). Zeh mentions that in the 1920s and 1930s none of the great physicists rejected the idea that “reality must be local (that is, defined in space and time)”. “It is this requirement that led Niels Bohr to abandon microscopic reality entirely (while he preserved this concept for the apparently classical realm of events).” (Zeh, p. 106) About the superposition of wave and electron Zeh writes that

*General* one-particle wave functions can themselves be understood as superpositions of all possible “particle” positions (space points). They define “real” physical properties, such as energy, momentum, or angular momentum only as a whole. (Zeh 2004)

Zeh emphasizes that such superpositions have been confirmed “to *exist*” by various experiments (superconducting quantum interference devices, mesoscopic Schrödinger cats, Bose condensates, superposition of a macroscopic current running in opposite directions and microscopic elements for a quantum computer). “All these superpositions occur and act as individual physical states. Hence their components ‘exist’ simultaneously.” (Zeh, p. 108) Essential for the EDWs perspective is the following idea of Zeh’s. As we saw above, the “entanglement” requires “superposition”. However, the “superposition” requires certain nonlocal states. Zeh stresses the distinction between the *kinematical* nonlocality (nonlocal states) and the *dynamical* nonlocality (“Einstein’s spooky action at a distance” or superluminal actions). (p. 109) Zeh considers that most physicists assume the nonlocal states as *dynamical* nonlocality.

In contrast, nonlocal entanglement must already “exist” before any crucially related local but spatially separated events would occur. For example, in so-called quantum teleportation experiments, a nonlocal state would have to be carefully prepared initially – so nothing has to be *ported* any more. After this preparation, a global state “exists but is not there” (Joos and Zeh 1985). Or in similar words: the real physical state is *ou topos* (at no place) – although this situation is *not utopic* according to quantum theory. A generic quantum state is not simply *composed* of local properties (such as an extended object or a spatial field). (Zeh, pp. 109–110)

Zeh is correct in claiming that this property must already “exist” before any spatially separated events take place. (Or in quantum teleportation “nothing has to be ported”.) However, within the unicorn-world, Zeh cannot really explain the “nonlocal entanglement”. He simply appeals to Greek words “*ou topos*” to explain a real physical state! It is not clear at all what this expression means. Maybe there are “many worlds” or more probably there is a superposition of the wave and the particles. Even if entanglement (or “quantum correlations”, Zeh 2004, p. 110) presupposes the superposition[[153]](#footnote-153), within the unicorn-world, the superposition cannot be explained even if “quantum correlations” were equivalent to our “correspondence”. From an EDWs perspective, the “superposition” is not a real superposition; it means only that the wave and the particles belong to the EDWs and we identify the correspondence between them to be within the “same spatio-temporal framework”. Indeed, the nonlocality is a kinematical state between the two particles and not a dynamical state that requires “Einstein’s spooky action at a distance”. However, this kinematical state of the wave cannot be fully explained within the unicorn-world. Only the “correspondence” between the wave and the particle can explain this “kinematical state”, the non-locality. The whole wave is not “simply composed of local properties” (such as an extended object or spatial field), but it *corresponds* to those “local properties” (let us say those two electrons). As we mentioned above, the quantum wave is not “divisible” like an extended object or a classical wave. This property (the *correspondence* between the wave and the particles) explains the “non-locality” of particles. We recall again that, according to the Bohr’s principle of complementarity, we cannot observe the particle and the wave at the same time. We can translate this idea to mean that the particles cannot “observe” the wave, and vice-verse, because they belong to the EDWs. The wave – as a “global state” –”exists” not in *ou topos,* but in a particular EW, the field-EW. To avoid the mentioned contradiction, Zeh considers that the wave “decoheres” into a particle. Within the unicorn-world, we cannot relate the “nonlocality” with the wave because the wave collapses, but the “nonlocality”, as a global property, remains between the particles! In other words, the nonlocality has no place – because the wave collapses or decoheres into particles – but still exists! The problem is that the superposition

have not been confirmed thus far in the macroscopic realm, a Heisenberg cut for the application of the collapse may be placed anywhere between the counter (where decoherence first occurs in the observational chain) and the observer – although it would eventually have to be experimentally confirmed.[[154]](#footnote-154) (Zeh 2004, p.113)

The question is where does the “collapse” take place? Zeh believes that, without any empirical evidence, we cannot determine where a collapse really occurs. From an EDWs perspective, we can clearly understand that “there is no empirical evidence for where a collapse occurs” just because there is no such “collapse”. The superposition is the *correspondence* between the wave and the particles which belong to the EDWs. Also, we have to reject the superposition of the same particle in “different places” (where the electromagnetic field is extended).

The title of the last section from Zeh’s article “[t]hat itsy bitsy wave function” and the following first paragraph both reflect the power of the unicorn-world in physics: “Reality became a problem in quantum theory when physicists desperately tried to understand whether the electron and the photon ‘really’ are particle or waves (in space).” In his paper, Zeh concludes that he has argued not for particles or for spatial waves, but for “Everett’s (nonlocal) universal wave functional”, a consistent kinematical concept (proposed by Wheeler 1957) that describes the reality. (Zeh 2004, p. 118) However, he mentions that this approach implies a multitude of separately observed quasi-classical universes in one huge superposition. For us, the “itsy bitsy wave function” is a notion that reflects the history of the last century of quantum mechanics. Again, from an EDWs perspective, the wave and the particles do not belong to the “various multiverses” in one “superposition”, but to the EDWs. (Again, the particle cannot be placed in different places at the same time!)

The last paragraph of Zeh’s paper is “However, you turn it: *In the beginning was the wave function.* We may have to declare victory of the Schrödinger over the Heisenberg picture.” (p. 119) Indeed, we suppose that after the Big Bangs, there were, firstly, the electromagnetic waves, but we translate Zeh’s statement in the following state: “*In the beginning was the unicorn-world”*. However, no beginning of the unicorn-world really existed!

Another step in defending the EDWs approach is to point out a few ideas from a the article written by Dyson (2004). Dyson suggests that DeWitt (1992) explains the notion of “decoherence” in quantum cosmology very clearly: “massiveness” and not “complexity” is the key for decoherence. (Dyson 2004, p. 77) Schrödinger’s cat, as a massive object, accomplishes “decoherence”. From an EDWs perspective, DeWitt is evidently correct regarding “massiveness”. However, the “massiveness” is represented by the macro-objects[[155]](#footnote-155) which belong to an EDW rather than the microparticles and we do not have any “decoherence”.[[156]](#footnote-156) We have here, again, certain degrees of correspondence and this “massiveness” of the macro-objects indicates us that we have to “ignore” (in a much stronger spirit than Einstein, i.e., by introducing the EDWs) the existence of microparticles and waves even if the macro-objects have “organizationally different parts”.

Dyson introduces four thought-experiments which support his conclusion that “quantum mechanics cannot be a complete description of nature”. (Dyson 2004, p. 74) Based on two of his thought-experiments, Dyson considers that the distinction between the classical (that include microparticles) and the quantum (waves) notions is reflected by the distinction between the past and the future. (Dyson 2004, p. 83) The past cannot be described using the quantum-mechanical notions, but only the classical terms. He quotes Bragg: “Everything in the future is a wave, everything in the past is a particle.” (p. 83) Therefore, quantum mechanics is a small part of science that describes a part of nature. More than this, Dyson contradicts the Copenhagen interpretation which declares that the “role of the observer” causes an

… abrupt “reduction of the wave-packet” so that the state of the system appears to jump discontinuously at the instant it is observed. This picture of the observer interrupting the course of natural events is unnecessary and misleading. What really happens is that the quantum mechanical description of an event ceases to be meaningful as the observer changes the point of reference from before the event to after it. We do not need a human observer to make quantum mechanics work. All we need is a point of reference, to separate past from future, to separate what has happened from what may happen, to separate facts from probabilities. (Dyson 2004, p. 84)

So the “role of the observer” is “solely to make the distinction between past and future.” (p. 83) From an EDWs perspective, the role of the observer is not to make the distinction between the past and the future, but the distinction between EDWs! Dyson introduces “time” as a single solution to avoid the “quite strange” ontological role of the observer. However, Dyson introduces this solution because he works within the unicorn-world. In fact, changing the conditions of observation (“point of reference”), the observer observes EDWs. In this case, Dyson’s distinction between the past (facts) and the future (probabilities) is useless. In support of the EDWs perspective is Dyson’s hypothesis of denying the existence of “gravitons” (at the end of his article). (Dyson 2004, pp. 88–9) The majority of physicists accept that the “gravitational field” must be a quantum field with associated “gravitons”. Dyson remarks that there are no arguments (empirical or theoretical – or even thought-experiments) which support this idea. The detectors can detect only the classical gravitational waves produced by the massive entities. If we do not have even a thought-experiment for supporting quantum gravity, then the gravitational field is a “pure classical field” and the gravitons do not exist. This hypothesis promotes the EDWs approach. The “gravity” is produced only by massive objects and if we *think* that either a planet is “composed” of microparticles, then we have “microgravity” or there are the “gravitons” that produce the gravity. However, these notions of “microgravity” and “gravitons” are empty notions! “Gravity”, apparently, “exists” only in one EW, the world of macro-objects. Without any object, the “space” has no curvature[[157]](#footnote-157)but we can observe the curvature only as produced by the macroobjects. It is “impossible” for us to introduce curvature at the quantum level.[[158]](#footnote-158)

The general view about the articles written by scientists that we have analyzed here is that physicists accept various (sometimes contradictory) alternatives (with odd, “empty” notions) in explaining “weird” phenomena. At the end of their article (2001), Tegmark and Wheeler introduced the results of an informal pool at a conference on quantum computation at the Isaac Newton Institute (Cambridge, July 1999). Out of 90, 8 accepted wave-function collapse, 30 preferred “many-worlds or consistent histories (with no collapse)” and 50 accepted “none of the above or undecided”! “Rampant linguistic confusion may contribute to that large number. It is not uncommon for two physicists who say that they subscribe to the Copenhagen interpretation, for example, to find themselves disagreeing about what they mean.” (p. 75)[[159]](#footnote-159) Tegmark and Wheeler mention that quantum theory “is probably just a piece in a larger puzzle”. Theories from physics can be organized in a family tree. At the top of the tree, we can see the general relativity and quantum field theory. However, “[p]hysicists know something is missing at the top of the tree, because we lack a consistent theory that includes both gravity and quantum mechanics, yet the universe contains both phenomena.” Therefore, the “ultimate goal of physics” is to find the “theory of everything” that “would have to contain no concepts at all”. (Tegmark and Wheeler 2001, p. 75) As we saw above, the theory of everything has a “meaning” only within the unicorn-world. As a summary of our analysis from the EDWs perspective, we claim that the persistence of this “peculiar” picture of quantum mechanics for 100 years is due to the extension, within the unicorn-world, of the correct idea of a waves’ superposition to the pseudo-“superpositions” of (1) waves and particles and (2) several states of a particle. Working within the unicorn-world paradigm, scientists and philosophers have obviously been forced to create such weird, empty notions.

Some physicists even started their book about the “elementary particles” mentioning the Ancient Greeks’ efforts in defining the “atoms” as “indestructible particles”, particles that are not composed of anything else. As we already know from our previous works (2002, 2007, 2008, 2010, etc.), the “decomposition” of the “whole” in “parts” is quite complicated and, in some cases, quite wrong. In fact, in some cases, the whole-parts relationship is a pseudo-relationship since either (a) even if the whole and the parts belong to the same EW, the whole does not exist for its parts and the parts do not exist for the whole, or (b) the whole and the parts belong to the EDWs.[[160]](#footnote-160) Following the Ancient Greek direction, theoretically and empirically, physicists “decomposed” matter in “elementary particles” several times in the 19th, 20th, and 21st Centuries. At one moment, some physicists even believed that they had reached the “elementary particles” (both theoretically and empirically). However, later, other physicists discovered (sometimes, first theoretically, later empirically) that the previous “elementary particles” were composed of smaller “elementary particles”. After several cases of “failure”, the physicists became quite suspicious, and actually they avoid to believe that they have finally discovered (theoretically and/or empirically) the “elementary particles”. In fact, the quarks (up and down) and the electrons are believed to be the elementary particles which constitute the matter, composed the “normal matter” (baryonic matter that composed the stars, planets and all other macro or micro-entities) that we observe or not in the “universe”. There are other particles which compose the stable or the unstable matter (which disintegrates quite fast). Among the “standard particles”, there are three forces that relate these microparticles like quarks and electrons: electromagnetism force, strong force, and weak force. These forces are “transmitted” by certain bosons: photons for electromagnetism, gluons for strong force, W+, W-, and Z0 for weak force. To these particles, we have to add the Higgs bosons/field that gives mass to all other elementary particles. Moreover, we have to add the forth force, gravitation that requires the “gravitons” as microparticles that transmit this force.

Any physical theory has its limits. Maxwell’s equations work beautifully to describe electromagnetic phenomena, but only up to a certain point. When dealing with the physics of the very small, electrons in atoms or photons in high-energy scattering experiments, Maxwell’s equations fail; they must be replaced by the equations of the Standard Model.” (Oerter 2006, p. 196)

Both Maxwell and Einstein were correct, but only within the EDWs. Within the unicorn world, there has been ontological contradictions which we can be avoided only using the EDWs perspective. Also, since it was constructed using the notion of “infinite” (which cannot even exist - see Vacariu and Vacariu 2029), the notion of “singularity” is wrong. The invention of “infinite” has to be connected with one characteristic of the human mind: it has no illusory “spatial” dimensions as any macro-object apparently has. The “process of interactions” constitutes the final state of the electron, of any microparticle. The electromagnetic wave does not collapse into the electron: both the wave and the microparticle always exist, but in the EDWs.[[161]](#footnote-161) This wave-particle duality cannot be explained within the unicorn world. Nevertheless, within the EDWs perspective, de Broglie’s wave-particle “duality” means that the particle is in one EW, while the wave is in an EDW.[[162]](#footnote-162) Essentially,

“Born realized that the quantum field can’t be the electron itself: An electron never splits up. You never find half an electron in each box. What you find instead is that, if you repeat the experiment many times, half of the time the electron ends up in one box and half of the time in the other box.” (Oerter 2006, p. 74)

This idea would mirror the EDWs: the electron is indeed in one box, only the electromagnetic wave spreads throughout the entire “space” (space is a pragmatic notion), in reality the wave “spreads” through the entire field-EW, i.e., parts of the electromagnetic field have different values and the changing of these values correspond to the “movement in space” of a microparticle.

**4.7 The brain and quantum mechanics**

Interestingly, Presura has a small section on the human brain and quantum mechanics. In that section, there is a drawing in which two neurons are represented in a model in which an “eventual soul” would act on the neurons. The Presura describes the neurons in quantum states.

Quantum mechanics tells us that the real state which will be found after the measurement cannot be predicted. We, however, presuppose that a ‘soul’ (…), placed in an immaterial world, determine effectively which state will be obtained (…). The soul is not part of this world, but it can influence it. (Presura 2014, 264)[[163]](#footnote-163)

At the first glance, talking about “different worlds”, this paragraph seems to be quite close to our EDWs perspective! However, the great error is that Presura mentions that the “soul” can influence the brain/body. From our viewpoint, one EW does not exist for any EDW, therefore, “influence” or any Presura kind of “causation” is a totally a wrong notion! However, few paragraphs later, Presura writes a paragraph very close to our EDWs perspective (!):

For instance, we can construct a mechanism through which our “soul” (a kind of “haze” that we suppose it belongs to another parallel world, a “world beyond”, let say) it realizes its presence through the decisions in this world of matter, through the *probability wave.* It tells us which are the probabilities for the result of a measurement, but it does not tell us the result itself. (Presura, p. 264)

Even if the beginning of this paragraph is quite close to our EDWs perspective, there is a mixture of EDWs! Anyway, it presupposes a wrong relationship between different “levels”, “material” and “immaterial worlds”. Furthermore, Presura offers more details about his model. We believe this model would be closer to Descartes’ dualism:

The world beyond would manifest in the brain through the selections of these results of quantum measurements, for which quantum physics can furnish us only probabilities. It has to be notice, this mechanism conserves “free will”. Our decision is not more a predictable mechanical result of the classical interactions between neurons, but a decision coming from the world beyond, that of souls. (Presura, p. 265)

Again, this paragraph seems quite close to our perspective, but there is still the same error: the influence of soul on the body![[164]](#footnote-164) Presura emphasizes that the most scientists believe that

the decoherence destroy the quantum states, and the our brain behaves classically, at macroscopic level. At atomic level, it behaves quantum, as any atom in the universe. However, a single quantum atom does not help us to decode consciousness, therefore we need a collective quantum state, formed from more macromolecule. (Presura 2014, p. 268)

There are no “levels” or “worlds” which influence each other, but the EDWs and one EW does not exist for any EDW. Moreover, there is the correspondence between the mind (which includes consciousness) and the brain/body; the mind does not exist for the body and vice-verse. Indeed, within the micro-EW, the brain does not exist, there is a huge amalgam of microparticles, and moreover, in the field-EW, there is a multiparticle wave that corresponds to that amalgam of microparticle. Consciousness is part of the mind which is an EW. (Recall SP)

**4.8 Laser and bulb light**

Another important topic in Presura’s work is “laser”. Very shortly, we introduce some of his ideas here: the light of a laser is “coherent”, i.e., all emitted photons are synchronized in time and space, they have the same phase, frequency, and polarization. Because of this fact, we can make the sum of all probability waves of photons (given by the electric field of electromagnetic oscillation). “In this way, we get almost an electromagnetic field classic macroscopic.” (Presura, p. 276) This kind of electromagnetic field is “classical”, while that emitted by the Sun or an electric bulb is not.[[165]](#footnote-165) “This is because the emission [of the photons] is thermal, and there is no relationship between the photons emitter by the atoms. They have only accidentally the same frequency, but their phases are not synchronized.” (Presura, p. 276) Therefore, we cannot sum their probability waves.[[166]](#footnote-166) Presenting the quantum field theory, Presura insists in emphasizing that the microparticles are certain “packets of energy” of the “relativistic probability wave”. These microparticles are

transferred to the electromagnetic field of which packets of energy are called photons… We get a familiar representation of a process through which an electron and a proton interact and disappear nowhere, leaving behind them a *photon*. In this case, the process can be seen as one of the transfer of energy from one field to another. (Presura, p. 358)

We can get these kind of interactions quantifying the electromagnetic field and the field of probability wave of relativistic electron (“quantum electrodynamics”). It is clear the above sentences are written within the unicorn world framework!

The power of physics is not so much in the equations of the Universe which it indicate us, but in its principles… We can say that, in the future, not the particular form of the equations will play so much an important role, but more important there will be the principles behind these equations. Maybe we will not be able to find the final equation of the universe, but a set of final principles. A set of principles which can be satisfied only by a limited number of equations. Therefore, paraphrasing Einstein, we can say that we will get closer to the mind of Creator. (Presura 2014, p. 248, his italics)

In our work (2019) and this work we have already inserted the principles of our Metaphysics that describe not the “Universe”, which does not exist, but the EDWs (which really “are”). To find the equations, it is the duty of physicists, not of philosophers. However, with these principles, we do not get closer to the “mind of the Creator” (which anyway cannot even exist – see our work 2019, last chapter), but we have become closer to understand the “Hypernothing” (which it is not the “Supreme intelligent creator”, but just an EW[[167]](#footnote-167))!

**4.9 Completely different FRAMEWORKS for the EDWs perspective and some approaches (constructed within the unicorn world!)**

**4.9.1 Bohr’s complementarity**

In 1927, Bohr introduced the idea of “complementarity” between the wave and the particle: “Whether an object behaves as a particle or as a wave depends on your choice of apparatus for looking at it.” (McEnvoy and Zarate 2013, p. 160) However, working within the unicorn world, Bohr’s brought together different aspects of Heisenberg’s matrix mechanics and uncertainty principle, Born’s probability of the Schrödinger’s wave equation and this complementarity (McEnvoy and Zarate 2013, p. 161):

Even more radically, I concluded (with Heisenberg, Pauli and Born) that the description of a state of an atomic system before a measurement, is **undefined**, having only the potentiality of certain values with certain probabilities. (McEnvoy and Zarate 2013, p. 161)

Obviously, the idea of “undefined” is just an abstract concept constructed within the unicorn world! This “Copenhagen Interpretation” was a SF story, not only for Einstein, but also for us! Within the unicorn world, Bohr believes that the properties of the wave and the properties of the particle are not contradictory, but complementary: “since the evidence was obtained under different experimental conditions, it cannot be combined in a single picture but must be regarded as complementary”. (McEnvoy and Zarate 2013, p. 162) The image of the world/Universe could not accept even Bohr’s complementarity (which could not get its own ontology just because of the framework of the unicorn world!). Many years, Einstein expressed his disagreement with Born’s probability, Heisenberg and Bohr’s views, finally introducing “Einstein, Podolsky, Rosen (EPR) paradox”: two electrons are “in a single state”, their spin cancel each other, if particle A has spin “up”, electron B must have the spin “down”. According to Copenhagen interpretation:

the spin of A has no definite value until it is measured at which point it must produce an instantaneous effect at B, collapsing its spin wave function into the opposite or “down state”. This bizarre situation demands **action-at-distance** or **faster-than-light** communication, neither of which is acceptable. (McEnvoy and Zarate 2013, p. 167)

Therefore, there has to be certain “hidden variables, (elements of reality)”, so quantum theory is incomplete. (McEnvoy and Zarate 2013, p. 167) This is clearly the “locality”/“separability” principle, based on the special relativity (nothing travel faster than light): one change in a system produces no instantaneous changes in a separate system. (McEnvoy and Zarate 2013, p. 167) However, the locality was rejected by Bohr and this team:

Quantum mechanics does not permit a separation between the observer and the observed. The EPR experiment does not demonstrate the incompleteness of quantum theory, but the naivete of assuming **local** conditions in atomic system. The two electrons and the observer are part of a single system… Once they have been connected, atomic system never separate.” (McEnvoy and Zarate 2013, p. 168)

Clearly, from our EDWs perspective, both Einstein and Bohr were partially right and partially wrong (due to the unicorn world): the electrons are really separate in the micro-EW, BUT when two electrons are placed together, their corresponding electromagnetic waves become one, therefore, the atomic system (those two coupled electrons) corresponds to one electromagnetic wave! When we measure the spin of electron A, through correspondence, we act on the whole electromagnetic wave therefore, and thus, we act on the electron B. Obviously, there is nothing “faster than light” since the electromagnetic wave is an indivisible entity. Thirty years later, John Bell introduces his inequality principle: his test was on two correlated photons (polarization of light instead of spin of electrons), but this test grasped the relationship between two microparticles (in this case, the photons) and assumed Einstein’s locality assumed to be true. (McEnvoy and Zarate 2013, p. 169): “if the experiments showed that the inequality was violated, this would mean that one of the premises in his derivation was false. Bell chose to interpret this to mean that nature is non-local”. (McEnvoy and Zarate 2013, p. 169) Few years later, John Clauser and this team (1978) and Alain Aspect’s team (1982) proved experimentally the violation of Bell’s inequality.

This means that in spite of the local appearances of phenomena, our world is actually supported by an invisible reality which is unmediated and allows communication faster than light, even instantaneously.

Interactions under Non-locality Reality

1. The interaction does not diminish with distance.

2. It can act instantaneously (faster than the speed of light).

3. It links up locations without crossing space. (McEnvoy and Zarate 2013, p. 170)

What an amazing picture of certain EDWs constructed within the unicorn-world![[168]](#footnote-168) From our perspective, there is no “invisible reality” which allows instant communication, but there is only the *correspondence* between two microparticles and their electromagnetic wave, no more or less. Points (1) and (2): when we act on one particle, we act on a part of electromagnetic wave, but since the wave is an indivisible entity, we act on the entire wave, therefore we act, through correspondence, on the second microparticle. Point (3) refers exactly to the indivisible electromagnetic wave which corresponds to those two electrons!

The Copenhagen standpoint on the measurement problem makes the same error, assuming the existence of the unicorn-world. Between two measurements, there is only the probability wave of electron, but not the electron. (Presura 2014, p. 284)[[169]](#footnote-169) In this interpretation, at one moment using one tool of observation a human subject can observe the wave. When the observer changes the measurement apparatus for observing an electron, the wave function collapses at a certain location. The measurement apparatus produces this collapse. Bohr always emphasized that before the measurement of the position of an electron, it is meaningless to ask where that electron is. For Bohr, “the electron simply *does not have* a definitive position before the measurement is taken.” (Greene 2004, p. 94) Again, “there is either a probability wave (between measurements), or a particle (at a measurement position), but never both in the same time”. (Presura, p. 284) From our viewpoint, it is quite impossible both entities to be present in the same place, at the same time. In reality, there are both the wave and the particle present in the same “place”, at the same time, but in EDWs! The error in this conception is that three objects are postulated in the same unicorn-world – the wave that collapses, the electron (microscopic object) and the measuring instrument (macroscopic object). To avoid this paradox, Bohr’s stratagem was to negate the existence of the particle until that particle is observed/measured, but in that moment, the wave function collapses into the electron in a certain location. Bohr’s approach represents one extreme position. The other extreme position for the quantum measurement problem is the many-worlds approach (Everett, De Witt, Deutsch, etc. – see below). Between these extremes there are other approaches, but all these theories assume the existence of the unicorn-world.

So the postulates of Bohr’s Copenhagen school, loosely speaking, can be summarized as follows:

a. All energy occurs in discrete packets, called quanta. (The quantum of light, for example, is the photon. The quanta of the weak force are called the W- and Z-boson, the quantum for the strong force is called the gluon, and the quantum for gravity is called the graviton, which has yet to be seen in the laboratory.)

b. Matter is represented by point particles, but the probability of finding the particle is given by a wave. The wave, in turn, obeys a specific wave equation (such as Schrödinger’s wave equation).

c. Before an observation is made, an object exists in all possible states simultaneously. To determine which state the object is in, we have to make an observation, which “collapses” the wave function, and the object goes into a definite state. The act of observation destroys the wave function, and the object now assumes a definite reality. The wave function as served its purpose: it has given us the precise probability of finding the object in that particular state. (Kaku 2005, p. 153)

At point (a): We have “quanta”, the smallest discrete entity (the microparticle which belongs to the micro-EW), but we also have to take into account the electromagnetic wave which belongs to the field-EW. At point (b): Within the quantum mechanics, matter is indeed represented by the “point particles” but these abstract entities exist only in mathematics, not in reality. The “probability” furnished by the relationship between the particle and the wave mirrors, in reality, the *correspondences* between entities which that belong to the EDWs. At point (c): Before an observation, an object does not exist in all possible states simultaneously. It is only the wave that exists everywhere, while the microparticle is always only in one place. The electromagnetic wave does not “collapse” into the electron and the act of observation does not “destroy” the wave function. The act of observation moves our observation, indirectly, from an EW (the microparticle-EW) to an EDW (the field-EW). If we replace “observation” with “interaction”, we immediately deduce that we, the human beings, are not the only “observers”: Any entity interacts with other entities- its existence is constituted by these interactions. The entity is an “observer”!

‘Observation’ is a loose, ill-defined concept. Moreover, it relies on the fact that there are actually two types of physics: one for the bizarre subatomic world, where electrons can seemingly be in two places at the same time, and the other for the macroscopic world that we live in, which appears to obey the commonsense laws of Newton. According to Bohr, there is an invisible ‘wall’ separating the atomic world from the everyday, familiar macroscopic world. While the atomic world obeys the bizarre rules of the quantum theory, we live out our lives outside that wall, in the world of well-defined planets and stars where the waves have already collapsed. (Kaku 2005, pp. 155-156)

Indeed, “observation” is a “loose, ill-defined concept”. This is the reason why, in our previous works (starting with articles from 2002, 2003, and 2005), we replaced “observation” with “interaction”, a much more real, objective process! With “interaction”, we reach Einstein’s “objective reality”, that is, according to Kaku, “the idea that objects can exist in definite states without human intervention”. The macroscopic world is the macro-EW, while the “atomic world” does not strictly exist, there is only the microparticle-EW and the field-EW. The “invisible wall” between the microworld and the macroworld refers to the EDWs. Thus, within our EDWs perspective we return to Einstein’s “objective reality” but we reject Bohr’s idea that, according to Kaku, “reality existed only after an observation was made”. In fact, we reject Bohr’s “observation” by extending this act to all ED entities. In this way, the human observation becomes a very small class of observation. Contrary to Bohr’s idea, “reality” (the EDWs) has existed without the need of human observation. The “entangled particles” ***correspond*** to the wave and this is the reason we have the “illusion” that these microparticles are somehow “entangled”. *The entanglement is only the correspondence between those two particles and the wave.* We strongly emphasize that these correspondences do not have any ontological status! Sheehan and Conselice (2015) write that

Bohr’s model postulated that electrons could only occupy certain specific orbits around the nucleus, and when in them, they neither emitted or absorbed radiation. They only emitted radiation when they jumped from a higher to a lower orbit, and absorbed it when they jumped from a lower to a higher orbit. The wavelength or frequency of the emitted or absorbed light was proportional to the energy difference between the levels. (Sheehan and Conselice 2015, p. 161)

From our viewpoint, such “jumps” of a particle from one orbit to another correspond to the proportional energy of each orbit! Again, as we showed in this book, the particle corresponds to the peak of the wavelength or frequency and the particles and the waves belong to the EDWs. Let us investigate other paragraphs from this book:

The existence of energy in empty space-the discovery that rocked our cosmological universe and the idea that forms the bedrock of inflation-only reinforces something about the quantum world that was already well established in the context of the kinds of laboratory experiments I have already described. Empty space is complicated. It is a boiling brew of virtual particles that pop in and out of existence in a time so short we cannot see them directly. Virtual particles are manifestations of a basic property of quantum systems. At the heart of quantum mechanics is a rule that sometimes governs politicians or CEOs-as long as no one is watching, anything goes... These “quantum fluctuations” imply something essential about the quantum world: nothing always produces something, if only for an instant. (Krauss 2012, p. 154)

Many physicists believed in that the exact same answer applies to the nonlocality problem in quantum mechanics. As we showed in our previous works, the “non-locality” between two particles is a wrong notion constructed within the unicorn world. In fact, the non-locality of two particles (that belong to an EW) corresponds to the indivisible electromagnetic wave (that belongs to an EDW). The same answer can be used for the problem mentioned by Hooper in the paragraph above: two “regions”, for instance, are not connected to each other, but they correspond to an indivisible entity which belongs to an EDW. Krauss is right, “empty space” is indeed “complicated”, since it does not even exist!

Whitaker considers that, for Bohr, the complementarity of position and momentum of a particle was the “fundamental example of complementarity”. (Whitaker 1996, p. 177) The next example of complementarity is the angular momentum and only the last one is the duality wave-particle. (p. 177-78) In Whitaker’s view, Bohr believed that the position and the momentum (kinematic-dynamic complementarity) are necessary for a classical description, but it is unclear the necessity of the wave or the particle in the description of light and matter. “So analysis of complementarity should always concentrate on the kinematic-dynamic, not on wave-particle case.” (Whitaker 1996, p. 178) It is obviously that, within the unicorn-world, we have to concentrate on the kinematic-dynamic complementarity. In fact, the “kinematic” corresponds to the rigidity of the wave, the “dynamic” to the relation between those two particles. So, inevitable, we have two EDWs![[170]](#footnote-170) Replying to the EPR thought-experiment, Bohr sustains that the measurement on particle 1 cannot “mechanically” disturb particle 2. (Whitaker 1996, p. 229) Nevertheless, according to Whitaker, the effect of the EPR on Bohr was “quite dramatic”. The EPR “forced some change in Bohr’s approach from ‘disturbance’ to the idea, (…), of *wholeness* and *the phenomenon*.” (Idem) Again, from an EDWs perspective, we can much easier understand Bohr’s recoil to “wholeness”! In fact, this wholeness is represented by the rigidity of the wave from EW2 that corresponds to those two particles from EW1. We strongly emphasize that we have to avoid the extension of Heisenberg’s principle to the viewpoints of all ED entities (i.e., to hyperontologize it). In other words, we have to apply the conceptual containment and complementarity principles (plus Kant-Hanna's rule) to stop this “hyperontologization of the unicorn-world”. As we will see below, gravity exists for planets and stars (without the need of the gravitons that would relate EDWs). Moreover, nobody can offer an ultimate clear definitive argument for sustaining that the field (or the wave) is more “elementary” than the elementary particles.

According to de Broglie, a wave is “associated” to (in fact, it corresponds to) each particle.[[171]](#footnote-171) But the photon cannot be split as it is possible for a wave. Then what produces the interference? Some physicists imagine that the electron “interferes” with itself, i.e., it is a kind of reconstruction of the interference “associated” to the wave. In Greene’s words, we are forced to conclude that each electron, as a particle, has certain characteristics of a wave. ( Greene, p. 121) In our opinion, it is completely wrong to think that an “electron interferes with itself”! Only in the unicorn-world, somebody is forced to think of this idea. Within the unicorn-world framework, the micro-level (the “ultimate reality”) is indeed a very strange notion for our common sense.

In other words, said de Broglie, the electrons always exist, they have speed and positions *well-defined*, and we see them in one part of the other only because they are guided there by the pilot-wave attached. In de Broglie’s interpretation, *both the pilot wave and the particle* (the electron, for instance) are *real*, both existing in any moment of time. Notice the difference between Copenhagen interpretation, where only one of those states manifests at one moment, either the probability wave between the measurements, or the point electron (classic) at one measurement of position. (Presura 2014, p. 284)

Because the electron has position and speed at any moment, de Broglie’s approach is the theory with “*hidden variables*”. (Presura, p. 284) We have to notice that de Broglie abandoned his approach. Later, Bohm became one of its proponent. He introduced “quantum force” (given by the pilot wave but a different force than the electric or magnetic forces/fields) that acts on the electron. The electron, the wave and this quantum force really exist. (idem) The spin is not an intrinsic property of the electron, but a property of quantum force (a result of the pilot wave). (Presura 2014, p. 286) In fact, for a better alternative, both de Broglie and Bohm would need to change their paradigm of thinking, i.e., to replace the unicorn world with the EDWs perspective! The problem is that, until Gabriel Vacariu, nobody discovered the beings of EDWs! In our opinion, Bohm introduced “quantum force” as one of those “hidden variables”. Indeed, both the electron and the wave really exist, but in EDWs. Working within the unicorn world, de Broglie and Bohm were forced to introduce such “hidden variables”. This “quantum force” is just the *correspondence* between the wave and the particle, but any “correspondence”, between the entities which belong to the EDWs, do not have any ontology! Therefore, in reality, the quantum force is nothing than the electromagnetic wave which belongs to an EDW. Essentially, however, is that Bohm believes that an ensemble of electrons is more than than the sum their properties, because in this equation we have to introduce also the multiparticle pilot wave (which really exists). The particle “depends” on the wave. (Presura, p. 287) Later, Bohm became a proponent of holistic theories (versus reductionism): the system cannot be describe by the properties of its components. “‘Is the hole Universe in the same situation?’ asked Bohm”. (idem)[[172]](#footnote-172) Bohm was quite close to the EDWs, but he did not have the imagination necessary for changing the old paradigm, the unicorn world with the EDWs perspective. The great difference between Bohm’s background and Gabriel Vacariu’s background is that the first was a physicist, while the second has been a philosopher who discovered the EDWs working on the mind-brain problem! The micro-EW and the wave-EW are both the external EDWs for the human subject. (Recall SP) Gabriel Vacariu has changed the unicorn world paradigm with the EDWs just working on the mind-brain problem: the brain belongs to the “external” macro-EW, while the mind is an EW. *We are quite convinced that it would be quite impossible for a physicist to discover the EDWs working only on the microparticle-wave duality or on the micro-macroparticles duality to discover the EDWs![[173]](#footnote-173)*

We want to highlight the huge difference between “association” and “correspondence” regarding the particle and the wave. The notion of association requires the unicorn-world and a causal relationship between the particle and the wave. The “correspondence” excludes any such relationship just because these two entities belong to the EDWs: the wave does not “influence directly” the particle, in any way. When we observe/act on a wave in one EW, we act but not observe, at the same time, the particle which corresponds to the observed wave. In a very small part of the wave, there are certain characteristics that are different than in the rest of the wave and these characteristics correspond, with great probabilities, to the particle. Within the unicorn-world, we would have had the impression that these characteristics influenced somehow the associated particle. Nevertheless, those characteristics *correspond* to the particle and are not associated to it. After presenting various interpretations of quantum mechanics, using “collapse” as a criterion, Putnam makes a classification of the main alternatives (the Von Neumann, many-worlds, Bohm and Ghirardi-Rimini-Weber interpretations). As we mentioned above, one of the main problems in quantum mechanics is the relationship between the microparticles and the macroparticles. Putnam reinterprets the Copenhagen interpretation in the following sense:

[T]he macro-observables have sharp values at all times… while micro-observables have sharp values only when measured, where measurement is to be defined as a certain kind of interaction between a micro-observable and the macro-observable. (Putnam 1965, pp. 149–55 in 2005, pp. 624–5)

And I said (Putnam [1965], p. 157) that the remaining problem for quantum mechanics was to say what is so special about macroobservable: “The result we wish is that although micro-observables do not necessarily have definite numerical values at all times, macroobservables do.” (Putnam 2005, p. 625)

Later he wrote that the first alternative in his classification (Von Neumann − “collapse” produced by something external) presupposes the collapse as “something external to the system and not subject to superposition” and this case is an unsolved problem.

“Macro-observables” is not the sort of term that can be an irreducible primitive in an ultimate physical theory, so I called for some future extension of quantum mechanics that would explain why macroobservable do not go into such states as 1/√2(Live Cat) + 1/√2(Dead Cat). (Putnam 2005, p. 628)

Let us analyze this paragraph in detail. From an EDWs perspective, we consider that, within the unicorn-world, the scientists have been forced to introduce the “collapse” of the wave. Otherwise, they could not accept that two things simultaneously exist in the same place, at the same time (or the same thing has two positions - one being observed or measured by us) within the unicorn-world. Evidently, without the difference between the epistemological-ontological and the organizational thresholds, the “irreducible primitives in an ultimate physical theory” (that would be the so-called “theory of everything”) could not be certain macro-objects. In other words, the planets, for instance, could not be irreducible primitives. Therefore, the scientists have been working to find the “gravitons” which would represent this force at “quantum level”. (The gravitons cannot even exist...) From the EDWs perspective, the planets are indeed irreducible primitives because, according to Einstein’s general theory of relativity, gravity is caused by massive objects that warp the surrounding space, gravity being a property of space. As we saw above, ignoring microphysical forces, Einstein adopted a perspective on the relationship between this necessary geometry and the entities as “practically rigid bodies”. (Friedman 2001, p. 114) Within the EDWs, we do not “ignore any forces” and each EW has its own irreducible primitives! The planets, the macro-objects are the irreducible primitives in the macro-EW and the microparticles are irreducible primitives in the micro-EW. It has to be clear that the “theory of everything” is the “theory of the unicorn-world”!

**4.9.2 Feynman’s “sum over histories”**

This notion supposes that, in two-slits experiment, it is possible that an electron travels through both slits before reaching the screen. Therefore, we have to take into account all the possible histories for any individual electron. “Feynman showed that each such history would contribute to the probability that their common outcome would be realized, and if these contributions were correctly added together, the result would agree with the total probability predicted by quantum mechanics.” (Greene 2004, p. 180) Again, because of the unicorn-world, Feynman can introduce a radical notion, the “sum over histories”, against the classical view. The beam-splitter experiment supports such an abstract, mathematical, picture of “reality”.[[174]](#footnote-174) It is understandable that if a beam of light is split into two beams and then, with the help of two mirrors, the beams are detected by a single detector, we can see the interference of those beams. When an individual photon is fired toward the splitter, the result is the same. But the photon cannot be split as it is possible for a wave. Then what produces the interference? Borrowing this property of splitting from waves, some physicists introduced different notions. We saw above that, decades after Feynman, Deutsch uses an empty notion of “shadow electrons” to explain the interference. For Feynman, we need to combine those two possible histories “in determining the probability that a photon will hit the screen at one particular point or another.” (Green, p. 181) In fact, each particle from the EW1 has a corresponding wave in an EDW, the EW2. When the apparatus fired the photon, we measured that particle from the EW1 which corresponds to “its” wave from the EW2. The screen measures the interference of the wave in the EW2 which corresponds to the particle from the EW1. At every time a particle has a corresponding wave but they are in the EDWs.

Classical electrodynamics deals with the classical interactions between the electric charges through the electromagnetic field. The theory of interactions between electrons, positrons, and photons is the “quantum electrodynamics”. (Presura 2014, p. 364)[[175]](#footnote-175) We have to deal here with the “multiparticle probability wave”. Further, let us introduce the interpretation from us perspective of Feynman’s *“sum over histories”*. (See again Vacariu 2008) In Young's experiment, when an individual electron (which belongs to the EW1) is shot toward a double-slit apparatus, the screen measures the interference of two waves (which belong to the EW2). For Feynman, the electron travels through both “slits” before reaching the screen! Therefore, we have to take into account all the possible “histories” for any individual electron. “Feynman showed that each such history would contribute to the probability that their common outcome would be realized, and if these contributions were correctly added together, the result would agree with the total probability predicted by quantum mechanics.” (Greene 2004, p. 180) So, we need to combine all possible histories “in determining the probability that a photon will hit the screen at one particular point or another.” (Greene 2004, p. 181) The electron passes not only through both slits but also through all possible trajectories from the apparatus which sent it until the screen during the same time! And these possible histories are “infinite”! Greene mentions that this state of affair seems to be crazy. (Greene 1999, p. 128)

The “standard interpretation” indicates that between our measurements, there is the wave, but in our process of measuring, we “localize” the particle. Feynman goes beyond this “framework of thinking”: for instance, in the double-slit experiment, the electron passes through both “slits” at the same time! Obviously, for Feynman, it was possible to think of this approach based to the “association” between and the particle and the entire electromagnetic wave! In his view, because the electromagnetic field is shared through the “entire space”, the electron passes through the “entire space” at the same time. There are the “virtual particles” everywhere following the “virtual trajectories” at the same time. (Presura 2014, p. 366) “The action S is minimum for the real trajectory of classical particle in relationship with all others virtual trajectories which can be imagined between initial and final events.” There are an infinity of virtual trajectories[[176]](#footnote-176), but the particle follows the classical trajectory because it has the greatest contribution to the probability transition from one place to another.[[177]](#footnote-177) (Presura 2014, p. 369)

Feynman mentions that quantum mechanics offers an absurd description of nature to our common sense: because this description fits with experiments, we have to accept nature exactly as it is, i.e., absurd. (Greene, p. 130) How this view fits with the classical world? Feynman specifies that for the classical macro-objects, all such trajectories cancel each other except one! We can clearly see here a “Ptolemaic epicycle” applied only to the micro-EW, but not to the macro-EW. Again, only within the unicorn-world, Feynman had “correctly” introduced this radical notion, the “sum over histories”. In reality, the wave from the EW2 corresponds to the particle from the EW1 and this *correspondence* would allow Feynman to introduce his “sum over histories” that are infinite because it is believed that the electromagnetic wave is infinite. When the apparatus fired the photon, we measured that particle from the EW1 which corresponds to “its” wave from the EW2. The screen measures the interference of the wave in the EW2 which corresponds to the particle from the EW1. Shooting the electron which belongs to the micro-EW with a macroscopic apparatus from the macro-EW, we measure the interference of the wave which belongs to an EDW with an apparatus from the macro-EW. We insist that, at every time, a particle from a particular EW has a *corresponding* wave in an EDW!

From the EDWs perspective, we can better understand another “ontologized” notion introduced by Max Born, the “*probability”*. The probability of an electron is calculated on the relationship between the particle and the “associated” wave. In the terms of classical quantum mechanics, the “wave function” describes all the possible states of a particle. Until it is measured, a particle is the sum of *all possible states*. The electron has greater probability to be found where the amplitude of the wave is greater. The wave-characteristic of matter implies that the matter itself has to be described at the “fundamental level” under a “probabilistic” framework. Thus, the “ultimate reality” is under the jurisdiction of probability! Again, when working in the unicorn-world, it is perfectly normal to introduce the probability in explaining the status of a microparticle which corresponds to a wave. *As limited entities and using limited tools of observation, we need to relate (with the help of the correspondences) two EDWs for acquiring more knowledge about entities which belong to EDWs, in this case the microparticles.* However, it is completely wrong to “ontologize the notion of probability”, i.e., to explain the status of a microparticle from our viewpoint (i.e., including the measurement apparatus in defining certain ontological classical states). This notion supposes that, in the two-slits experiment, it is possible that an electron travels through both slits before reaching the screen. Therefore, we have to take into account all the possible histories for any individual electron. “Feynman showed that each such history would contribute to the probability that their common outcome would be realized, and if these contributions were correctly added together, the result would agree with the total probability predicted by quantum mechanics.” (Greene 2004, p. 180) Again, because of the unicorn-world, Feynman can introduce this radical notion, the “sum over histories”, against the classical view. The beam-splitter experiment supports such an abstract, mathematical, picture of “reality”. It is understandable that if a beam of light is spilt into two beams and then, with the help of two mirrors, the beams are detected by a single detector, we can see the interference of those beams. When an individual photon is fired toward the splitter, the result is the same. But the photon cannot be split as it is possible for a wave. Then what produces the interference? Borrowing this property of splitting from waves, some physicists introduced different notions. We saw above that, decades after Feynman, Deutsch uses an empty notion of “shadow electrons” to explain the interference. For Feynman, we need to combine those two possible histories “in determining the probability that a photon will hit the screen at one particular point or another.” (Greene 2004, p. 181) In fact, each particle from the EW1 has a corresponding wave in EDW, the EW2. When the apparatus fired the photon, we measured that particle from the EW1 that corresponds to “its” wave from EW2. The screen measures the interference of the wave in the EW2 that corresponds to the particle from EW1. At every time a particle has a corresponding wave, but they are in the EDWs!

**4.9.3 Everett’s “Many Worlds” and “multiverse” or “parallel worlds”**

We dedicate this short section to illustrate the completely different frameworks for the “many worlds” and the EDWs. There can be a huge confusion between Everett’s “many worlds” or the “multiverse” and our EDWs. The “multiverse” approach indicates the existence of many “universes” within the same “spacetime” framework. These “universes” (related to the notion of “inflation”) are like “islands of universes” (Presura, p. 528) The “many worlds” approach (or “parallel” approach), created by Everett (1957), and followed by Zeh, Zurek, Deutsch (see above) and Tegmark seems to be the closest alternative to the EDWs perspective. The many-worlds interpretation was created by Everett as an alternative to the collapse of the wave function into a particle during the measurement (Copenhagen interpretation). According to Tegmark and Wheeler (2001), Schrödinger’s equation predicts that the person seeing a particle will “enter” a superposition of two possible states. (p. 72) There are two parts of the total wave function (of person plus the particle) that work completely independently in two parallel worlds.

In 1927, Dirac relates electric and magnetic fields with quantum “level” (quantum field theory): the particles are excited states of the electromagnetic field. Born introduced the statistic interpretation of the wave: the wave function is a complex number for each place, at each time for the particle. Born introduces the probability just because the particle does not a clear trajectory. There are possible different trajectories for this particle before someone measures where the particle is placed. Obviously, after the measurement, the observer finds the particle in a position, but before the measurements, there were only certain probabilities to find the particle somewhere. Before measuring where the particle is placed, this microparticle has the probability of being in each point which corresponds with the electromagnetic wave (Schrödinger’s equation), some points having greater probabilities the particle to be there. However, it is possible another wave function (solution to the same equation) which corresponds to the particle in another point. If there are different waves functions at the same time, their sum is the solution for that particle. So, according to the solution to Schrödinger’s equation, the particle can be in several places at the same time (quantum superposition). However, when we realize the measurement, this superposition disappears. In reality, nobody could observe this superposition! Some physicists believe that the wave function “collapses” into the particle, other physicists believe that the world splits into different “worlds”!

Everett considers that we have to preserve the postulate of probability wave and its evolution, but we have to reject the postulate referring its “collapse”. Everett extends this idea to the entire universe and we get the “parallel universes”. (Presura 2014, p. 268) Let see Everett’s view applied to Schrödinger’s cat. Classically, if the radioactive atom disintegrated, the cat would be dead. If the atom has not disintegrated, the cat is still alive. When, at one moment, we open the box, we will see either one state or the other. Quantum mechanics: “Before opening the box, the cat is in a quantum superposition between the above two states. When we open the box, the probability wave of the entire system from the box (the cat and the atom) will suffer a quantum collapse in one of those classical states” (Presura, p. 268), the cat is alive or death. The Schrödinger equation’s indicates the superposition of these two states, and following Presura (he writes the equation for other two states, blue cat and brown cat), we can write:

1/√2 |disintegrated atom, alive cat> + 1/√2 |disintegrated atom, death cat>

Presura emphasizes that the sign “+” indicates the two classical states form a “quantum superposition”. (Presura 2014, p. 268) Each of this classical state receives a complex number, and its “module” gives us the probability to find the system in that state. The symbol | > indicates each classical state, the complex number is in the front of this symbol. (idem) Everett rejects the collapse of the probability wave. In his example, Presura introduces the “soul” of the cat. Therefore, his equation becomes “1/√2 |disintegrated atom, blue cat, soul of this cat> + 1/√2 |disintegrated atom, brown cat, soul of this cat>”. There are two souls in the box, before opening it! Moreover, in the equation, we have to introduce “the rest of the Universe” and “our soul” (in each component). We get

“1/√2 |disintegrated atom, blue cat, soul of this cat, our soul, rest of Universe> + 1/√2 |disintegrated atom, brown cat, soul of this cat, our soul, rest of Universe>”.

So, there is a “superposition” of the entire Universe. (Presura, p. 269) The standard interpretation is that when we open the box, the superposition collapse in one of those two states. Everett believes that there is no collapse, but there are *two parallel Universes*! For him, the entire Universe is a sum of these both states, that is of two components, in each being a cat in one state and a soul! (Presura, p. 270) Therefore, “I” see a blue cat, for instance, just because that “I” belongs to the first component. In a parallel world/Universe, another “self”/“I” see the cat brown! (Presura 2014, p. 271) There is no collapse of the probability wave, but two parallel Universes which, after opening the box, *evolve in parallel*.[[178]](#footnote-178) This evolution is furnished by the Schrödinger’s equation. If we have more measurements, there are more “parallel universes”! “We notice that the parallel universes are representations of the quantum superposition components. They share the same space and time, but they do not interact one wit, another because of the linearity of probability wave.” (Presura, p. 270) Even if it seems to be quite paradoxically, even if those two universes share the same space, “those two components of probability wave remain *independently* in their later evolution. (Presura, p. 271)

From our viewpoint, Everett’s approach is totally wrong, meaningless, or better, his approach is really a “SF-story”! First of all, there is no space and time (or spacetime). Our EDWs do not share the same spacetime, since one does not exist for the other. This is the main reason the interactions between one EW with an EDW is a meaningless notion. Then, essentially for our view, not only the “collapse” is rejected, but also the “superposition”: there are no “parallel souls”. Moreover, the “soul” (the mind) does not exist for the body, so it is meaningless to consider the interaction between the soul and the brain! Obviously, Presura’s example illustrates the image of quantum mechanics until Gabriel Vacariu discovered the EDWs. It has to be clear that Everett’s “many-worlds” approach is constructed within the unicorn world! These “many-worlds” exist within the same macro-EW, there are “universes” situated in different “places” within the same “framework”. In his book 2011, Greene introduces different theories involving the “Multiverses”: Parallel (or Many) Worlds (Quantum Multiverse), Quilted Multiverses, Inflationary Multiverses, Brane and Cyclic Multiverses, Landscape Multiverses, Holographic Multiverses, Ultimate Multiverses and String Theory. Constructed within the unicorn world, all these “multiverses” are quite complicated and “difficult to be proved”. Again, from our viewpoint, all these alternatives are more or less “SF stories”. For instance, see Figure 8.12 (Greene 2011) to understand different frameworks for Everett’s “many worlds” and the EDWs. The following paragraph is written below the figure 8.12: “In Everett’s approach, the measurement of a particle whose probability wave has two spikes yields both outcomes. In one world, the particle is found at the first location; in another world, it is found at the second.” (Greene 2011) Really, we would not be able to understand what Everett’s wanted to illustrate with his “many worlds”. *Anyway, all the alternatives of the “parallel worlds” are constructed within the unicorn world, and therefore these theories are in a totally different framework than the EDWs perspective.* For us, there is no superposition of any states, since the wave and the particle belong to the EDWs! So, it is not a split in two “worlds” and other two worlds and so on.

The EDWs approach is much more adequate to explain the “reality” just because our approach mirrors the “reality” much better; our EDWs perspective is much simpler that any “multiverse” or the “many worlds”. We recall the main rule for the EDWs (that indicates the huge difference between our EDWs perspective and all other alternatives) is that, in principle, the EDWs (more exactly their entities and interactions among them) are situated in the same “place”, but one EW does not exist for any EDW. So, only from this aspect and we can notice *the HUGE difference between the EDWs perspective and Everett’s “many worlds” or “multiverse”: there are (or involve) totally different paradigms of thinking!* Gabriel Vacariu discovered the existence of EDWs working firstly on the mind-brain problem. Everett’s “many worlds” cannot even be applied to the mind-brain problem; on the contrary, its application to this problem would produce absurd results. We repeat, Everett’s “many worlds” or the “multiverse” approaches are, in principle, quite absurd human constructions within the wrong framework, the unicorn world. In our previous works, we have applied the EDWs perspective not only to the mind-brain problem, but also to the main problems of quantum mechanics and to the relationship between quantum mechanics (microparticles, waves) and Einstein’s general relativity (macroparticles). Only these applications would indicate the total different frameworks for Everett’s “many worlds” (the “multiverse”), on one side, and the EDWs, on the other side!

We mention once more that the idea of the superposition of two waves and that of the pseudo-“superposition” of the wave and the particle led the physicists to the idea of the “superposition” of various states of a particle before measurement. From an EDWs perspective, because the wave and the particle belong to the EDWs, there is no superposition of various states for a particle. As a consequence, there is a totally different relationship between the “parallel universes” (“many-worlds” or “multiverse”) and the EDWs. The “parallel universes” ontologically exist within the unicorn-world simultaneously, while EDWs epistemologically exist in the “hyperverse” (i.e., one EW does not exist for any EW!).

Davies dedicates one chapter in his book (2006) to the “multiverse” alternative in quantum mechanics. He mentions some problems for this interpretation: “many scientists hate the multiverse idea”, this theory cannot be tested and it imposes the duplicate problem and the idea of the “fake universe”. The number of parallel worlds can be huge, “I repeat, on the Many Worlds interpretation, there will be 2^30 Einstein-‘histories – parallel worlds’; science fiction is literally right!” (Putnam 2005, p. 630) The number of different *types* of EDWs is very limited given by the epistemologically different interactions and the corresponding ED entities. Everett tried to solve the problem of superposition as a reply to the Copenhagen interpretation about the “wave function that ‘collapses’ into a definite classical outcome wherever the observation was made, with probabilities given by the wave function.” (Tegmark 2004, p. 473) For Everett, this “controversial collapse postulate was unnecessary”. (Tegmark, p. 473) In fact, quantum theory alone predicted that one classical real scene would split into the superposition of many. Interesting for the EDWs perspective is Tegmark’s remark that Everett could not solve two essential questions:

1) Why we do not perceive macrosuperposition and

2) “What physical mechanism picks out approximately classical states (with each object in only one place, etc.) as special bewilderingly large Hilbert space?” (Tegmark 2004, p. 474) The “decoherence” answers both questions. But as we saw above, the decoherence is a wrong notion constructed within the unicorn-world. The “cat” is not both dead and alive before our observation. The physicists needed such “decoherence” only because of the unicorn-world. They consider that the superpositions are available only for isolated systems. When such systems have contacts with other entities (a photo or molecules) the split in the “parallel universes” of those “superpositions” takes place. Surprisingly, Tegmark wrote that decoherence “is now quite uncontroversial and has been experimentally measured in a wide range of circumstance.” (p. 474) In reality, the world does not exist, but only the EDWs are!

Everett showed that it is mathematically consistent to say that when a scientist measures the position of an atomic particle, he *splits* into numerous copies of himself. Each copy resides in a different universe. And each copy sees the particle in a different position. The set of all copies covers the set of all possible particle positions inside a *multiverse*. According to Everett, each universe inside the multiverse is constantly branching, like a tree, into separate but parallel worlds that cannot communicate with each other. Each parallel universe records a self-consistent history drawn from a range of physically possible histories. (Byrne 2010, p. 5)

According to physicist, Bryce DeWitt, Everett showed that ‘This universe is constantly splitting into a stupendous number of branches, all resulting from the measurement like interactions between its myriad of components. Moreover, every quantum transition taking place on every star, in every galaxy, in every remote corner of the universe is splitting our local world on earth into myriads of copies of itself. . . . Here is schizophrenia with a vengeance.’ (DeWitt, B. S. (1970). 161 (Byrne 2010, p. 5)

In our previous books and this work, it has been is very clear that Everett’s “many worlds” is an approach COMPLETELY different than the EDWs perspective. From our viewpoint, Everett’s “many worlds” is a “SF story”, no more or less! We repeat that Gabriel Vacariu discovered the existence of EDWs working on the mind-brain problem (and later he applied his theory to the quantum mechanics). It would mean that the discovery of EDWs rested on the dichotomy subject-world (external), and it was quite impossible somebody to discover the EDWs working on the “wave-particle” duality just because the terms of this dichotomy “wave-particle” (the main problem in quantum mechanics) refer to the entities which belong both to the “external world”. It would mean that it would not be possible for someone to discover the existence of EDWs working on ED entities all belonging to the “external world”! We believe this was the main reason Everett needed to invent “many-worlds” and he did not have any idea about the EDWs. *Working within the unicorn-world,* in order to avoid certain ontological contradictions, Everett introduced “many-worlds” (“parallel worlds”). These “parallel worlds” are within the unicorn-world, therefore, these “multiverses” are completely different than the EDWs: there are “parallel universes” within the unicorn world, no more or less! Also, David Lewis’ logical “plurality of worlds” (somehow, related to Everett’s physical “many worlds”) has nothing in common with our EDWs:

Multiple universes were now a palatable topic for academic discussion. Philosophers started to pay attention. David Lewis, who was in the process of developing a theory of multiple worlds based purely upon philosophical concepts, signed Everett’s dissertation out of the Princeton library.40 Lewis’ well-known ‘modal’ construct of a plurality of worlds based on ‘counterfactuals’ is purely philosophical, and not quantum mechanical,41 but his work has influenced modern interpretations of how probability fits into the Everett worlds. (Byrne 2010, pp. 310-311)

Again, it has to be very clear the huge difference between the “multiverse” and the EDWs. The multiverse means many “Universes” placed all in parallel within the unicorn world. “In parallel” means that one universe is placed near to the other within the “Universe”. No more or less. The huge difference between “multiverse” is that an EW does not exist for any EDW. So, the EDWs are not placed “in parallel” within the same macro-EW at all! On the contrary, for the EDWs perspective, one EW does not exist for any EDW, while for the “parallel Universes/worlds” perspective, the universes are placed all in parallel within the same EW, the macro-EW.

**4.9.4 Strocchi’s “different worlds” and Oriti’s “different ontologies”**

Apparently, Strochi and Oriti’s approaches are quite related. We investigate only Strocchi’s main notion “different worlds” and then, in more details, Oriti’s “different ontologies”.

(a) Strocchi’s book is very specialized on physics and in general we cannot understand it just because there are many mathematical elements. Therefore, we will make a very short investigation of few paragraphs which contain the expression “different worlds” .

**Existence of disjoint Hilbert space sectors**, stable under time evolution in the set of solutions of the classical (non-linear) field equations. They are the strict analogs of the existence of inequivalent representations of local field algebras in quantum field theory (QFT). As in QFT such structures rely on the concepts of locality (or localization) and stability, as discussed in Chap. 5, with emphasis on the physical motivations of the corresponding mathematical concepts; such structures may have the physical meaning of *disjoint physical worlds*, disjoint *phases* etc. which can be associated to a given non-linear field equation. (Strocchi 2005, p. V)

Obviously, Strocchi did not write here about the EDWs. We believe he refers to those “phenomenological worlds” promoted by Bohr, no more or less. These “disjoint physical worlds” cannot exist all within the same paradigm, i.e., the unicorn world! Strocchi does not indicate he rejects the notion of “Universe”. Also Bohr worked within the unicorn world. What is then the ontological relationships between these “disjoint physical worlds”? He emphasizes that these “worlds” have a physical meaning, but within the unicorn world, there would be strong ontological contradiction: that is, the table and the amalgam of microparticles cannot exist both! They are neither complementary (as Bohr thought). We recall that one EW does not exist for any EDW, therefore, Strocchi’s “disjoint physical worlds” or Bohr’s “complementary aspects” are quite wrong.

As it will be discussed in these lectures, the phenomenon of spontaneous symmetry breaking in the radical sense of non-symmetric behaviour is rather related to the fact that, for non-linear infinitely extended systems (therefore involving infinite degrees of freedom), the solutions of the dynamical problem generically fall into classes or “islands”, stable under time evolution and with the property that they cannot be related by physically realizable operations. This means that starting from the configurations of a given island one cannot reach the configurations of a different island by physically realizable modifications. The different islands can then be interpreted as the realizations of different physical systems or *different phases* of a system, or as *disjoint physical worlds*. (Strocchi 2005, p. 4)[[179]](#footnote-179)

Here the expressions “islands”, “different phases” or “disjoint physical system” refer to the same Bohr’s phenomenological worlds or Everett’s many worlds, no more or less. “Different phases of a system” (i.e., disjoint physical worlds) indicates the framework of thinking for Strocchi: the Universe (unicorn world). “The existence of minima of the potential unstable under the symmetry therefore gives rise to islands (or phases or disjoint physical worlds) in which the *symmetry* cannot be realized or, as one says, is *spontaneously broken*.” (p. 5) Let us investigate the main notion, “spontaneously broken of symmetry”.[[180]](#footnote-180) The “broken symmetry” leads to the creation of “islands”, “disjoint physical worlds”, exactly Everett’s “many worlds”. The problem is that nobody can indicate what exactly was that “matter” with the “unbroken symmetry” or “non-perturbative” system. However, as we indicated in our work (2019), Everett’s many worlds are totally different than EDWs! In reality, neither Bohr or Everett, nor Strocchi or Oriti refer to the EDWs since all of them worked within the unicorn world! They talk about certain “phenomenological worlds” (in Kantian sense) just because they do not have any idea about the main rule of the EDWs perspective: “One EW does not exist for any EDW! These “disjoint physical worlds” mirror exactly Bohr’s “complementarity” between the wave and the particle, but this complementarity is constructed within the unicorn world (under the umbrella of Kant’s distinction “phenomen-noumen”). Working within the unicorn world, Bohr’s complementarity could have only a “phenomenological” meaning, otherwise, there would produced strong ontological contradictions, Bohr and the others scientists being aware about this fact. In the next paragraph, we have a definition of “disjoint physical worlds”:

The physical relevance of such structures should be evident as a consequence of the above discussion: a phase can in fact be interpreted as the “world” of configurations which are physically accessible, starting from a given ground state configuration. By definition of local structure, configurations belonging to the same phase or “world” differ by quasi-local perturbations, i.e. they have the same large distance behaviour (for a more detailed discussion see Appendix E); then, since we cannot modify the large distance behaviour of our (reference or) ground state, nor can change the boundary conditions of our physical world or “universe” by means of physically realizable operations, different phases define *disjoint physical worlds*. (Strocchi 2005, p. 28)

This paragraph almost sends the reader to the EDWs! However, Strocchi writes again about his “disjoint physical worlds”, but it does not explain which is their relationship! So, a “phase” is a “world” of “configurations which are physically accessible, starting from a given ground state configuration”. This statement sends again directly to Bohr’s complementarity! We recall, our EDWs are not complementary since one EW does not exist for any EDW! Moreover, Strocchi uses “our physical world or ‘universe’ ”, that is the unicorn world. Even if the word “universe” in within common, Strocchi works within the unicorn world. These “disjoint physical worlds” are no more than Bohr’s complementary entities (that would represent these “worlds”) or Everett’s many worlds![[181]](#footnote-181) The last paragraph we introduce here indicates the same idea:

It is worthwhile to stress that two ingredients play a crucial role: due to the infinite number of degrees of freedom, two ground states define two disjoint worlds or phases of the system and therefore, in contrast with the case of ordinary quantum mechanics, the non-invariance of the ground state implies the asymmetry of the corresponding physical world defined by it. The criterium of spontaneous symmetry breaking of (8.13) crucially relies on the uniqueness of the translationally invariant state and therefore it applies to pure phases. Symmetric correlation functions defined by a mixed state do not imply that the symmetry is unbroken in the pure phases in which the theory (defined by such correlation functions) decomposes. The check of the symmetry of the correlation functions should then be accompanied by the check of the cluster property. (Strocchi 2005, p. 121)

“Two grounds states define two disjoint worlds or phases of the system” means exactly Everett’s many worlds (or, even Bohr’s complementarity). Again, we have Bohr’s noumen-phenomen distinction: the noumena is the “non-invariane of the ground state” that involves the asymmetry of the corresponding physical world defined by it”. This non-invariance of the ground state means exactly the “noumenon”! The “noumenon” would be this “pure phase” that is invariant with an “unbroken symmetry”. Our question is: “What is the matter with this unbroken symmetry or a matter in this pure phase?” It seems to be the Kantian noumenon used also by Bohr and Oriti (see below) about which we have no knowledge at all! Again, we see clearly that Strocchi works within the unicorn world (the Universe) and his paradigm of thinking is totally different than the EDWs perspective!

(b) We emphasize that Oriti worked, explicitly, within the unicorn world (Universe/world) until 2018! He talks about “levels of description” explained by “different theories”, but his framework is the “identity theory”, that is, the micro-entities = the macro-entities, or “the micro-entities compose the macro-entities”. Suddenly, in his article from 2018, Oriti writes about “different ontologies”! However, these expression sends directly to Strocchi’s “different worlds” just because Oriti mentions Strocchi’s book from 2005!

We furnish some details about Oriti’s approach regarding “spacetime”: he believes that spacetime “emerges”. In our book 2016, we indicate that “spacetime” has no ontology, therefore the “emergence of spacetime” is meaningless (it does not matter what kind of “emergence” is involved: in our previous works, we indicated that any notion of “emergence” is meaningless). In almost all his papers, Oriti believes that the “spacetime” really exist. Obviously, this is a great mistake, from our viewpoint, the EDWs perspective. In many articles, Oriti investigates the relationship between (1) Einstein’s general relativity and quantum mechanics, (2) the wave and particle (field theory-atomistic approach). Oriti’s main framework is the “Group Field Theories” (GFT) (but he emphasizes also the “Loop Quantum Gravity”, LQG). He indicates the “emergence of a continuum spacetime” (necessary for General Relativity, GR) from Quantum Gravity. For him, the GFTs are the fundamental quantum field theories for the “elementary quantum constituents” of space, his fundamental “atoms of space”. (2007, p. 7) (the title of section 1.1: 1.1. Spacetime discreteness, the “atoms of space” and the problem of the continuum)

One fascinating possibility is that, at high energies and small distances, spacetime loses its continuum appearance and is instead best described in terms of discrete structures. This possibility is a basic assumption in some approaches to quantum gravity, e.g. causal set theory [2], as a convenient computational tool in others, e.g. simplicial quantum gravity [3, 4], and it is the natural (preliminary) outcome of standard quantization techniques applied to GR, e.g. in Loop Quantum Gravity [8], being also suggested by several results in string theory. (1)

From our viewpoint, this paragraph indicates several errors (Oriti follows this route in all of his articles following the same mistakes). These errors are:

- The emergence of space (mainly he talks about “atoms of space” in many of his articles). In other words, Oriti believes that space has an ontology. From our viewpoint, the existence of “space” would produce strong ontological contradictions! (See our work 2016)

- Levels of descriptions.

- Different ontologies.

Until his article from 2018, Oriti’s works clearly within the unicorn world. That is, the micro-entities represent the “building blocks” of the macro-entities; also, as we will see below, Oriti uses the notion of “emergence”, but it has to be clear that he refers to the “weak/epistemological emergence” and not “strong/ontological emergence”. Moreover, very often, he talks about “levels of description”. To view the unicorn-world paradigm in which Oriti’s works, see this paragraph:

We have a discrete system whose building blocks are fermionic atoms and a microscopic field theory describing its dynamics. At low temperature, the system undergoes a phase transition and condenses to a liquid phase. In this phase most of the microscopic details are irrelevant (not all of them, of course; e.g. if the system was a made of atoms living in 6 space dimensions, say, the collective velocity of the fluid would be 6-dimensional, or in 4He vorticity is absent and a different class of metrics emerge, etc), and one can adopt an effective hydrodynamic description in terms of a continuum, and of collective variables describing the fluid, together with low energy excitations (quasi-particles) propagating in it. The microscopic theory provides the values of the effective ‘fundamental constants’ of the macroscopic theory. … These limitations notwithstanding, we have a concrete example of how: 1) the continuum can be understood as a convenient, if not necessary, approximation of a fundamentally discrete system; 2) spacetime and of geometry can emerge from a theory that is not about spacetime nor geometry nor gravity; 3) General Relativity itself can emerge as an effective description of the (hydro-)dynamics of the collective continuum variables of a microscopically discrete system.

How these results should change our views about spacetime and gravity is of course a matter of debate [11, 12]. It seems to us that these results fit nicely with the point of view outlined in the beginning, which sees a continuum spacetime as an approximation of some yet to be discovered ‘atoms of space’, described by a theory that is not expressed in terms of a pre-existing spacetime to start with, and from which General Relativity emerge in a low energy or macroscopic limit. (Oriti 2007, p. 4)

We have here the identity between the macro-entities and the micro-entities, since the micro-entities are the “building blocks” of the macro-entities: “The microscopic theory provides the values of the effective ‘fundamental constants’ of the macroscopic theory.”! The emergence from points 1, 2 and 3 is a “weak emergence”, that is, the macro-entities have a weak emergence from the micro-entities, that is the micro-entities = macro-entities. Moreover, the “continuum” (necessary for GR) is just an approximation of “a fundamental discrete system”. Again, we have here Kantian distinction “noumen-phenomen” (used also by Bohr). The theory from which GR “emerges” does not refer to “spacetime” at all. Obviously, it is about a kind of “noumenon” here. Again, the “continuum spacetime” is just an approximation of “atoms of space” (that have to be discovered!). We believe “atoms of space” do not exist, i.e, do not have any ontology![[182]](#footnote-182) When Oriti refers to the relationship between quantum mechanics and Einstein’s general relativity, he uses the same notion of emergence (that is about “weak emergence”), which presupposes the identity between the micro- and the macro-entities:

This will be by definition the phase of the theory where a continuum approximation is appropriate, or in other words, where a continuum spacetime emerges. The search for such a phase will be done by studying the properties of the GFT system: i) varying the ‘number of atoms’; ii) varying the temperature of the system (one expect condensation in the low temperature regime); iii) varying type and strength of the interaction (which is also related, from the quantum gravity point of view, to the strength of spatial topology changing processes; iv) in the GFT analogue of both the relativistic and non-relativistic regimes (from a purely formal point of view, the generalised GFT models mentioned above have a non-relativistic Schrodinger-like kinetic term in the time variables; v) varying of course the type and symmetries of the fields and the group manifold on which they are defined (thus the specific GFT model considered). Once the condensed/liquid phase has been found, and thus the issue of the emergence of a continuum spacetime solved, the the final goal is to show the emergence of General Relativity as the hydrodynamic description of the collective variables in this phase. Here one could build up directly on the insights gained in condensed matter analogues of gravitational phenomena [11]. (pp. 8-9)

Again, it is clear that Oriti works within the unicorn world! There are just “levels of description” and “weak emergence” of GR, no more or less. The conclusion of his article mirrors perfectly the identity between the micro-entities and the macro-entities:

we may have already found the right (class of) microscopic theory (theories) of the fundamental constituents of a quantum spacetime. We have in fact at our disposal a quantum field theory of simplicial geometry, describing the interaction of elementary building blocks of space, and with a discrete spacetime emerging from this interaction;… In particular, we have argued in the present contribution that GFTs may be the right framework in which to realize the idea of spacetime as a condensate and of General Relativity as an emergent effective theory for the collective behaviour of the atoms of space in this phase, i.e. as a geometro-hydrodynamics [12], solving in this way the outstanding problem of the continuum approximation that all current discrete quantum gravity approaches still face. (pp. 9-10)

Based on the quantum field theory, we have here the “emergence” of a “discrete spacetime”. Obviously, the GR “emerges” from the “collective behaviour of atoms of space”! But this emergence is, obviously, a weak emergence![[183]](#footnote-183) Again, there is no “atoms of space” (or spacetime) just because the existence of “spacetime” would produce strong ontological contradictions! (see Vacariu and Vacariu 2016) In his chapter from 2009, Oriti writes:

There exist fundamental building blocks or atoms of space, which can be combined to give rise to all sorts of geometry and topology of space. At the perturbative level spacetime is the discrete (virtual) history of creation/annihilation of these fundamental atoms; it has no *real* existence, at least no more real existence in itself than each of the infinite possible interaction processes corresponding to individual Feynman diagrams in any field theory. The description of this evolution is necessarily background independent (from the point of view of spacetime) because spacetime itself is built from the bottom up and all of spacetime information has to be reconstructed from the information carried by the “atoms” and thus by the Feynman diagrams. … Spacetime information is thus necessarily encoded in structures that do not use *per se* a notion of spacetime. Finally, there would be a *fundamental discreteness* of spacetime and a key role for *causality*, in the pre-geometric sense of *ordering* (so that it would probably be better to talk about “pre-causality”). (Oriti 2009, pp. 327-8)

We see here the same idea about the fundamental building blocks of space! However, at the non-perturbative “level”, there is no “spacetime” at all since the “spacetime information” (?) is necessarily encoded” in those elements of nonperturbative level. These nonperturbative elements send to Kantian noumena. We see again the emergence of “spacetime atoms”. Another Oriti’s mistake: he believes that the “quantum gravity is “encoded in elements of GFT”. From our viewpoint, “gravity” cannot exist within the micro-EW. If “spacetime information” is encoded in “structures” that do not use “spacetime”, what kind of emergence of spacetime is about? From our viewpoint, this statement is mirrored by the correspondence between the field-EW (where the fields occupy everything) and “nothing” (no ontology) between the micro-entities (the micro-EW) or the macro-entities (the macro-EW). Oriti needs to translate his view in the EDWs language! More interestingly, Oriti asks the following:

(b) If a continuum spacetime or space are nothing else than some sort of “condensate” of fundamentally discrete objects, as in some “emergent gravity” approaches (see chapter 7 by Dreyer and chapter 9 by Markopoulou) and, as suggested by condensed matter analog models of gravity [42; 43], what are these fundamental constituents? What are their properties? What kind of (necessarily background independent) model can describe them and the whole process of “condensation”? What are the effective hydrodynamic variables and what is their dynamics in this “condensed or fluid phase”? How does it compare to GR? (p. 329)

Again, we have the “emergent spacetime” from certain “fundamentally discrete objects”, but Oriti asks himself what are these fundamental constituents? From our EDWs perspective, this question is meaningless! It sends either to the “beginning” of time (anyway, time does not exist, space does not exist) or to the “infinite” time (which cannot exist, see our work 2016 based on Aristotle’s view who claims that “time” cannot be infinite)! Obviously, how do we “compare” these “fundamental constituents” with the macroscopic entities (that is, the general relativity)? We have here the EDWs! Anyway, Oriti’s answer is constructed within the same paradigm as everybody, the unicorn world:

the GFT approach identifies uniquely the basic building blocks of a quantum space, those that could be responsible for the kind of “condensation” process or the transition to a fluid phase at the root of the emergence of a smooth spacetime in some approximation and physical regime, and gives a precise prescription for their classical and quantum dynamics, that can now be investigated. From this perspective, it is best interpreted as a theory of “pregeometry” in the sense discussed in the chapters by Markopoulou and Dreyer. (329-330)

Oriti emphasizes that the “condensation process or the transition to a fluid phase at the root of the emergence of a smooth spacetime”: we have again the “emergence of spacetime”, a huge mistake! Firstly, there is no spacetime at all, and secondly, in this case, the emergence is a “weak/epistemological emergence”, of course. Otherwise, any kind of “strong/ontological emergence” would produce strong ontological contradictions within the unicorn world! Quite interesting is Oriti’s paper from 2011 about “quantum space”. The first paragraph is this one:

Is reality digital or analog? Of course this question refers, at least implicitly, to the ’ultimate’ nature of reality, the fundamental layer. I do not know what this could mean, nor I am at ease with thinking in these terms. Therefore, the closest I can get to the issue of the digital/analog nature of reality is to consider a special physical system that is, in some sense, the most fundamental of all: space. The question I will focus on in this essay, then, will be: is space digital or analog? What is the best language to understand/describe (quantum) space? (Oriti 2011, p. 1)

Again, we have the “ ‘ultimate’ nature of reality”, the “fundamental layer”, a meaningless notion within the unicorn world. Anyway, this question is also meaningless from the EDWs viewpoint! “Reality” does not exist, even if the reader can make a mistake identifying the “ultimate nature of reality” with our “Hypernothing”! The problem is that the Hypernothing (the EW0) has a hyperontology, while all other EDWs have ED ontologies. The “ultimate nature of reality” (that is the ultimate “level” of reality) has a hyperontology, while all other EDWs have EDWs ontologies! The difference between the hyperontology and ontology save us from falling within the “infinite ”, “spacetime”, emergence, levels, etc. Oriti has no idea about the distinction between hyperontology and ontology! As we have seen above, he talks about “levels”, another huge mistake in philosophy and physics, from the EDWs perspective:

One risk that I will try to avoid is the confusion between physical distinction of different regimes of a physical system and of its dynamics, and the philosophical distinction between different levels of reality, or different ontologies. In particular, the question of the discrete vs continuous nature of quantum space will be addressed in the first context, rather than in the second. Similarly, the problem of the emergence of a set of properties of quantum space, at one level of description, from a different (more fundamental?) one will be sketched in its possible physical/scientific aspects, in the specific models of quantum space I favor, leaving the philosophical reflection on the respective role of reductionism and emergentism [6] to a later stage.

The issue of digital/analog nature of Nature, even in the discrete/continuous translation, as well as the related issue of emergentism vs reductionism, are very complicated on their own, in any specifific chosen context [6]. Space is itself a very difficult subject of reflections, for its elusive and at the same time ubiquitous nature. Quantum gravity is an even weirder case study, because it already poses numerous and very difficult philosophical challenges on its own, in part coming directly from its supposed ingredients: General relativity and Quantum Mechanics [3, 4, 5]. (Oriti 2011, pp. 2-3)

Oriti makes no difference between “levels of reality” and “different ontologies”. In this paragraph, Oriti indicates that he refers to “levels of description”. So we have here the weak emergence! Moreover, the expression “more fundamental” sends us directly tot the unicorn world. In the middle of the first sentence of the second paragraph there is “nature of Nature”: again, we have the Kantian “noumenon”. Obviously, it indicates us that he works within the unicorn world. “Different regimes”, “different levels of reality”, “different ontologies” are all wrong notions constructed within the unicorn world! Also, the question about the “discrete vs continuous nature of quantum space” is meaningless since space (spacetime) does not have any ontology. Again, the notion of emergence is a wrong notion. (See our previous works on this notion) Within this wrong framework (the unicorn world), obviously, the relationship between QM and Einstein’s general relativity is quite difficult![[184]](#footnote-184)

At question “what is the nature of “spacetime”, Oriti’s answer is: “It depends”! His answer is constructed probably within Everett’s “many worlds”. It seems that following Strocchi (our opinion), Oriti considers that “different phases” of a system involves “different physical properties” and also a continuum or discrete medium. Within the unicorn world, these levels are epistemological levels or levels of description! Oriti investigates if the “water in a bucket” is continuous or discrete. He talks about the conditions (temperature, etc.) in which we “observe” this water. Depending on temperature, we have “gas”, “liquid” or “ice” (solid). How is the “system”, discrete or continuous? When someone ask about the “system” in general, then the question refers to the noumenon of this system! Therefore, all other states of that system are various representations of that system.

In a very strict sense, what we call water is the liquid, continuous phase of the system, so it is continuous by definition, as we suggested for physical space. In a broader sense, it depends. It depends on the phase in which the system resides, which in turns depends on the macroscopic parameters characterizing it. (p. 6)

We emphasize that Oriti does not thinks that the same system can be in two phases at the same time! Also, this observation indicates us that Oriti works within the unicorn world. The environmental conditions stabilize the system in one or another phase, but not in two phases at the same time. If we change the environmental conditions, we change the phase of the system, but the system can remain within the same EW, like the water in those three conditions. More importantly, Oriti believes that “The same could be true for quantum space.” (p. 6). Anyway, Oriti speaks about the “macroscopic scale” and the microscopic “scale”, that is about the the “aspect of observation scale”. (Oriti 2011, p. 6) At one “scale” the “system” can be continuous. At another “scale” the system can be discrete. It is very clear, the “scale” refers to the “levels of description”. The most important idea in this paragraph is the following:

I have two problems with the idea that a condensed matter system is fundamentally discrete because it is made of atoms. The first is conceptual. This point of view rests on a certain reductionism that I accept, like most physicists [23, 24], but still find in need for further analysis. (Oriti 2011, p. 6)

Oriti emphasizes that he, like almost all physicists (!), accepts the “reductionism paradigm”! It is very clear that he works within the unicorn world! In the same paragraph, Oriti mentions the “philosophical problem” of “emergence”. Moreover, he writes that we cannot talk absolutely about the “fundamentally” discrete entities: “It depends”! (Oriti 2011, p. 6)

… idea that the microscopic building blocks of a condensed matter systems are themselves fundamentally discrete. It seems to me that also this is not absolutely true, that ‘it depends’. This is simply because, before any further approximations, of limited validity by definition, the framework for describing the microscopic properties and dynamics of the very building blocks of any condensed matter system is quantum field theory, in which the atoms are quanta of a continuous field….So, is the system discrete or continuous? It depends. (Oriti 2011, p. 7)

Oriti accepts the reductionism, that is the macro-entities are “composed” of the micro-entities. Also, it has to be very clear he works within the unicorn world (“phenomenological/epistemological framework”) and he has no idea about EDWs. Anyway, he declares that we have no information about the ultimate level of nature, i.e, an “absolute ontological framework”! Again, we see here the framework furnishes by the Kantian distinction noumen-phenomen in which Oriti works.[[185]](#footnote-185) In the same article, recalling Laughlin’s notion of “dark size of Protection”, Oriti emphasizes that certain “macroscopic features” of condensed matter system cannot be describe by the microscopic features of the microscopic systems. (Oriti 2011, p. 13)

In a sense, this is what makes condensed matter theory possible at all, by ‘protecting’ the interesting macroscopic properties from the microscopic and usually out of control details of the dynamics of the building blocks. Something similar could be at work for quantum space. (Oriti 2011, p. 13)

Within his framework, Oriti talks only about “levels of description”, no more or less, that is, his framework is an epistemological or “phenomenological” one![[186]](#footnote-186) He introduces again the idea of “atomic properties of quantum space” (his “atoms/quanta of space”). (Oriti 2011, p. 14)

We may not achieve the same level of certainty about the nature of quantum space as we have for quantum matter, but we will have found a more interesting reality than we naively assumed in imagining theories of everything or fundamental quantum theories of gravity in the traditional sense. We will have to accept and then understand the existence of different levels and phases of reality, and their mutual relations. So, is quantum space continuous or discrete? If the above speculation is right, to realize it concretely will be a revolutionary scientific and cultural experience. But it will not provide us with a better answer to this question than: “It depends”. (Oriti 2011, 14)

Again, it is very clear that “different levels and phases of reality” are just “levels of description”, that is, epistemological levels. Otherwise, working within the unicorn world, if it is about “ontological levels”, then there would be strong ontological contradictions! For instance, if a planet and an amalgam of microparticles really exist within the unicorn world, there would be strong ontological contradiction of existence since we cannot accept the existence of two entities in the same place at the same time! Following exactly Bohr’s view, Oriti’s expression, “it depends”, refers to the “level” of which we observe the “system”. It is about “levels of description”, no more. Anyway, this Kantian framework was accepted by many physicists working in quantum mechanics in 20-30’s years and later!

In his article from 2017, Oriti writes again about different “levels”, but these levels are epistemological levels. He writes again about the “emergence of spacetime” and “gravitons” (mentioning “loop quantum gravity”, string theory and other theories and certain notions like “spin network”, renormalization, quantum gravity, etc.). Also, he recall again the “atoms of space”. We can see clearly his framework, the unicorn world:

This list of tasks is common to all approaches to quantum gravity. It is also a more abstract and, admittedly, exotic analogue of the list of tasks that any theory of ‘real’ atomic, many-body systems has to undertake to go from the identification of the fundamental constituents to the characterization of their collective, macroscopic properties. (Oriti 2017, p. 6)

We do not have here the EDWs, but the “unicorn world with levels of description”. In this context, Oriti introduces a set of questions that mirrors his unicorn world framework:

… is geometry emergent from entanglement (of the fundamental ‘atoms of space’)? what is the geometric, gravitational counterpart of other quantum properties of the underlying atoms of space? should we drop basic features of effective field theories, like locality or unitarity? what about the very notion of separation of scales, which is based on the existence of a given geometry and it is what suggests that quantum gravity effects should only become relevant at microscopic, Planck scales? if we drop this, and more generally if the very notion of spacetime is emergent, what prevents phenomena that we usually consider macroscopic, large-scale aspects of the world (e.g. the cosmological constant, dark energy and the current accelerated expansion of the universe) to be really of quantum gravity origin? The list could go on for quite a while. (Oriti 2017, p. 7)

All these questions are constructed within the framework of unicorn world, a framework in which the “emergent spacetime” is accepted. We repeat, as we indicated in our works, all notions of “emergence” (weak, strong, epistemological, ontological) are totally wrong since these notions have been constructed by many people working within the unicorn world! In the above paragraph, we have again the notion of “scales”, but it is about the “observational”, “phenomenological” or epistemological “scales”, no more or less. In the next section of this article, Oriti indicates that the “macroscopic systems” are described by “field theories on an emergent curved geometry, whose metric is a function of macroscopic collective variables”. (Oriti 2017, p. 7) Again, we have just “different scales” or “levels of descriptions”. We have to be aware that, in the context of the unicorn world and using “levels of description”, Oriti can talk about the “correspondence” between entities which belong to “different levels”. He mentions the “AdS/CFT correspondence [23]”[[187]](#footnote-187)

the AdS/CFT correspondence is a map between a conformal field theory (CFT) living on a flat d-dimensional Minkowski spacetime and a gravitational theory living on a (d+1)-dimensional curved spacetime with a metric approximating the Anti-DeSitter (AdS) one close to its flat boundary, where it reduces to the Minkowski metric on which the CFT depends. (Oriti 2017, p. 9)

We believe that this “correspondence” is just an epistemological one! That is, it refers to the correspondence between entities which belong to different levels of description. Within the unicorn world, it cannot be an ontological correspondence. If it is about an ontological correspondence, it would be a wrong notion since within the unicorn world, we cannot talk about the existence of the micro-entities and the macro-entities. The next paragraph indicate us that Oriti works within the epistemological framework:

The reason is the point we emphasized from the beginning: modern quantum gravity approaches are based on fundamental entities that are not gravitational or geometric per se, at least not in the standard GR sense of corresponding to continuum metric and matter fields, but are of more abstract, discrete quantum nature. Spacetime with its geometric properties has to emerge from their collective quantum dynamics. (Oriti 2017, p. 11)

When a person writes about “quantum gravity approaches”, “fundamental entities” and “emergence”, it means she works within the unicorn world. In his article from 2018, talking about “quantum gravity”, certain paragraphs in the first pages indicate that there is a problem between quantum mechanics and general relativity (“two schemes”):

one corresponding to the idea of quantum gravity resulting from quantizing a classical theory of geometry and gravity (e.g. General Relativity) [2–4], the other in which spacetime, geometry and gravity are in some sense ‘emergent ’from something else [5–7]. In fact, not only the distinction is very coarse grained, but it is ambiguous since the issue of the ‘emergence’ of features of spacetime and geometry appears also in the first scheme. The emergent paradigm is the most recent and it is acquiring traction in recent years. Especially from the perspective of this second scheme, the problem of quantum gravity can be stated as: to identify the fundamental (quantum) degrees of freedom of spacetime, the “atoms”of space (or spacetime); to define a consistent quantum dynamics for them; to show that a continuum and classical spacetime (with a geometric and matter fields) emerges from it, in some approximation; to show that General Relativity is a good effective description of the dynamics of this emergent spacetime.” (Oriti 2018, pp. 1-2) [[188]](#footnote-188)

Again, it is very clear, Oriti works within the unicorn world. There are just “different schemes”, but not EDWs. The emergence is a “weak emergence”. Oriti introduces “four levels of emergence for space, time, and geometry (thus the gravitational field) in quantum gravity formalism”! Obviously, there are levels of description constructed within the unicorn world. Let us investigate these four levels (of description).

We discuss four ways in which space, time and geometry may be said to disappear in quantum gravity and, consequently, have to emerge to recover the description provided by General Relativity, within a more fundamental quantum gravity formalism. These four levels have to be understood as successive steps in a process of widening of the perspective, revealing new details and new conceptual issues and new questions at each step. They also represent a deepening of our understanding of the issue of the emergence of space and time in quantum gravity. They should not be misunderstood as successive, sequential ontological or inter-theoretical steps. They are not characterized each by different entities and they are not described each by a different theoretical framework. On the contrary, some of them can share the same fundamental degrees of freedom and all can be part of the same theoretical framework or quantum gravity formalism. (Oriti 2018, p. 3)

In the first part of this paragraph, we have again the notion of weak emergence. They are not “successive”, sequential ontological” or “inter-theoretic steps”! Oriti is aware about the ontological contradictions that are produced if someone talks about “different entities”. We do not have here “different entities” described by “different theoretical frameworks”. The “zeroth level of spacetime emergence is the one corresponding to the traditional idea of quantum gravity as ‘quantised GR’(or variations thereof).” (Oriti 2018, p. 3) Oriti talks about “levels of description”, no more. Level 1 refers to the geometry and the “emergent spacetime”:

An important issue is the ontological nature of the new fundamental entities underlying spacetime and, conversely, of space and time themselves, once we deprive them of their fundamental status and understand them as emergent. In fact, modern ontology [van Inwagen and Sullivan] is based explicitly or implicitly on spatiotemporal notions, to the point that ‘to be real’ is often thought equivalent to ‘to exist in space and time’, i.e. to have a well-defined location and stable duration. … One has to accept a multi-level ontology of some sort, in which both fundamental and emergent properties and entities are real in an appropriate sense. In other words, an emergent spacetime scenario forces a radical revision of metaphysics in parallel with the revolution in physics that it represents, concerning what is meant by real (which has to be independent to some extent from spatiotemporal properties) and what this attribute is assigned to (which probably has to be done in a more liberal and less exclusive way). For recent work on these issues, see [16–18, 26, 27]. Another set of issues raised by emergent spacetime scenarios is of a more epistemological nature. (Oriti 2018, pp. 8-9)

The fundamental entities that “underlies spacetime” send again to the Kantian “noumena”, which, Oriti can claim, really exists! In this context, he introduces the “multi-level ontology of some sort in which both fundamental and emergent properties and entities are real in an appropriate sense.” Until now, Oriti has talked about the “levels of description” but here he uses the “multi-level ontology” in which all entities from different levels are “real in an appropriate sens”! What does it mean “in an appropriate sens”? Within the unicorn world, we have hare a strong ontological contradiction! A planet and a huge amalgam of microparticles cannot exist in the “same location” at the same time! In the next sentence, Oriti indicates a radical revision of metaphysics and a revolution in physics referring “what is meant to be real” (independent of spacetime!) This sentences do not involve “levels of description”, but we do not understand what “kind of levels” are here. If it is about “ontological levels”, within the unicorn world, there would be strong ontological contradictions. However, regarding the “emergent spacetime”, we have the weak emergence within an epistemological framework. Oriti clearly indicates the epistemological framework:

The quantum dynamics of such interacting systems leads normally to different macroscopic phases, separated by phase transitions. Each macroscopic phase is characterized by different emergent properties, different macroscopic observables and a different effective dynamics. In some sense, the underlying microscopic quantum system is ‘replaced’ by a very different kind of emergent, macroscopic system in each phase. A different macroscopic phase is, in many ways, a ‘different world’[72]. [[189]](#footnote-189) (Oriti 2018, p. 10)

What is the relationship between different “macroscopic phases” (which presuppose “different emergent properties” and “different macroscopic observable”)? “In some sense, the underlying microscopic quantum system is ‘replaced’ by a very different kind of emergent, macroscopic system in each phase.” In what sense? What does it mean “replaced” here? It sends directly to the weak emergence. Moreover, if each macroscopic phase has different emergent properties, then what kind of emergence is here about? Strong emergence? If yes, it would indicate that both the macro-entities and the micro-entities really exist! But where? In the same place, at the same time? Ontological contradictions within the unicorn world.

In what sense, a “different macroscopic phase is, in many ways, a ‘different world’[72]. [Strocchi Springer 2015]” What does it mean: “different worlds” here? We investigated above Strocchi’s “different worlds” expression. Within the unicorn world, “different worlds” produces strong ontological contradictions, therefore, both Strocchi and Oriti are forced to use “levels of description” for avoiding these ontological contractions, even if we have “different worlds” and “different ontologies”. We have to remember that Bohr and Everett worked exactly within a similar framework, the unicorn world! (see above) In Kantian sense, for Bohr, we cannot have access to the noumenon: using different tools of observation, we can observe “different entities”, but these entities are a kind of “epistemological entities” not real entities, given by our tools of observation.[[190]](#footnote-190) (see Vacariu 2005, 2008) For Oriti, either these worlds are “epistemological worlds” or “ontological worlds”, but both kinds of worlds are within the unicorn word. We strongly emphasize that both notions are quite wrong within the EDWs perspective! These expression send us directly to the famous, but wrong distinction between “epistemology” and “ontology”.

Referring to Oriti’s expression if it is about (a) “phenomenological worlds” (levels of description), it is a kind of return to Bohr’s “phenomenological entities”, so we have access just to certain phenomenological entities without any ontological background (2) “ontological worlds”, there are strong ontological contradictions: we cannot accept that both the “planet” and the “amalgam of microparticles” really exist within the unicorn world, because there would be strong ontological contradictions! We emphasize again that Oriti works within the unicorn world, therefore, all these statements lead either to strong ontological contradictions or to “levels of description, Bohr’s phenomena (no ontological background, only epistemological, descriptive “levels”!) and Everett’s many worlds.

There is a clear sense in which, in the presence of a non-trivial macroscopic phase diagram, thus of different phases only some of which (hopefully) of a spatiotemporal and geometric nature, spacetime and geometry can be said to be emergent and not fundamental in a deeper and more radical sense that exposed at Level 1. (Oriti 2018, p. 11)

We have here “different phases”, “emergence” and “not fundamental” notions. These notions are constructed within the unicorn world. Maybe, the next paragraph sends us to some EDWs within the unicorn world (therefore, strong ontological contradictions!):

The reason is that such atoms of space are now deprived even more of any spatiotemporal attribute, even though they remain, mathematically, the very same entities identified at Level 1. In fact, whatever properties of such entities end up producing spatiotemporal observables or dynamics (e.g. some ‘volume/extension attributes’), after coarse-graining or some other approximation, or after being treated in a collective manner, they do so only in some specific phase of the system (e.g. only for specific values of the coupling constants or macroscopic parameters characterizing it).

They may be ‘seeds’ of an emergent spacetime, in some sense, but one is precluded the possibility to consider them ‘spatiotemporal properties’ in disguise. Yet in other words, something more radical is at play than a simple ‘approximation’. For example, continuum spacetime and geometry are not just an approximate construction from a discrete and quantum spacetime and geometry, differing only in some aspects but sharing the same nature. The very same entities, even when looked at in the same macroscopic approximation or treated by analogous coarse-graining techniques, may not produce a continuum spacetime or geometry at all. Their ontology has to be understood as being of a truly different kind. In parallel with it, the ontological status of continuum spacetime and geometry has also to be understood differently, since it turns out to be emergent in an even more radical sense. (Oriti 2018, pp. 11-12)

Oriti wants to replace the notion of “approximation” between “levels of description” within something else, but working within the unicorn world, he could not find a better expression then “Their ontology has to be understood as being of a truly different kind.” (p. 12) What does it mean “truly different kind”? Again, this emergence in “even more radical sense” is also wrong, since any meaning of “emergence” is wrong. Why? Because these different meanings of “emergence” have all been constructed within the unicorn world! (see our previous works) There is not about a “different ontology” because within the unicorn world, there would be strong ontological contradictions. From our viewpoint, it is about EDWs within the EDWs perspective.

Of course, new issues arise also at the epistemological level, at least in the sense that many of the same questions raised at Level 1 have to be further refined in the presence of new quantum gravity phases for our universe. Any further analysis of such epistemological refinements, as well as of the new ontological issues raised at this new level, will have to be carried out in the context of specific quantum gravity formalism. In any case, the very existence of such new issues is the reason to emphasize the existence of such new level of spacetime disappearance (and emergence). (Oriti 2018, pp. 11-12)

In this paragraph, it is again clear that Oriti works within an epistemological framework using “levels of description”, but also “ontological level” (which, from our viewpoint, would imply the “strong emergence”). Oriti mixtures two wrong frameworks (or levels): an epistemological and ontological frameworks (or levels)! (As Gabriel Vacariu emphasized in 2005, 2007 and later, the distinction between epistemology and ontology is the worst distinction in history of human thinking!) Level 3 indicates the emergence of spacetime through a “phase transition” as a physical process of the same system:

So, first, we need to have a background-independent and non-spatiotemporal notion of ‘evolution’ in the space of quantum gravity coupling constants, i.e. in the ‘theory space’ characterizing the quantum gravity formalism at hand. Notice that such evolution will relate different continuum theories, in particular different macroscopic effective dynamics, for the same fundamental quantum entities. (Oriti 2018, p. 13)

Within the unicorn world, if we have here ontological levels, there would be a strong ontological contradiction: how is it possible for the “same fundamental quantum entities” to be relate with “different macroscopic effective dynamics”? In fact, Oriti speaks about “levels of description” and “epistemological entities” since he uses the “fundamental quantum entities”. What really exists are these fundamental quantum entities. All other entities belong to different levels of description that are just epistemological entities.

We know that there is a deeper level of description (and of physics) for fluids, which becomes even more relevant for superfluids: the underlying quantum theory of atoms. This could be described by a quantum field theory for bosonic or fermionic entities, and we know that its features are not captured by the straightforward quantization of classical hydrodynamics. The microscopic quantum dynamics differs from the one corresponding to quantum hydrodynamics (even when expressed in the same variables, as in the case of superfluids described in terms of a single complex scalar field);

We know that there is a deeper level of description (and of physics) for fluids, which becomes even more relevant for superfluids: the underlying quantum theory of atoms. This could be described by a quantum field theory for bosonic or fermionic entities, and we know that its features are not captured by the straightforward quantization of classical hydrodynamics. The microscopic quantum dynamics differs from the one corresponding to quantum hydrodynamics (even when expressed in the same variables, as in the case of superfluids described in terms of a single complex scalar fifield); moreover, the classical, long-wavelength approximation of quantum hydrodynamics does not reproduce the classical theory one started from, in general. For superfluids, moreover, we know that the quantum statistics of the atoms is required in a complete understanding of the key macroscopic features, i.e. superfluidity itself. The macroscopic parameters are understood as functions of the microscopic coupling constants, e.g. the mass of the atoms.

… The very basic variables of the macroscopic theory, the hydrodynamic variables, are also understood to be useful expressions of collective (and coarse-grained) properties of the fundamental atoms, and the same holds of course at the level of observables. In particular, it holds for those observables that, in the analogy, correspond to spatiotemporal and geometric quantities. Spacetime is emergent, then, in the same sense in which the hydrodynamic description is emergent from the more fundamental atomic description, based on a different kind of degrees of freedom, thus a different ontology. This is Level 1. (Oriti 2018, p. 16)

In the first part, we see both the “level” of “description” and “physics”! In earlier articles, Oriti indicates “different ontologies”, but these ontologies are very similar to Strocchi’s “different worlds” (2005). (See above) Anyway, there is a mixture of “epistemology” and “ontology” within the unicorn world. Later, in the same paragraph, we have a “correspondence” between the microscopic entities and the macroscopic entities, but it is clear that Oriti works within the identity theory. In the second part, Oriti talks about “theories” (referring to the “macroscopic” and the “fundamental atoms”) and their “correspondence”, but this correspondence would involve “levels of observable”. These levels of description are constructed within the unicorn world, more precisely, within Bohr’s or Everett’s views. Even if Oriti speaks about a “different ontology” everything is constructed within the unicorn world! The “emergence of spacetime” sends to the unicorn world since, within the EDWs perspective, any kind of emergence is rejected. Within the EDWs framework, it is completely wrong to talk about “emergence” and “different ontologies”! Also, there is a huge difference between the EDWs and Everett’s many worlds (see Vacariu and Vacariu 2019 or above). Within the unicorn world, “different ontologies” produce strong ontological contradictions. This is the reason, Bohr preserved just the phenomenological level, placing the entire discussion at a phenomenological/epistemological “level” and avoiding any ontological level/noumenon. Oriti works within the same framework, if he talks about the “fundamental level”. It seems that Strocchi and Oriti would like to push further Bohr’s framework and Everett’s many worlds, but their mistake is that they also work within the unicorn world! This view is given by this sentence from the above paragraph: “The very basic variables of the macroscopic theory, the hydrodynamic variables, are also understood to be useful expressions of collective (and coarse-grained) properties of the fundamental atoms, and the same holds of course at the level of observables.” Because of the notion “level of observable”, and “fundamental atoms”, we have here the identity theory expanded through exactly Bohr’s “phenomenological view”. The “fundamental level” is, in fact for Bohr, Oriti and Strocchi, the Kantian noumenon, thing-in-itself and this is “what really exists”. Again, within the unicorn world, the expression “different ontologies” produces strong ontological contradictions! Within the EDWs perspective, “different ontologies”, “many worlds”, “fundamental entities”, “emergence” (any kind), “spacetime” are meaningless notions!

Our final conclusion is that both Oriti and Strocchi work in a framework very close to Bohr’s complementarity and Everett’s many worlds within the “fundamental” unicorn world. Moreover, neither Bohr or Everett, nor Oriti or Strocchi explain the relationship between the “fundamental world” (the noumena) and Bohr’s “complementarity worlds” or Everett’s “many worlds” or Strocchi “disjoint physical worlds”! Working within the unicorn world, they have to accept the Kantian “noumena-phenomena” distinction: “noumenon” refers to the “fundamental world” (“pure phase”) or “fundamental constituents”, while “phenomena” refer to “different worlds”, “disjoint physical worlds” or “different ontologies”. Even if Strocchi and Oriti write about “different ontologies”, working within the unicorn world, these “different worlds/ontologies” are:

- either “contradictory ontologies” (to avoid this contradiction, Bohr uses “complementarity”)

- or phenomenological/epistemological “ontologies”. Oriti and Strocchi would need to translate their approaches into the EDWs perspective which would furnish their approaches the hyperontological background for their “different worlds/ontologies”...

**4.9.5 Penrose’s reductionism**

There are some physicists, Penrose for instance, who believe in the existence of only one real world, the world of the “wave of the universe”. In this case, the humans do not even exist since they are not “electromagnetic waves”. In fact, in our view, the waves correspond to the microparticles and there are the EDWs, no more or less. Penrose has his own interpretation of the existence of the quantum “level”. He considers that if we believe that “any one thing in the quantum formalism is ‘actually’ real for a quantum system then we think that it has to be the wave function (or state vector) that describes quantum reality”. The momentum state is:

(i)n no way localized like an ordinary particle. It is spread out evenly over the whole of the universe.… What has happened to our ordinary picture of a particle, as something (at least approximately) localized at a single point? Well we might say that a momentum state is only an idealization. We can still get away with having a very well-defined (if not perfectly precisely defined) momentum if we pass to somewhat similar states referred to as “wave packets”. These are given by the wave function that peaks sharply in magnitude at some position and are “almost” eigenfunctions of momentum, in an appropriate sense. (Penrose 2004, p. 508)

Evidently, Penrose is logically constrained by the existence of the one world, the unicorn-world, to eliminate the existence of particles (and also of macroparticles). For Penrose, “the question of ‘reality’ must be addressed in quantum mechanics” and, accepting that the quantum formalism applies to the whole of physics, then “if there is no quantum reality, there can be no reality at any level”. Therefore we have to accept only the existence of the quantum level. His opinion is that we cannot deny the “physical reality” completely, but we need a “notion of physical reality, even if only a provisional or approximate one, for without it our objective universe, and thence the whole of science, simply evaporates before our contemplative gaze!” (Penrose 2004, p. 508) Within the unicorn-world and, from our viewpoint, trying to avoid Kant’s criticism against dogmatism (“empty concepts”), Penrose is forced to reduce all levels of existence to the one level, the quantum level (the electromagnetic waves). From the EDWs perspective, if we reduce all levels to the quantum level, then it is not only “our objective universe” and the whole of science that evaporates, but also each of us, i.e., each self that *corresponds* to each physical human body. We have to remember that, through the EDWs perspective, the conversion of ontology into hyperontology takes place, the hyperontology being these constitutive epistemologically different interactions of ED entities. If we accept Penrose’s idea (only the “waves” really exist[[191]](#footnote-191)), then we have to consider that the person who is writing these sentences in these moments is an amalgam of waves! That is, not only the mind does not exist, but even the body does not exist (neither the planets, not even the microparticles). The EDWs perspective is completely against Penrose’s reductionism (and any kind of reductionism) which would eliminate Penrose as a “person” or “human being” from this discussion! His reductionism is quite close to Kantian noumena-phenomena distinction. Except the “level” of electromagnetic waves, all other “levels” are “levels of description”. In other words, Penrose’s body does not really exist, it is just an appearance without real ontology. His works are just illusions, the Nobel prize obtained by him in 2020 is also an illusion…

**4.10 From the “micro-system” to the “macro-system”**

We write about a research realized just few days ago by some physicists from University of Heidelberg. Their research indicates when something considered as “macroscopic” emerge from “microscopic”. There are certain phenomena that cannot be described at the “level” of microscopic[[192]](#footnote-192): “collective excitations (phonons which oscillate atom in a crystal lattice)”, phase transition (a substance transforms from one state to another one like liquid evaporates in gas)[[193]](#footnote-193) (Starr 2020) which exist “only in thermodynamics limit”[[194]](#footnote-194), but the authors of this research discovered this phenomena in “surprisingly small systems”. (Bayha et al, 2020, p. 583) Anyway, we emphasize that, working within the unicorn world, the authors use the notion of “emergence”.

Under proper conditions, the researchers discovered that only six atoms can be considered as a “macroscopic system”! (Starr) “The surprising result of our experiment is that only six atoms show all the signatures of a phase transition expected for a many-particle system”.[[195]](#footnote-195) [(Marvin Holten](https://www.uni-heidelberg.de/en/newsroom/two-six-many) in Starr 2020) The properties of such “many-body” (macroscopic) systems cannot be explained in terms of microscopic properties. The researchers use the “Feshbach resonances” between 6 atoms into a “laser trap”. (Starr 2020)

“On the one hand, the number of particles in the system is small enough to describe the system microscopically,” lead researcher [Luca Bayha explained](https://www.uni-heidelberg.de/en/newsroom/two-six-many). “On the other hand, collective effects are already evident.” (Starr 2020)

So, we have to pay attention that there is not a “transformation” from a micro-system into a macro-system! We want to emphasize this paragraph from Starr just because it illustrates exactly the existence of EDWs in a research realized by certain physicists quite recently. Amazing for them, the “collective behaviour” is based on strengthening the interactions of a small number of microparticles.

Obviously, from our viewpoint, those six microparticles remain “six microparticles” for another microparticle (i.e, within the micro-EW), but that micro-system can be regarded as a macro-system for another macro-system (i.e, within the macro-EW). The physicists should take into account that the amalgam of those six particles corresponds to a particular electromagnetic wave (field-EW). In reality, it is the micro-system of six particles and their correspondence to the electromagnetic field which corresponds to the macro-system (the macro-EW). Within the field-EW, there is only a particular electromagnetic wave (an unitary, indivisible system) without limits, and the limits of those six particles correspond to the limits of the macro-system. More exactly, the indivisibility of the electromagnetic field (the field-EW) (through the intermediary “level”, the micro-EW) corresponds to the indivisibility of the macro-entity (the macro-EW). We recall that one EW does not exist for any EDW. This experiment indicates, directly, that the physicists need the EDWs perspective in order to explain phenomena which belong to the EDWs.[[196]](#footnote-196) It is quite clear that this experiment confirms directly the existence of EDWs!

**5. The final verdict for all approaches of quantum mechanics**

Until Gabriel Vacariu discovered the existence (being) of EDWs (2002), everybody had been working within the wrong framework, the unicorn world (Universe/world). Therefore, all approaches constructed within the unicorn world contain strong ontological contradictions. We strongly emphasize that Bohr, Everett, Feynman, Strocchi, Oriti, Penrose and all other physicists (all scientists and philosophers) have been working within the unicorn world! The EDWs perspective is against all kinds of philosophical notions of “reductionism” and “emergence”, but also against all alternatives of the “identity” approaches applied in Physics, Cognitive neuroscience, and Biology. (see our previous works) All these notions (complementarity, emergence and reductionism, spacetime, many worlds, multiverse, parallel worlds, different worlds, different ontologies) are quite wrong concepts constructed within the unicorn world. All new approaches that will be elaborated by scientists (and philosophers) within particular sciences (Physics, Cognitive Neuroscience, etc.) (and Philosophy) need to be constructed within the EDWs perspective. Otherwise, the approaches constructed within the unicorn world (Universe/world) will also contain strong ontological contradictions!

The last section of McEnvoy and Zarate’s book is “An undiscovered world”. The title is quite wrong: it is not an undiscovered world, but we have to replace the unicorn world with the EDWs![[197]](#footnote-197) The book ends with J. A. Wheeler who strongly accentuates the role of observer in “creating reality” (McEnvoy and Zarate 2013, p. 173): “For the EPR paradox, remember: we have no right to ask what the photons are doing during their travel. No elementary particle is a phenomenon until it is registered.” (McEnvoy and Zarate 2013, p. 173)

Obviously, all physicists including Bohr, Born, Heisenberg, Wheeler, etc. have been working within the unicorn world, therefore all of them have been wrong! If “no elementary particle is a phenomenon until it is registered” were truth, neither Wheeler’s body (nor the Earth) would not existed until somebody else observed it! The authors close their book with “A final word”:

Wheeler wrote to the author recently . . .

December, 2000, is the 100th anniversary of the greatest discovery ever made in the world of physics, the quantum. To celebrate, I would propose the title, “The Quantum: The Glory and the Shame”. Why glory? Because there is not a branch of physics which the quantum does not illuminate. The shame, because we still do not know “how come the quantum ?”. (McEnvoy and Zarate 2013, p. 173)

The “glory” is given by empirical results applied in one or another EW. The “shame” is given by the wrong framework, the unicorn world in which all (quantum) physicists have been working until our discovery, the EDWs! The book continues with section “Further reading” which starts with this paragraph:

Quantum theory cannot be *explained.* Physicists and mathematicians from Niels Bohr to Roger Penrose have admitted that it doesn’t make sense. What one *can* do is discover how the ideas developed and how the theory is applied. Our book has concentrated on the former. Other recommendations are listed below. (McEnvoy and Zarate 2013, p. 174)

Again, working within the unicorn world, this conclusion is inevitable! Maybe the reader will understand that the EDWs perspective is the greatest discovery in the history of human being and this is the reason so many people have plagiarized our ideas! The reader has to understand that physics started with classical picture, followed by Einstein’s changes (still a “classical” image), but dramatically changed by the quantum mechanics. All “classical” physicists (including Einstein) elaborated their theories for phenomena belonging to one or the other EW (either macro-EW, micro-EW or wave-EW). However, quantum physicists were forced to put together, within the unicorn world, the phenomena from the micro-EW with the phenomena from the field-EW, and thus many paradoxes have appeared within this wrong framework. With the EDWs, we clarify all, but indeed ALL “mysteries” of quantum mechanics![[198]](#footnote-198) The research from the University of Heidelberg (section 4.10) indicates directly the existence of EDWs!

We end this chapter with

- David Hilbert’s words: “Physics is becoming too difficult for the physicists.” Indeed, the great problems of physics and all other sciences have always been philosophic and not scientific problems! Gabriel Vacariu has solved all great problems of quantum mechanics and physics in general by changing the paradigm of thinking (the unicorn world, i.e., Universe/world) that dominated the human thinking of the last 2500 years into a new paradigm, the EDWs. We emphasize here that changing a large paradigm of thinking is a job of a philosopher, not of a physicist or of any scientist. Under this new framework of thinking, all great problems of quantum mechanics (ad physics in general) has become some pseudo-problems.

- Two Einstein’s famous sentences about quantum mechanics, followed by a short comment:

Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. The theory says a lot, but does not really bring us closer to the secret of the 'Old One.' I, at any rate, am convinced that He is not playing at dice. (Einstein to Max Born, Born 1926)

If it is correct, it signifies the end of physics as a science. (Albert Einstein)

Quantum mechanics was “imposing” within the unicorn world! Moreover, the secret of the “Old One” is not about “God” (which cannot even exist, see Vacariu and Vacariu 2019), but about the Hypernothing, an EW no more or less. In reality, it is not God who “is not playing at dice”, but there are no dice within the EDWs! Indeed, if quantum mechanics were a “correct” theory, then indeed, physics would have ended as science…

Now, the reader can much better understand Feynman’s slogan constructed within the unicorn world: “If you think you understand quantum mechanics, you don't understand quantum mechanics.” Obviously, nobody could understand the quantum phenomena within the unicorn world! However, all these ED phenomena are much better understand within the EDWs! The last verdict is this one: with all its competitive or not approaches, quantum mechanics is quite a wrong paradigm of thinking constructed within the unicorn world. Our EDWs perspective has to replace not only all alternatives of quantum mechanics, but also Einstein’s relativities and all other main theories in Physics, Cognitive Neuroscience and Philosophy![[199]](#footnote-199)

**Chapter 5**

**The EDWs perspective against “Grand Unified Theory”, “Theory of Everything”, “Big Bang”, and “inflation”**

“First of all, the Big Bang wasn't very big.

Second of all, there was no bang.

Third, Big Bang Theory doesn't tell you what banged, when it banged, how it banged.

It just said it did bang. So the Big Bang theory in some sense is a total misnomer.”

([Michio Kaku](https://www.brainyquote.com/authors/michio-kaku-quotes))

We start this chapter with the first paragraph of Brian Greene’s book, a pioneer of the string theory[[200]](#footnote-200):

Calling it a cover-up would be far too dramatic. But for more than half a century—even in the midst of some of the greatest scientific achievements in history—physicists have been quietly aware of a dark cloud looming on a distant horizon. The problem is this: There are two foundational pillars upon which modern physics rests. One is Albert Einstein's general relativity, which provides a theoretical framework for understanding the universe on the largest of scales: stars, galaxies, clusters of galaxies, and beyond to the immense expanse of the universe itself. The other is quantum mechanics, which provides a theoretical framework for understanding the universe on the smallest of scales: molecules, atoms, and all the way down to subatomic particles like electrons and quarks. Through years of research, physicists have experimentally confirmed to almost unimaginable accuracy virtually all predictions made by each of these theories. But these same theoretical tools inexorably lead to another disturbing conclusion: As they are currently formulated, general relativity and quantum mechanics *cannot both be right*. The two theories underlying the tremendous progress of physics during the last hundred years—progress that has explained the expansion of the heavens and the fundamental structure of matter—are mutually incompatible. (Greene 2003, p. 6)

Within the unicorn world, obviously, the general relativity and quantum mechanics “cannot both be right”! Even the idea of “Grand Unified Theory” (GUT) or “Theory of Everything” (TOE) are quite wrong within the EDWs perspective: as we have seen above, from our viewpoint, the general relativity uses “spacetime” which has no ontological status, while the quantum mechanics is a pseudo-theory (a mixture of EDWs), Moreover, these theories have not been “mutually incompatible” (as, working within the unicorn world, every physicist has believed, but these approaches have referred to the EDWs)! Even if we can elaborate, in the future, a theory of pre-Big-Bang-EW, it does not mean that theory would refer to “everything”. A theory of the “Hypernothing” has nothing to do with TOE or GUT[[201]](#footnote-201) (which would presupposes the wrong idea of “unification” of Einstein’s general relativity and quantum mechanics).

Greene continues writing that the things can be either small and light (atoms and their components) or huge and heavy (like stars and galaxies), “but not both”. In reality, when we talk about “things” we talk about the ED entities which belong to the EDWs! Physicists use either quantum mechanics or Einstein’s theory of general relativity and “can, with a furtive glance, shrug off the barking admonition of the other. For fifty years this approach has not been quite as blissful as ignorance, but it has been pretty close.” (idem) No, nobody has been “pretty close” to the “unification” of these two theories since there are at least three EDWs!

But the universe *can* be extreme. In the central depths of a black hole an enormous mass is crushed to a minuscule size. At the moment of the big bang the whole of the universe erupted from a microscopic nugget whose size makes a grain of sand look colossal. These are realms that are tiny and yet incredibly massive, therefore requiring that both quantum mechanics and general relativity simultaneously be brought to bear. For reasons that will become increasingly clear as we proceed, the equations of general relativity and quantum mechanics, when combined, begin to shake, rattle, and gush with steam like a red-lined automobile. Put less figuratively, well-posed physical questions elicit nonsensical answers from the unhappy amalgam of these two theories. (Greene 2003, p. 6)[[202]](#footnote-202)

Again, these paragraph mirrors the main problem of physics in the last 50 years, the relationship between Einstein’s theory of general relativity and quantum mechanics. Obviously, working within the unicorn world, Greene is correct: within one world/universe “*cannot both be right”*! Nevertheless, these two theories cannot be combined just because they explain phenomena that belong to at least three EDWs: micro-EW, field-EW and macro-EW. As we saw in Vacariu (2008) and Vacariu and Vacariu (2010), quantum mechanics has its own problems: it mixes two EDW, field-EW and micro-EW. Therefore, it is absolutely normal to think that the “more deeply you think of relativity, the less strange it seems. The more deeply you think of quantum mechanics, the more strange it seems.” (Rosenblum and Kuttner 2006, p. 192) Again, in our works 2005, 2007, 2008, 2010, 2016, we showed that quantum mechanics (microparticles and waves) is quite a wrong theory since it mixtures EDWs: the micro-EW and the waves-EW. Moreover, in 2014 and 2016, Gabriel Vacariu showed that even if both the special theory and the general theory of relativity are correct, the main notion of both theories is the “spacetime” which has no ontological background, therefore, we replaced this wrong notion with “motion” of real ED entities.

In the last years of his life, Einstein was almost entirely forgotten by the many physicists who were working in quantum mechanics, the new framework in physics in that period. However, the physicists have not been able to reduce Einstein’s theory of general relativity to quantum mechanics just because nobody discovered the “quantum gravity” (which, in reality, it cannot not even exist). Indeed, working within the unicorn world, for physicists, the relationship between Einstein’s theory of relativity and quantum mechanics (the theory of unification) has been one of the great problems in physics for many decades. During many decades, the physicists have made great efforts for unifying these two theories without any viable result. Again, as we showed in our books (2008 and 2010), the relationship between quantum mechanics and the theory of general relativity mirrors the relationship between the micro-objects and the macro-objects, that is between the micro-EW and the macro-EW. Most important, one EW does not exist for any EDW, so the relationship between the micro-EW and the macro-EW (between quantum mechanics and Einstein’s theory of relativity) is meaningless! The discovery of the EDWs by Gabriel Vacariu was a very important one because it indicates that the theory of relativity perfectly explains truly existent phenomena in the macro-EW (which is neither an “approximation”, nor an “appearance” of reality), while quantum mechanics represents a pseudo-theory (before the discovery of EDWs, only the microparticles were considered to be the “real” components of the universe) which mixes phenomena belonging to the EDWs (the field-EW and the particle-EW). Therefore, within the EDWs perspective, we attest, somehow, *Einstein’s revenge*: even if he used a pseudo-notion like “spacetime”, his theory explains some real phenomena/processes which belong to the EDWs that really exist.[[203]](#footnote-203) Quantum mechanics does not explain “reality”, since the unicorn world does not exist and, moreover, the wave and the particle are, not even as Bohr thought - *complementary*, but these phenomena belong to the EDWs. Indeed, the physicists need to change their framework of thinking, in order to avoid “empty notions” with wrong results in the future. We believe that now is the time to change the old paradigm of the unicorn-world with a new one, the EDWs paradigm, not only in philosophy, but also in science.

In Physics, it is necessary to find a new more general framework, and we believe that this is the EDWs perspective. Moreover, this new way of thinking for science and philosophy means a new framework of thinking in general, because the “world” has dominated the human being’s vision of thinking all times. Therefore, such kind of change is the most difficult process just because all thinkers have been deeply trapped in the old paradigm, the unicorn world. “Nature” is not simple, but “subtle”: it is not the unicorn-world, but the EDWs. The EDWs approach might be negative in rejecting so many things in philosophy and science, but it is also positive in proposing the necessary new framework, the being of EDWs. Our message is mainly for young scientists and philosophers who prefer not to waste their time doing research under the umbrella of the unicorn-world.[[204]](#footnote-204) Working within the unicorn-world, the major mistakes have been either (a) the mixtures of various judgments with notions that describe epistemologically different entities that belong to the EDWs, or (b) the elaborations of judgments that relate “uncontained concepts” (about these “uncontained concepts”, see Vacariu 2008), i.e., the mixture of notions that describe epistemologically different entities or epistemologically different phenomena that belong to the EDWs. Thus, some contradictions about the existence of various entities have dominated science and philosophy in the last century, for instance, the question: what really exists within the unicorn-world, the macro-particles or/and the micro-particles, the waves or/and the corpuscles, the mind or/and the brain. In order to avoid using these pseudo-judgments that have no objective reality, we have to change our framework, i.e., to replace the unicorn-world with the EDWs.

In this sense, we will comment on recent news: by unifying Einstein’s theory of relativity and quantum mechanics, Laura Mersini-Houghton (a professor at UNC-Chapel Hill) mathematically proves that the black holes cannot exist. “The work not only forces scientists to reimagine the fabric of space-time, but also rethink the origins of the universe.” (Benios 23rd September 2014) Physicists have believed that the black holes collapse under their own gravity to a single point in space (i.e., the “singularity”). However, Einstein’s theory of gravity predicts the existence of black holes, while quantum mechanics predicts that no information can disappear from the universe. (idem) “Many physicists and astronomers believe that our universe originated from a singularity that began expanding with the Big Bang. However, if singularities do not exist, then physicists have to rethink their ideas of the Big Bang and whether it ever happened.” (Benios 23rd September, 2014) In our books (2008, 2010, 2014), within the EDWs perspective, we showed that combining Einstein’s theory of relativity with quantum mechanics is totally wrong. Therefore, either through combining these two theories (Mersini-Houghton’s work) or through completely rejecting the combinations of these two theories (the EDWs perspective), the black holes cannot have any ontological status.

Gravity is neither in the micro-EW (gravitons do not exist), nor in the macro-EW (Einstein was partially right, claiming that the gravity is simply “curved spacetime”; in reality, it is “nothing” which is curved but it corresponds to the “curved” electromagnetic field which belong to the field-EW). (See Vacariu 2014) In fact, among the planets/galaxies or in the center of each galaxy, the “black holes”[[205]](#footnote-205) are “nothings” (not “space” since “space” cannot have any ontological status) that are “curved”, but these “nothings” (no ontological status) correspond to the electromagnetic waves, for instance, that are, indirectly (i.e., through correspondences), “curved” by the mass of those planets/galaxies. The black holes are “nothings” which correspond to “something” which belong to an EDW than our macro-EW. This EW could be the Pre-Big-Bang-EW. Moreover, from our point of view, the macro-objects do not exist at all in the micro-EW (a microparticle does not interact with a macroparticle just because one does not exist for the other), therefore “gravity” cannot exist in the micro-EW. Many physicists think that discovering the “gravitational waves” mirror a “deep relationship” between quantum mechanics and Einstein’s general theory of relativity. (Carey 2014) However, in the last period, the existence of these gravitational waves has been rejected. From the EDWs viewpoint, we cannot unify the gravity with the micro-forces (the “Standard Model”[[206]](#footnote-206)) just because this unification would require a mixture of EDWs. (Against the unification of all four forces, see Vacariu 2007, 2008, Vacariu and Vacariu 2010) Moreover, for this unification we would need the “gravitons”, but as we argue in our first two books, according to the EDWs perspective, the gravitons cannot even exist and therefore Einstein was correct (in the time of elaborating his theory): gravity is not a force (that implies a particle) but the “curvature of nothing (empty “spacetime”) which corresponds to something, for instance, to the electromagnetic waves. (As we saw in chapter 2 and our book 2016, the “spacetime” would not have any ontological status.) The discovery of gravitational waves does not mirror the existence of “gravitons”, but only the “ripples in space-time”, that are, from our viewpoint, “ripples in nothing” which correspond to something which belong to an EDW. If “space-time” does not exist, then the Big Bang or the interaction between two black holes, for instance, produced not “ripples” of space-time, but ripples of “nothing” (no ontological status) which correspond to the Higgs-field, for instance.

Einstein's general theory of relativity predicts the existence of ripples in space-time, known as gravitational waves, and physicists assume that these waves would be made of gravitons, just as electromagnetic waves are made of photons. But Dyson argued that the standard approach to searching for gravitational waves — by bouncing light off a set of mirrors to measure tiny shifts in their separation — would be hopeless for detecting gravitons: To be sensitive enough to detect the minuscule distance change due to an individual graviton, the mirrors would have to be so heavy that they would collapse to form a black hole. (Cowen 2013)

As we noticed in our books, in the vicinity of a huge amalgam of other microparticles which belongs to the micro-EW (which, in another EW, corresponds to a planet), a photon (microparticles, in general) travels within the curved “spatio-temporal” framework produced by planet! However, even if the photon travels in this curved “spatio-temporal” framework (i.e., of “nothing” without any ontological status), the planet does not exist for that photon since any microparticle does not “perceives”/interacts with the planet but with those microparticles which correspond to the planet (in the macro-EW). Again, we strongly emphasize that the planet does not exist for the photon, the photon does not exist for the planet and the “spacetime” has no ontological status at all! Talking about the “deep relationship” between quantum mechanics and Einstein’s general theory of relativity is a mixture of EDWs that represents a huge mistake created within a wrong framework, the unicorn world.

The existence of energy in empty space-the discovery that rocked our cosmological universe and the idea that forms the bedrock of inflation-only reinforces something about the quantum world that was already well established in the context of the kinds of laboratory experiments I have already described. Empty space is complicated. It is a boiling brew of virtual particles that pop in and out of existence in a time so short we cannot see them directly. Virtual particles are manifestations of a basic property of quantum systems. At the heart of quantum mechanics is a rule that sometimes governs politicians or CEOs-as long as no one is watching, anything goes. Systems continue to move, if just momentarily, between all possible states, including states that would not be allowed if the system were actually being measured. These “quantum fluctuations” imply something essential about the quantum world: nothing always produces something, if only for an instant. (Krauss 2012, p. 154)

Again, we showed here, the energy in the “empty space” (in the “nothing”) does not exist and, moreover, “space” has no ontological status (on the contrary, a stone, a planet, and a mental state have ontological backgrounds). We repeat that space and time (or Einstein’s “spacetime”) are just *methodological notions* that help us to describe some characteristics of the EDWs, but they do not have any ontological status. As we showed in previous works, the “quantum fluctuations” is a completely wrong notion (the unification of entities/processes that belong to the EDWs). The “virtual particles” do appear from “nothing”, but there is a correspondence between the microparticles and the waves since “nothing can appear from nothing”! These “virtual particles” of a particular EW correspond to the formation of some peaks of the waves of EDW. If the CMB is extremely uniform, then the “structure of the universe” did not appear because of some “quantum fluctuations” (such “spontaneous fluctuations” and “virtual particles” exist only in the unicorn world) that lead to the creation of the galaxies, but because of certain correspondences with the pre-Big-Bang-EW.

As I have defined it thus far, the relevant “nothing” from which our observed “something” arises is “empty space.” However, once we allow for the merging of quantum mechanics and general relativity, we can extend this argument to the case where space itself is forced into existence. General relativity as a theory of gravity is, at its heart, a theory of space and time… Having a quantum theory of gravity would therefore mean that the rules of quantum mechanics would apply to the properties of space and not just to the properties of objects existing in space, as in conventional quantum mechanics. (Krauss 2012, p. 161)

Believing in the “quantum theory of gravity”, Krauss considers that as “Stephen Hawking has emphasized, a quantum theory of gravity allows for the creation, albeit perhaps momentarily, of space itself where none existed before”. (Krauss 2012, p. 163) “Space” neither existed after the Big Bang! Importantly,

quantum gravity not only appears to allow universes to be created from nothing-meaning, in this case, I emphasize, the absence of space and time-it may require them. ‘Nothing’-in this case no space, no time, no anything! – is unstable. (Krauss 2012, p. 168)

Again, we cannot talk about the “quantum theory of gravity” that represents a mixture of Einstein’s theory of relativity and quantum mechanics.[[207]](#footnote-207) As we show in previous works, even the quantum mechanics is a wrong theory, since it is about a mixture of entities/processes which belong to at least two kinds of EDWs. “There, ‘nothing’ meant empty but preexisting space combined with fixed and well-known laws of physics. Now the requirement of space has been removed.” (Krauss 2012, p. 169) It is clearly a wrong mixture of these two theories but “spacetime” does not exist (space and time do not have any ontological status).

The problem is that we cannot relate the microparticles with the macroparticles (planets and their gravity), but also we cannot relate the electromagnetic wave with either the microparticles or the macroparticles. In all cases, the error is the same: the mixture of EDWs.[[208]](#footnote-208) In this context, we introduce another reason for rejecting the existence of “space-time” furnished by the “combination” of quantum mechanics with Einstein’s general theory of relativity. We emphasize again Rosenblum and Kuttner’s slogan: “The more deeply you think of relativity, the less strange it seems. The more deeply you think of quantum mechanics, the more strange it seems.” (Rosenblum and Kuttner 2006, p. 192) Indeed, this statement is perfect available because Einstein’s relativity is a very correct theory (however, the “spacetime” has to be replaced with “motion”), while quantum mechanics is a wrong theory constructed within the unicorn world, i.e., a mixture of EDWs, the field-EW and the microparticles-EW.

We introduce the analogy between Abbot’s Flatland story (people living in two-dimensional world) applied to the Big Bang and inflation, quantum mechanics and Einstein’s theory of relativity under the umbrella of EDWs. In Flatland, any being lives in a two-dimensional world and no one can perceive any tridimensional object. Let us supposes that a bidimensional plan (a deformed square, for instance) intersects - perpendicularly and with a certain uniform speed - the bidimensional plan in which that being lives. The being would see suddenly the appearance of many points in her “world”. Some processes are happening for that bidimensional being, so that she concludes there are some phenomena surpassing the speed of light.

Exactly this is situation with the “empty” notion of “inflation”: suddenly appearances of one point (not certain this information) and then other points which indicate that something surpassed the speed of light. People believing in “hyperspace” consider that this story reflects the relationship between our world and the “hyperspace”. From our viewpoint, this story reflects exactly (1) the *non-locality* in quantum mechanics: two points (among those many points) are those (un)famous two microparticles, while the Flatland is the wave; we have here the EDWs (2) the *inflation*: even if the square does not surpass the speed of light, the bidimensional being observed some processes that surpassed c. Exactly in the same situation is the physicist who have believed in the “unexplained notion of *nonlocality*” in quantum mechanics and inflation. *Essentially, as we indicated in our previous works, we can avoid the wrong notion of “inflation” considering that there were many Big Bangs in the same period of time.*

Also, as we emphasized in other works, we do not believe in any GUT or TOE.[[209]](#footnote-209) Maybe we can talk about a single theory that was available in that moment, but it was not a theory about “everything” since maybe “everything” were some waves in the field-EW and some particles in the particles-EW. Anyway, in the period immediately after the Big Bangs, maybe we can talk about the EDWs, maybe we can talk about different entities/processes which appeared and disappeared within the same EW. We can have the (in)famous parts-whole relationship within the same EW or within the EDWs. The physicists have to answer to these questions. Essentially, an EW does not exist for any EDW, therefore, everything in the above picture is quite wrong: we cannot put together all these four forces.[[210]](#footnote-210) This picture of the “universe” has dominated the framework of cosmologists in the last decades, but it has been quite a wrong picture! It is supposed there was a Big Bang approximately 13.82 billion years ago. We believe there were many Big Bangs and not one. Moreover, before the Big-Bang, there were a pre-Big-Bang-EW. (For more details, see Vacariu 2011, etc.)

We emphasize again that all *great* scientific questions are, in reality, philosophical questions![[211]](#footnote-211) Therefore, “What was before the Big Bang?” is a philosophical question and it has a plausible answer only within the EDWs perspective. We furnished the answer to this question in 2006: before the Big Bang, there was an EDW! Maybe that EW still exists today, we don’t know. Let us call this EW the “pre-Big Bang EW” (even if this “pre-” is quite a wrong notion since one EW does not exist for any EDW, and, moreover “time” does not even exist). (About this notion, see also Vacariu 2012) This “pre-Big-Bang-EW” did not exist for any EDW; also it was not for the EDWs that appeared after the Big Bang: the plasma-EW, followed by the field-EW[[212]](#footnote-212), the micro-EW, and, finally, by the macro-EW. Before this pre-Big-Bang-EW was EDW and so on. How do we stop the regress *ad infinitum*? To stop this regress *ad infinitum*, we have to believe that it was the first EW, i.e., the EW0. Within the EDWs perspective, this EW0 will be named the “Hypernothing-EW” or shortly the “Hypernothing”![[213]](#footnote-213) The Hypernothing hyperis, while the mind-EW is; however, many other EDWs do not really are: what really exist within these “phantoms” (the apparent EDWs) are the “ED entities” and their “ED interactions”! We call these ED entities and their ED interactions the “EDWs” (which do not have an ontological status, at least referring to the EDWs that we actually know). Maybe in the relationship with EDWs, these EDWs really exist as entities for ED entities which belong to an EDW. Also, within the EDWs perspective, the “inflation” did not exist, this notion being simple a human mind invention. In 1979, Alan Guth elaborated the idea of “inflation”: immediately after the Big Bang, the universe dramatically increased in its size in an extremely short time (10-34 seconds).

In the inflationary scenario, in the first trillionth of a trillionth of a second, a mysterious antigravity force caused the universe to expand much faster than originally thought. The inflationary period was unimaginably explosive, with the universe expanding much faster than the speed of light. (This does not violate Einstein’s dictum that nothing can travel faster than light, because it is empty space that is expanding. For material objects, the light barrier cannot be broken.) Within a fraction of a second, the universe expanded by an unimaginable factor of 10^50. (Kaku 2005, p. 13)

The main point is that the inflation passed the speed of light and scientists has founded an explanation for this strange phenomenon.

According to the most popular, but not universally accepted, theory of the early universe, 10^-34 seconds after it began the universe experienced a period of rapid growth – expanding 100 trillion trillion times to something the size of a marble. An inflationary period would produce larger gravitational waves than would have been generated without. Nevertheless, even most inflationary models do not predict a gravitational wave large and polarizing enough to be detected by BICEP. (Luntz 2014)

We draw the attention that working within the unicorn world, the notion of “inflation” contradicts directly Einstein’s theory of relativity: some authors tell us that the process of inflation (dilation of the “universe” in a fraction of fraction of second after Big Bang) is a process that took place with a speed that surpassed the speed of light, c. However, Einstein postulated that the maximum speed that can be reached by any physical process is the speed of light in vacuum, c. Essentially, from our viewpoint, Maxwell and Einstein were correct: it is nothing that can surpass this limit. Otherwise, Einstein’s theory of relativity would have great problems.

Physicist Alan Guth formally proposed inflationary theory in 1980, when he was a postdoctoral scholar at SLAC, as a modification of conventional Big Bang theory. Instead of the universe beginning as a rapidly expanding fireball, Guth theorized that the universe inflated extremely rapidly from a tiny piece of space and became exponentially larger in a fraction of a second. This idea immediately attracted lots of attention because it could provide a unique solution to many difficult problems of the standard Big Bang theory. (Carey 2014)

From the EDWs perspective, we consider that “inflation” is a wrong notion constructed within the unicorn world. In Vacariu (2011), Gabriel Vacariu wrote that

it is believed that the time immediately after Big Bang ran much faster than the actual time of the “Universe, few seconds being equivalent to millions/billions of years. For me, this idea is an amazing Ptolemaic epicycle. With the EDWs, we replace this extraordinary expansion of the ‘universe’ with the correspondence between certain phenomena that belong to EDWs. The matter that appeared in few seconds is nothing more than *spontaneous* appearance from hyper-nothing that *corresponds* to something from the pre-Big-Bang-EW. The dark matter and the dark energy, the infinities in physical phenomena or even the black holes are other Ptolemaic epicycles created by the human scientific imagination! These elements just correspond to some phenomena that belong to other EDWs. (About these notions and the perspective of EDWs, see Vacariu and Vacariu 2010) (Vacariu 2011, footnote p. 50)

From the EDWs perspective, the inflation has an explanation without breaking Einstein’s postulate regarding the limit of light speed: some phenomena that happened in the EDW *correspond* to the Big Bang and it is almost “spontaneously inflation” of the “universe” (i.e., the inflation of the micro-EW). In this very short period, there were no signals that surpassed the speed of light. There were just *correspondences* between certain phenomena which belong to at least two EDWs. Almost spontaneous “inflation” from the “primordial universe” (in reality many Big Bangs at the same time) *corresponds* to the manifestation of *different* processes of an EDW at the same time and therefore it was not necessary the manifestation of any process which surpassed the speed of light. The *correspondences* of some entities/processes and their interactions from the primordial universe (Big Band and the first fractions of a second) appeared almost spontaneously (instantly) creating the primary EW after Big Bang (probably one field-EW). As the observers of some processes that happened 13,82 billion years ago, we perceive some spontaneously appearance of some entities/processes and their interactions in different places at the same time and this is the reason these results indicate that something surpassed the speed of light.In reality, there is no processes that surpassed the speed of light, there were just these spontaneously appearances in different places at the same time in the “universe”.[[214]](#footnote-214) Within the unicorn world, physicists have been forced to introduce one or both two wrong hypotheses: inflation indicates (1) the unification of all four forces requires something that surpassed c (2) the existence of “multiverse”.

(1) With the result of BICEP2 (see below), some physicists hope to relate the three forces, electromagnetism, weak and strong nuclear forces of Standard Model (quantum mechanics), with gravity (available for planets). As we indicate above (and in other books), those three forces belong to the micro-EW, while gravity is the curved “nothing” (empty “spatio-temporal framework”) available for the macro-EW, but corresponding to the curved electromagnetic waves (the field-EW), for instance. It is supposed that these four forces “have long suspected that those are simply different manifestations of a single unified force that ruled the universe in its earliest, hottest moments.” (Overbye 2014) We can agree with this affirmation only if we consider that “single unified force” as belonging to an EDW than the micro-EW, macro-EW, waves-EW, etc. The single unified force can still exist in that EW (for instance, the Hypernothing or the EW1). If this forced really existed, our actual four forces would just correspond to this single unified force. We emphasize that we talk here about the EDWs. However, we don’t know if we can even use this notion “force” in explaining the entities and the processes that are in an EDW than the EDWs that we know.

(2) The theory of inflation favors the existence of “multiverse”.

This theory posits that, when the universe grew exponentially in the first tiny fraction of a second after the Big Bang, some parts of space-time expanded more quickly than others. This could have created "bubbles" of space-time that then developed into other universes. The known universe has its own laws of physics, while other universes could have different laws, according to the multiverse concept. (Kramer and Writer 2014)

Immediately after the BICEP2 results, both Guth and Linde indicate that idea of “multiverse” has to be taken into account. Linde believes that if our universe is one of the bubbles, there must be many other bubbles in the “cosmic space”.[[215]](#footnote-215) (Kramer and Writer 2014) From the EDWs perspective, the idea of “multiverse” (many “universes” placed within the same macro-EW) can be correct (but obviously these multiverses are completely different than the EDWs!), but Everett’s many worlds, superstring theory, and many other approaches are simple human inventions created because of their wrong framework of thinking, the unicorn world.[[216]](#footnote-216) We can avoid these complicated inventions by replacing the unicorn world, “multiverse”, or hyperspace with the EDWs.

Heller mentions some critics against the “inflation”. Importantly, the “hypothetical ‘false vacuum’ indispensable for the initiation and maintenance of inflation, as we saw in the previous chapter, is not the same as a ‘real’ physical vacuum, which is defined as the global minimum of the potential energy function.” (Heller 2009, p. 62) Other notions like “quantum fluctuations” and (pre-existing) “quantum vacuum” are just pseudo-notions created within the unicorn world. (See Vacariu 2008, Vacariu and Vacariu 2010, Vacariu 2016) Only through correspondence, we can claim that the “origin” of vacuum is the “pre-Big-Bang-EW”. With the EDWs, we avoid many notions that have no explanation or, better said, pseudo-notions. We have to mention Heller’s next idea:

While inflation demonstrates how empty space endowed with energy can effectively create everything we see, along with an unbelievably large and flat universe, it would be disingenuous to suggest that empty space endowed with energy, which drives inflation, is really nothing. In this picture one must assume that space exists and can store energy, and one uses the laws of physics like general relativity to calculate the consequences. So if we stopped here, one might be justified in claiming that modern science is a long way from really addressing how to get something from nothing. This is just the first step, however. As we expand our understanding, we will next see that inflation can represent simply the tip of a cosmic iceberg of nothingness. (Krauss 2012, p. 153)

Inflation is a wrong notion, the “empty space” is not “endowed” with energy, (but this “empty space” corresponds to something that, for us, can appear to be a strange “energy”). From the EDWs perspective, there wasn’t any kind of process surpassing the speed of light: the Big Bang did not happen in an infinitesimal point 13.82 billions years ago.[[217]](#footnote-217) On the contrary, there were many the Big Bangs at the same time and, in this way, we avoid any kind of “inflation”! The space (empty notion) cannot “store energy”, and “nothingness” just corresponds to something which belongs to an EDW.

Inflation is strong related to the *flatness* problem and the *horizon* problem. (Palen et al. 2012, p. 440) Regarding the flatness problem:

How do we get from the assumed curvature of space in the very early universe to the present *lack* of spatial curvature in our universe that has been revealed by cosmological data? The big bang model would have to be ultra-fine-tuned to achieve the matter density that is equal to the critical density necessary to produce the spatially flat universe that we inhabit today. This fine-tuning, a mathematical cancellation of very large numbers to up to sixty decimal places, is considered unacceptable by most physicists because it would bring about an unnatural initial state at the beginning of the universe. (Moffat 2008, p. 92)

The problem is not the “lack of spatial curvature” but the lack of any kind of “space”! The Big Bang took place but not within a spatio-temporal framework, the Big Bang did not create a particular spatio-temporal framework, but only we human beings use “spatio-temporal “frameworks to describe certain cosmological (physical) phenomena, but these frameworks do not have any ontological status.

Presura indicates certain “coincidences” which cannot be explained by the Standard Model. (Presura 2014, p. 540) For instance, the electric charge of a quark is precisely 1/3 or 2/3 of an electron. “That is, the electric charge of a proton is perfect equal with that of an electron.” (p. 540) From our viewpoint, we explain this “coincidence” through the correspondence between the proton, respectively the electron, and the electromagnetic waves (which have the same characteristics)! The unification of those three nuclear forces involves the strengthens of each force which is related to the probability of emission or absorption of the bosons which mediate the interactions. (p. 540) For instance, in the quantum electrodynamics, the electric charges have a finite probability of emission or absorption virtual photons (the bosons are without electric charges). There is also the “color interactions” between the quarks given by the gluons (which have “charges of color”). The strengthens of interactions can varies with the distances between the microparticle: either decreases or increases with increasing the distances between them. After presenting details about these interactions, Presura concludes: at short distances, all strengthens of interactions of those three forces would have the same value which implies that the real charges associated with these three nuclear forces are equal. “Maybe the bosons which mediate the interactions (photon, gluon, bosons Z and W) are the results of a single original boson and all the interactions would be unified within a single interaction!” (Presura 2014, p. 542) We believe that there is no such “single original boson”, but only the correspondences between different electromagnetic waves and those microparticles (photon, gluon, bosons Z and W). We will never be able to associate the bosons with the “gravitons” since the gravitons cannot even exist!

Presura dedicates a sub-chapter for the “quantum gravity” (p. 206) which refers to the unification of quantum mechanics with Einstein’s general relativity. He describes in detail the “loop quantum gravity”. He mentions that the quantum mechanics was unified with the special theory of relativity (but not with the general theory of relativity). The key as the “quantum fields theory” according to which the microparticles are just packages of energy of classical fields, but the background spacetime of these microparticles is classical, Euclidean one. (p. 603) However, if we try to applied also the general theory of relativity to the particles, some great problems would appear. The main reason is that for the general theory of relativity, the “space” is “*curved* and *dynamic*”. (p. 603) “Being dynamic, we should quantify also the space, therefore the background on which the matter manifests!” (p. 603) This element has not been realized with the quantum field theory (where the spatial background is classical, that is, Euclidean), so the unification between these two theories are quite difficult to be accomplished today. (p. 603) From our viewpoint, since the “spacetime” has no ontology, it is meaningless to try to “quantify” it. Presura indicates that even the “space” can be in a “quantum superposition state”. (Presura 2014, p. 604 and p. 610) However, as we indicated in our works and this book, the “superposition states” in quantum mechanics is a wrong notion (i.e., it is a mixture of EDWs, no more or less). Presure also mentions a great difference between these two theories: the general theory of relativity is deterministic, while the quantum mechanics is “fundamentally indeterministic”. (p. 610) Obviously, as we have seen above, according to the EDWs perspective, Heisenberg’s uncertainty principle is not on ontological principle, but just an epistemological one.

Thus, quantum mechanics is a theory of microscopic world, in which the particles appear as points, without any dimension at all. The general theory of relativity is a theory for cosmic distances, in which the determinant role is played by field on great distances. Therefore, we are searching for a unification theory of quantum mechanics and gravitational theory, a theory which nobody has found it yet. We would expect such theory would unify, somehow, the notion of particle and that of field. ………………………………….

A part from the difficulty regarding the unification of quantum mechanics with general theory of relativity is due, in principle, to the different scales of those two theories: quantum mechanics deals with microscopic particles, while the gravitation deals, in general, with celestial massive bodies. (Presura 2014, p. 353)

There are not only “different scales of those two theories”, but mainly the EDWs, the micro-EW and the macro-EW, at least, but not “simple worlds” (as in the “multiverse” approach or Everett’s “many worlds”) placed all within the unicorn world. In reality, we will not be able to unify the particle and the field at all, since these entities belong to the EDWs! Also, we will not be able to unify the microparticles and the macroparticles since they belong to the EDWs. At the same page (p. 610), Presura introduce another problem in actual physics: the “*weakness* of gravitational interactions”. The gravity is much more weaker than the other “fundamental” forces.

For instance, because the particles attract each other weak gravitational, we can say that the static mass are very small… This fact has the indirect consequence of very weak curvature of space on local zones, which it is almost Euclidean…. What key is behind this observation? (Presura 2014, p. 610)

The key for this statements is that the “space” (“spacetime”) does not exist, i.e., it does not have any ontological status. Therefore, the statements above have to be re-written within the EDWs perspective. Our conclusion is the following: it is quite wrong to relate Einstein’s general relativity with quantum mechanics (the Standard model) since these theories refer to the entities and their interactions which belong to the EDWs. The Standard model is a “quantum theory”, while the general relativity is a “classical theory of field”. We can believe that these theories refer to the entities that are, in Spinoza’s terms, “aspects” of the same “thing-in-itself”. However, there is a huge difference between Spinoza’s philosophy and the EDWs: these “aspects” really exist in their EDWs, and one “aspect” does not exist for the other “aspect”! Therefore, even Spinoza’s “dual aspect” is quite a wrong approach constructed within the unicorn world. Also, in the context of EDWs perspective, the TOE based on the unification of those known four forces is quite a wrong movement. Maybe there are people who claim that they are dealing with the “thing-in-itself”, not with the “aspects” furnished by those two theories. From a scientific viewpoint, this movement is quite impossible today. From our viewpoint, the “thing-in-itself” “hyperis” the EW0 and, actually, we are unable today to grasp any knowledge about it, but there are EDWs and we have quite a lot of knowledge about them.

Again, all EDWs really are, while the Hypernothing hyperis. We repeat: it does not mean that the Hypernothing is “God”, but it is only the first EW, i.e., the EW0, no more or less! In chapter 1, we wrote that nothing could be changed within the EW0. The Hypernothing hyper-is the Hypernothing, no more or less. Also, the EW1 did not exist for the EW0. The pre-Big-Bang-EW did not exist for the post-Big-Bang-EW. Because of the habituation of language, we are forced to used certain empty notions like the “Big Bang”. However, according to the actual physical theories, something happened 13.82 billions years ago. According to our EDWs perspective, indeed something happened 13,82 billions years ago, but not a Big Bang. It was just the appearance from “nothing” of the post-Big-Bang-EW (but this “nothing” with no ontological status corresponded with the pre-Big-Bang-EW). Maybe it was a the “great fire” (maybe not) and after other 380,000 years, the light “evaded” from that fire and so the field-EW and later the micro-EW appeared from nothing (but corresponding to that “fire”). The question is: “Where did the “Big Bang” happen?”: either in the pre-BB-EW or in after-BB-EW? From our viewpoint, it would be a meaningless question, since the Big Bang did not happen at all. Therefore, within the EDWs perspective, we can understand now that there was no Big Bang at all (due to which, it is believed, appeared the “Universe”). Moreover, since nothing could change within the EW0, then there was no Big Bang for the EW1 at all! This is another reason the so called “Big Bang” (13.82 years ago) could not happen. Finally we can say that an explanation about the Hypernothing is not a GUT or TOE at all! It would be a metaphysical hyper-viewpoint about the EW0, no more or less!

**Chapter 6**

**Dark matter, dark energy and the EDWs**

The origin and nature of dark energy is without a doubt the biggest mystery in fundamental physics today. We have no deep understanding of how it originates and why it takes the value it has.

(Lawrence Krauss 2012, p. 101)

Nothing comes from nothing.

(Lucretius)

It is difficult to search for a black cat in a dark room, especially when there is no cat.

(Confucius)

Along with “Antimatter” and “Dark Matter” we’ve recently discovered the existence of “Doesn’t Matter” which appears to have no effect on the universe whatsoever.

(Rich Tennant)

The really hard problems are great because we know they'll require a crazy new idea.

(Mike Turner in Panek 2011, p. 195)

We strongly emphasize that this chapter is neither a history of dark matter, nor a presentation of the main theories on this topic. We will try to furnish a framework (not a solution) for dark matter and dark energy. Mainly, we will apply the EDWs perspective to only some aspects of dark matter.[[218]](#footnote-218) In the first part, we shortly present the EDWs perspective, in the second part we analyse some aspects of the dark matter from our perspective, in the last part we introduce very few information supporting the existence of the “mega-EW”. We claim that the “dark matter” does not exist for the macro-entities (planets that form galaxies and clusters of galaxies) which belong to the macro-EW, but it exists in an EDW, the “mega-EW”.

**6.1 Rethinking “dark matter” within the EDWs perspective**

In our days, the most difficult problem of Cosmology is the dark matter and the dark energy.[[219]](#footnote-219) What is dark matter? Contemporary thinkers believe that the gravity of

dark matter must therefore be the “glue” that holds galaxies like our own together. The fate of the universe itself seems to hinge on the total amount of dark matter and the properties of a mysterious form of energy—often called *dark energy*—that appears to be counteracting the effects of gravity on large scales. (Bennett et al. 2010, 445)

Dark matter is the name given to mass that emits no detectable radiation; we infer its existence from its gravitational effects… *dark matter* is the name we give to whatever unseen influence provides the gravity needed to explain the motions we observe. Dark energy is the name given to the unseen influence that may be causing the expansion of the universe to accelerate with time. (Bennett et al. 2010, 446-7)[[220]](#footnote-220)

Every object on a merry-go-round goes around the center in the same amount of time (the rotation period of the merry-go-round). But because objects farther from the center move in larger circles, they must move at faster speeds. The speed is proportional to distance from the center, so the plot illustrating the relationship between speed and distance is a steadily rising straight line (Figure 16.1a). In contrast, orbital speeds in our solar system *decrease* with distance from the Sun (Figure 16.1b). This drop-off in speed with distance occurs because virtually all the mass of the solar system is concentrated in the Sun. The gravitational force holding a planet in its orbit therefore decreases with distance from the Sun, and a smaller force means. (Bennett et al. 2010, p. 447)[[221]](#footnote-221)

The question is the following: “Why the stars/planets situated farther from the center of a galaxy, for instance, have such great speed in their orbital movement around the center of galaxy?” Instead the speed of stars to decrease from the stars situated in the center toward the stars situated at the margin, their speeds increase! It was believed that this speed is produced by the gravity, and in the center of galaxy the gravity is the greatest because in the center there is the greatest amount of mass that produces the gravity. So, the dark matter (an unknown matter) partially determines the speed of any star in a galaxy. Nobody has any idea what kind of “matter” is this “dark matter”. Only certain physical processes indicate, indirectly, the “effects”, the “influence” of dark matter within a galaxy. It was the first physical process that determined the appearance of “dark matter” in cosmology. Amazing, it was based on the incredible physical difference between the movements of planets within our Solar System and the movements of stars/planets within a galaxy! Instead the speed of stars decrease with distance from the center of a galaxy (where it is the greatest gravitational field), at the margin of galaxy, the stars have the same speed as the stars close to the center of galaxy. Something that cannot be explained (“dark matter”) holds together all stars and planets of any galaxy. There are direct and indirect methods of detecting the dark matter.[[222]](#footnote-222) (Mitsou 2019) For instance, the amount of dark matter in a galaxy is determined by comparing the mass of galaxy with its luminosity (mass-to-light ratio).[[223]](#footnote-223) *The main problem is that plotting “the orbital speeds observed at different distances for most spiral galaxies shows that these speeds do not drop off with distance from the center (…).” (Bennett et al. 2010)* It is believed that in the first billions years of the “universe”, the dark matter had no role even if it was present even in that period! In fact, we consider that the EW of dark matter appeared when, in the macro-EW, galaxies and cluster of galaxies were formed. It means that if any galaxy was not formed in a particular place than there was no EDW which has the “mega-entities” which correspond to the galaxies.

The evidence for the existence of dark matter is varied and compelling. It comes from cosmic structures on all scales and across all epochs: from the smallest, dark-matter-dominated dwarf galaxies (e.g. [2]), through the largest clusters of galaxies (e.g. [3]), to the large-scale structure of the Universe (e.g. [4]) and back to the very seeds of cosmic structure reflected in the temperature of the cosmic background radiation (CMB; e.g. [1]). (Zavala and Frenk 2019, p. 1)

Probably, there are the mega-entities which correspond to the individual galaxies, but there are also the mega-entities which correspond to the clusters of galaxies. Krauss (2012)[[224]](#footnote-224) mentioned the names of some important people working in cosmology in the first decades of the 20th century[[225]](#footnote-225) (but we added other persons on his list):

* Lord Kelvin who introduced the “dark bodies” and Poincare (1906) who used “dark matter”. (Bucklin 2017)
* Lemaitre who proposed the Big Bang in 1920’s.
* Hubble, one of the most important astronomers[[226]](#footnote-226): together with Milton Humason, he proposed the “Hubble law”: “There is a linear relationship between recessional velocity and galaxy distance. Namely, galaxies that are ever more distant are moving away from us with faster velocities!” (Krauss 2012, p. 33)[[227]](#footnote-227)
* Harlow Shapley who indicated that the Milky Way is much larger that it was proposed.
* Henrietta Leavitt who showed the “regular relationship between the brightness of Cepheid stars and the period of their variation. Therefore, if one could determine the distance to a single Cepheid of a known period (subsequently determined in 1913), then measuring the brightness of other Cepheids of the same period would allow one to determine the distance to these other stars!”[[228]](#footnote-228) (Krauss, 2012, p. 30)
* Vesto Slipher who “observed in 1912 that the absorption lines from the light coming from all the spiral nebulae were almost all shifted systematically toward longer wavelengths (although some, like Andromeda, were shifted toward shorter wavelengths). He correctly inferred that most of these objects therefore were moving away from us with considerable velocities.” (Krauss 2012, p. 33)[[229]](#footnote-229)

By observing stars and hot gas that were ever-farther from the center of our galaxy, Rubin determined that these regions were moving much faster than they should have been if the gravitational force driving their movement was due to the mass of all the observed objects within the galaxy. Due to her work, it eventually became clear to cosmologists that the only way to explain this motion was to posit the existence of significantly more mass in our galaxy than one could account for by adding up the mass of all of this hot gas and stars. (Krauss 2012, p. 45)

* Dutch astronomer Jacobus Kapteyn (1922) and radio astronomy pioneer [Jan Oort](https://en.wikipedia.org/wiki/Jan_Oort) (1932) hypothesized the existence of dark matter.
* Fritz Zwicky (1933) was among the firsts who presupposed the necessity of “dark matter”, indicated that the rotational velocities of galaxy clusters need much more mass that was present in stars and planets.[[230]](#footnote-230)

“If this would be confirmed,” Zwicky wrote, in his 1933 paper. “We would get the surprising result that dark matter is present in much greater amount than luminous matter.” The additional mass from this theorized dark matter would help explain how the galaxy cluster is able to hold together via gravitational attraction. Later calculations showed that Zwicky’s estimate of the mass-to-light ratio was too large, by a factor of about 8, which meant that his estimates for the amount of dark matter were too high. Even still, his work paved the way for our understanding that most of the mass of a galaxy cluster is actually not in the form of atoms. Like others that came before him, Zwicky still felt that dark matter was composed of material such as cold stars, other solid bodies, and gases. As of yet, the scientific community had no compelling evidence that this missing mass could be anything else. (Bucklin 2017)

Obviously, from our EDWs perspective, there are no “atoms” (microparticles) that “form” the dark matter. The movements of the galaxies (their masses) has to be regarded in relationship with other galaxies (not with the masses of planets which “compose” the galaxies). Within the macro-EW, the galaxies do not have any ontological status, only the planets exist and “represent”, for us, the galaxies.[[231]](#footnote-231) The same principle is available for investigating the relationship between the microparticles and the macroentities: there are the ED laws for the ED entities. The microparticles *correspond* to the planets, so it would be wrong to consider that the microparticles “form” the planets. In consequence, it would be wrong to consider that the “planets form the galaxies”! Indeed, the “missing mass” is not “something else” in the macro-EW, but only in the mega-EW[[232]](#footnote-232)! In the mega-EW, the planets or the microparticles do not even exist; in this EW, there are other ED entities and ED laws than in the macro-EW or the micro-EW!

* Vera Rubin and Kent Ford (1970) published a paper about the rotation of Andromeda galaxy showed that the velocities of the stars require ten times more mass in the galaxy than the visible mass, that is, 90% of the mass of this galaxy was “dark matter”. (Hooper 2006, p. 16)

By observing stars and hot gas that were ever-farther from the center of our galaxy, Rubin determined that these regions were moving much faster than they should have been if the gravitational force driving their movement was due to the mass of all the observed objects within the galaxy. Due to her work, it eventually became clear to cosmologists that the only way to explain this motion was to posit the existence of significantly more mass in our galaxy than one could account for by adding up the mass of all of this hot gas and stars. (Krauss 2012, p. 45)[[233]](#footnote-233)

* Kenneth Freeman (1970) (Australian National University) observed that:

the rotation --curves of several galaxies, which describe the velocity at which stars and gas orbit around the center of the galaxies hosting them, seemed to be incompatible with the observed distribution of visible matter. It is what Freeman wrote in the appendix to the paper he published in the *Astrophysical Journal* that earns him a special place in the history of dark matter: There must be in these galaxies additional matter which is **undetected**. Its mass must be at least as large as the mass of the detected galaxy, and its distribution must be quite different from the exponential distribution which holds for the optical galaxy. (Bertone 2013, p. 24)

* (We add) Jaan Einasto, Ants Kaasik and Enn Saar (1974):

… the discrepancy between the total mass and the stellar mass implied the existence of a “corona”, consisting of a “previously unrecognized, massive population”. They then used 105 pairs of galaxies to estimate the total mass and dimensions of their galactic coronas, concluding that the total-mass of galaxies exceeded that in stars by an order of magnitude. Finally, the authors argued that these new mass estimates could also explain the mass discrepancy that had been observed in clusters. (Bertone and Hooper 2016, pp. 55-6)

* J. P. Ostriker, P. J. E. Peebles, and A. Yahil (1974) wrote that there were “reasons, increasing in number and quality, to believe that the masses of ordinary galaxies may have been underestimated by a factor 10 or more. (J. P. Ostriker, P. J. E. Peebles, and A. Yahil, “The size and mass of galaxies, and the mass of the universe”, *Astrophysical Journal* 193 (1974) L1–L4” (in Berton 2013)[[234]](#footnote-234)
* (We add) Richard Gott, James Gunn, David Schramm and Beatrice Tinsley (1974): the same idea as above: “the authors argued that the body of astronomical data indicated that there was simply not enough matter in the Universe - even accounting for the large mass-to-light ratios observed among galaxies - to equal or exceed the critical density of the Universe.” (in Bertone and Hooper 2016)

By observing stars and hot gas that were ever-farther from the center of our galaxy, Rubin determined that these regions were moving much faster than they should have been if the gravitational force driving their movement was due to the mass of all the observed objects within the galaxy. Due to her work, it eventually became clear to cosmologists that the only way to explain this motion was to posit the existence of significantly more mass in our galaxy than one could account for by adding up the mass of all of this hot gas and stars. (Krauss 2012, p. 45)

Today, there are several reasons for supporting the Big Bang, the “phenomenon” who did take place approximately 13.75 billions years ago.

Essentially, the predictions of formation of the “light elements” (“hydrogen, deuterium (the nucleus of heavy hydrogen), helium, and lithium”, p. 40) after Big Bang strongly coincide with certain empirical measurements:

This is one of the most famous, significant, and successful predictions telling us the Big Bang really happened. *Only a hot Big Bang can produce the observed abundance of light elements and maintain consistency with the current observed expansion of the universe.* (Krauss 2012, p. 40, his italics)

The heavy nuclei (carbon, nitrogen, oxygen, iron, etc.) were created after the Big Bang. Krauss mentioned a problem: comparing with the abundance of light elements, the density of protons and neutrons produced by the Big Bang should be doubled that it exists. (p. 45) So, it was necessary the introduction of “dark matter”[[235]](#footnote-235):

It implied, literally, that the dominant particles in the universe were not good old-fashioned garden-variety neutrons and protons, but possibly some new kind of elementary particle, something that didn’t exist on Earth today, but something mysterious that flowed between and amidst the stars and silently ran the whole gravitational show we call a galaxy. (Krauss 2012, p. 46)

The rotation curves did not decline at large distances from the centers of galaxies, but either remained at the same maximum velocity or continued to rise out to larger and larger radii.7 This result, first established by Babcock for M31, was now found to be a general result, holding for all spirals. In other words, far from the center, the galaxies were rotating much too fast. Moreover, this rise in the rotation curves occurred well beyond the light-emitting part of these galaxies. The only explanation for this finding—unless one wanted to throw out the Newtonian law of gravity altogether, which was unthinkable—was that the gravitational field of the stars was too small by a factor of 10 or so to explain how fast the galaxies were rotating. But that meant that there must be a lot of material out there (what kind of material one couldn’t say). This “dark matter” not be detected directly, but was considerably more preponderant than ordinary dark matter, and furthermore, if there were some kind of telescope that allowed imaging of mass without imaging light, the galaxies would look completely different than the pictures of them we were used to. (Sheehan and Conselice 2015, p. 333)

Again, we have here the classical example of the “rotation curves” of stars within a galaxy: instead their speed to “decline” at large distance from the center of galaxy, the speed increases at the larger radii. Therefore, it has to be some “dark matter” that produces the velocities of stars at larger radii, even if nobody detected this dark matter yet. From our viewpoint, the explanation is much clear and simple: any “galaxy” corresponds to an entity which belongs to the “mega-EW” and this is the reason of these “unexplained” velocities. Everybody agrees that the dark matter has not been detected directly until now. Clearly, we believe that nobody will be able to detect directly the dark matter or the dark energy since there are phenomena which belong to the mega-EW. We recall that an EW does not exist for any EDW, therefore, we cannot detect the dark matter/energy within the macro-EW. Importantly, we have to translate “the dark matter is present everywhere in the macro-EW” means that the dark matter from the mega-EW corresponds to something in each point that belongs to the macro-EW.

Another serious reason for the existence of the Big Bang is the measurements of *cosmic microwave background radiation* (CMB). (Krauss 2012, p. 59) 300, 000 years after Big Bang, there was very hot plasma (3000 degree Kelvin) opaque to radiation. Becoming cooler, the “universe” became “transparent” to the radiation.

When Hubble announced his discovery that the universe is expanding, Einstein realized his mistake. General relativity demands that the structure of the universe be dynamic. Instead of inventing the cosmological constant, Einstein could have *predicted* that the universe must either be expanding or contracting with time. What a coup it would have been for his new theory to successfully predict such an amazing and previously unsuspected result. He called the introduction of his fudge factor, the cosmological constant, the “biggest blunder” of his career as a scientist. It is ironic that with our measurements of the brightness of Type Ia supernovae, Einstein’s biggest blunder has returned to center stage. The repulsive force represented by the infamous cosmological constant is just what is needed to describe a universe that is expanding at an ever-accelerating rate. Today, we write this constant as ΩΛ (pronounced “omega sub lambda”). If ΩΛ is not zero, something is effectively pushing outward from within the universe, adding to its expansion. (Palen et al. 2012, p. 437)[[236]](#footnote-236)

From our viewpoint, it is very important to stress that it is not the “space itself” (or the “energy of vacuum space”), but something that corresponds to the “empty space”! “Space” (what we usually think as being “space”, but which does not exist) is “empty” in the macro-EW, but it always *corresponds* to “something” from an EDW, the mega-EW or to something from the field-EW.

Assuming that dark energy exists in the same quantity in every piece of space and at all times, its presence would have precisely the effect of a cosmological constant. Dark energy does not act at all like the ordinary energy or matter in our Universe, however. Whereas ordinary energy or matter causes the Universe to be pulled together by the force of gravity, the presence of dark energy has a sort of counter-gravity effect, pushing the Universe apart. Also, unlike the other components of our world, dark energy cannot be diluted. The expansion of the Universe reduces the density of matter and radiation. If the volume of the Universe doubles over a period of time as it expands, then the density of matter, including dark matter, is reduced by half. The density of dark energy, on the other hand, stays fixed. (Hooper 2006, p. 169)[[237]](#footnote-237)

This paragraph is like a synthesis of what we have already investigate until now. The dark matter “does not act” like the ordinary matter/energy: being a “different matter which belongs to an EDW, then the dark matter cannot “act” as the matter which belongs to the macro-EW. The dark energy “pushes” the “universe” apart just because there is a kind of force in the mega-EW that, very possible, acts on the “mega-disks” (the “macro-macro-disks”). Just because the dark matter and the dark energy do not exist in the macro-EW, their density is “constant”. It cannot be diluted since it does not exist in the macro-EW.

The dark matter cannot interact with matters which belong the EDWs than the mega-EW since one EW does not exist for any EDW. For instance, it is known that “dark matter does not interact with radiation”, but from our viewpoint, dark matter cannot interact with radiation since dark matter and radiation belong to the EDWs, the mega-EW and the electromagnetic-EW! It has to be clear that dark matter/energy belongs to an EDW than the micro-EW, the macro-EW and the field-EW.[[238]](#footnote-238) (Recall SP) We also can suppose that there is no dark energy accelerating the galaxies because the accelerations of galaxies correspond to the activation of something which belong to the pre-Big Bang-EW which already exist there. So, it is not directly about the “acceleration of the galaxies”, but it is about the activation of certain “matter” which exist in the pre-Big-Bang-EW. We can make an analogy: in the brain, there are the activation of certain neuronal parts of the brain (which belongs to the body, an entity in the macro-EW). The brain/body already exists in the macro-EW before those activation. However, because of the activation of these parts of the brain, certain mental states appear suddenly within the mind. From the viewpoint of the mind, if we ask how these mental patterns arise, we can introduce “dark matter” and “dark energy” in order to explain these apparitions.[[239]](#footnote-239) The same explanation is for real “dark matter” and “dark energy”… We can make the same type of analogy regarding the “entanglement” in quantum mechanics: the “nonlocality” between two particles it is not due to certain “mysterious” force/relationship, but it corresponds to the electromagnetic wave which corresponds to those two particles and the “space” between them (nothing more). The entanglement is not a mysterious force, but it is due to the *correspondence* between the electromagnetic waves (the field-EW) associated to those two particles (the micro-EW).

Even if it is believed that dark matter is present everywhere in the “universe”, dark matter has to be a “non-baryonic” matter (since the normal matter is all baryonic). Today, regarding the total mass-energy of the “known universe”, there is 73% (or less) dark energy, 23% (or more) dark matter and 4% (a little more) ordinary matter. (Other alternative: 68.3% dark energy, 26.8% dark matter, 4.9% baryonic matter). We have to be aware that what we call “dark matter” and “dark energy” means “nothing” in the macro-EW which just *correspond* to something which belong to the mega-EW. This “nothing” has no ontological status within the macro-EW, even if we can see certain *unexplained* “indirect phenomena” (dark matter and dark energy), but these strange phenomena correspond with something which belong to the mega-EW. For explaining dark matter and dark energy, we need to develop scientific theories which describe phenomena which belong to the mega-EW and *correspond* to “nothing” in the macro-EW. Some physicists consider that the particles which produce the dark matter are WIMPs (weakly interacting massive particles), axion, neutrino, neutralino, and many others particles.[[240]](#footnote-240) It is completely meaningless to search for such microparticles which “compose” the dark matter, since these ED entities (the microparticles and the dark matter) belong to the EDWs. Therefore, the microparticles do not exist for the dark matter, the dark matter does not exist for the microparticles! Bertone (2013) enumerates ten necessary properties for dark matter which we will shortly investigate them from the EDWs perspective:

1. *Is its abundance just right?* For a new particle to be considered a good dark matter candidate, a production mechanism must exist. The problem is that for most particles the production mechanism leads to an abundance in the universe that is too large—in which case the particle must be discarded—or too little—in which case the particle can contribute only a fraction of the dark matter, as is for instance the case for Standard Model neutrinos—compared with the abundance of dark matter measured from cosmological observations. (Bertone 2013, p. 59)

Within the EDWs perspective, dark matter does not exist in “our universe”, but the elements our “universe” (everything that is present including planets, stars, comets, dust, “empty space”, etc.) corresponds to an EDW. If we perceive, indirectly, our “universe”, then we cannot perceive (not even indirectly that EDW). Therefore, the correspondence has to be everywhere.[[241]](#footnote-241)

2. *Is it cold?* Dark matter particles are responsible for the clustering of all structures in the universe. If their velocity distribution is large, they cannot be confined in halos, as they tend to “free-stream” away, like water molecules from an overheated pan. If the particles are cold, that is, if they velocity dispersion is low, this does not happen; in this case, by gravitational clustering, they can grow the supporting structure for galaxies and clusters of galaxies. (Bertone 2013, p. 59)

Dark matter is neither cold, nor hot and there is no velocity for it. The “structure of clusters of galaxies” which belongs to the macro-EW of planets and galaxies) only *corresponds* to the certain mega-entities/processes which belong to an EDW, the mega-EW.

3. *Is it neutral?* There are many reasons to believe that dark matter particles cannot possess an electric charge (or any other kind of charge). (Bertone 2013, p. 59)

Obviously, the correspondences do not have any kind of “charge” since all such correspondences between the ED entities which belong to the EDWs do not have any ontological status.

4. *Is it consistent with Big Bang nucleosynthesis?* The set of calculations that go under the name of “Big Bang nucleosynthesis” constitute one of the most impressive successes of standard cosmology (see the next chapter). This theory predicts the abundances of the light elements produced in the first three minutes after the Big Bang; any dark matter candidate must fulfill a series of severe constraints in order not to spoil the agreement between theory and observation. (Bertone 2013, p. 59)

We have to be aware about the correspondences and their evolution in time, when we try to construct the entities/processes which correspond to all entities, interactions, vacuum space of our “universe”.

5. *Does it leave stellar evolution unchanged?* Similarly, we have achieved a rather precise understanding of stellar structure and evolution, and the agreement between theory and observation provides a powerful tool to constrain dark matter particles. Particles that could be collected in large quantities at the centers of stars, including our Sun, could in fact lead to an accumulation of mass so large that they would collapse into a black hole, which would subsequently devour the entire star in a short time. The fact that we still observe the Sun shining allows us to rule out any combination of particle physics parameters that would destroy the Sun and other stars. (Bertone 2013, pp. 59-60)

We cannot talk about any kind of difference between the entities/processes of our “universe” and the entities/processes which belong to an EDW, since one set does not exist for any other set. Since the entities which belong to an EDW do not exist for the entities which belong to an EDW, it is meaningless to sustain that “there is influence” or “there is not influence” between them. We can talk only about the correspondences between the mega-EW and the macro-EW, for instance[[242]](#footnote-242).

6. *Is it compatible with constraints on self-interactions?* As we have seen in the previous chapter, the Bullet Cluster provides convincing evidence that most of the mass in the two clusters in that system is dark. Interestingly, this system allows us to set a constraint on the self-interaction of dark matter particles. The “bullet” would be dragged by the larger halo in the presence of a strong self-interaction, leading to an offset between the positions of the visible galaxies (which are practically collisionless) and the total mass peak. (Bertone 2013, p. 60)[[243]](#footnote-243)

The “large halo” is “nothing” in this macro-EW, but something from the mega-EW (which corresponds to this “halo”). In the macro-EW, nobody can see this “halo” just because it does not exist in this EW. The “halo” is “nothing” (no ontological status) in the macro-EW, but “something” (a mega-entity) which belongs to the mega-EW!

7. *Is it consistent with* direct *dark matter searches?* As we shall see, *direct* dark matter searches aim to detect the interactions of dark matter particles with the nuclei of a detector, usually placed deep underground. The reason for placing these experiments in underground laboratories is that they need to be shielded from the copious cosmic radiation showering from space. These experiments have made huge progress in the last four decades, and the constraints arising from these experiments are complementary to those arising from accelerator experiments. (Bertone 2013, p. 60)

Again, it is not possible to detect the “dark matter” but only the correspondences which are “nothing” in the macro-EW! We can see some “strange, un explained phenomena” in the macro-EW (strange behavior of the matter or of “empty space” from the macro-EW), but we have to accept that these real phenomena *correspond* to *something* which belong to an EDW.

8. *Is it compatible with gamma-ray constraints?* Alternatively, dark matter particles can be detected *indirectly* through the products of their annihilation or decay. In practice, whereas direct searches aim to detect collisions of dark matter particles with the nuclei of a detector, indirect searches aim to detect the pale light arising from the collision of two dark matter particles with each other. This process is more efficient where the density of dark matter particles is higher, and therefore we are using powerful telescopes to search for the high-energy light produced by large concentrations of dark matter lying at the Galactic center or in nearby galaxies. (Bertone 2013, p. 60)

The dark matter particles cannot be detected (directly or indirectly) because they do not even exist. It is about certain “particles” (better, “entities”) which belong to an EDW. There are certain mega-entities which belong to the mega-EW.[[244]](#footnote-244)

9. *Is it compatible with other astrophysical bounds?* Besides gamma rays, that is, high-energy light, one can search for other particles produced by the annihilation or decay of dark matter particles, for instance neutrinos, antimatter, or light with a smaller energy than understand the macroscopic consequences of the microscopic properties of dark matter, and although convincing detection has not been achieved, these techniques are useful at least for allowing us to rule out some theoretical possibilities. (Bertone 2013, pp. 60-61)

There are no chances of detecting any kind of “microscopic properties of dark matter”. So, it is useless to construct apparatus for detecting the “microparticles” that “form” dark matter.

10. *Can it be probed experimentally?* Strictly speaking, this is not really a *necessary* condition, for dark matter particles could well be beyond the reach of any current or upcoming technology. However, measurable evidence is an essential step of the modern scientific method, and a candidate that cannot be probed at least indirectly would never be accepted as the solution to the dark matter problem. (p. 61)

Hopes never disappear. We have to translate the word “indirectly” from the last sentence in “correspondence”. From our viewpoint, the dark matter does not exist within “our universes” at all! In fact, there are no “mysterious particles” that we cannot observed empirically, since such entities cannot even exist in the macro-EW[[245]](#footnote-245).[[246]](#footnote-246) There are only some “phenomena” which that ED entities and ED interactions which belong to an EDW than the macro-EW! These phenomena only *correspond* to some strange “phenomena” that cannot be explained in the macro-EW. The macro-EW (that contains the macro-objects, the planets, and the stars that “form”, for us, the “galaxies”) is not the largest macro-EW. In fact, “largest” has no meaning regarding the comparisons of EDWs. It is a notion which would presupposes the notion of “space” (which does not exist). Moreover, an EW does not exist for any EDW, so the notion “the largest EW” has no meaning. A “galaxy” (no ontological status) in the macro-EW corresponds to something from an EDW, the mega-EW.[[247]](#footnote-247) Essentially, a star appeared with other planets which “formed in a flattened disk surrounding it”. (Bennett et al. 2010) This idea is quite important in explaining the dark matter of a galaxy.

Let us imagine a human being trowing a disc (a CD) in air (in an “empty space” - a long distance from any planet and their gravitation). The CD will rotate exactly as a galaxy rotates. The margin of that disc rotates with a speed much greater than the speed of points closer to the center of the disc. The force acting on the disc (centrifugal force) corresponds to the micro-forces which bring together these microparticles and their rotation, even if we cannot understand the origin of this centrifugal force. In the micro-EW, there are the microparticles, their micro-forces, and their “dark” rotation. In the macro-EW, there is a disc with a centrifugal force (and maybe a “gravitational force”). According to the principles of EDWs perspective, the microparticles exist just because of their interactions (within the micro-EW); the macro-entities (stones, planets) exist because of their interactions (within the macro-EW). The “dark matter” (the mega-entities) (within the mega-EW) corresponds to the planets and the “empty space” (i.e., nothing) among them (which only represent, for us, the “galaxies”). Essentially, from the EDWs perspective, *the mega-entities (that represent the mega-EW) exist just because of the mega-interactions between them within this EW*. The mega-entities do not exist for planets (a planet does not exist for a mega-entity) just because the mega-entity and the planet are ED entities which belong to the EDWs (and one EW does not exist for an EDW)![[248]](#footnote-248) (Recall SP)

Another method of measuring the mass of a galaxy is using Einstein’s method of “gravitational lens”: the deviation of light in the gravitational field produced by a galaxy/star (1936). In 1933, Fritz Zwicky, among the firsts who presupposed the necessity of “dark matter”, indicated that the rotational velocities of galaxy clusters need much more mass that was present in stars and planets. In 1937, Zwicky proposed that, using Einstein’s method of gravitational lens, it is possible:

(1) testing general relativity, (2) using intervening galaxies as a kind of telescope to magnify more distant objects that would otherwise be invisible to telescopes on earth, and, most important, (3) resolving the mystery of why clusters appear to weigh more than can be accounted for by visible matter: “Observations on the deflection of light around nebulae may provide the most direct determination of nebular masses and clear up the above mentioned discrepancy.” (Krauss 2012, p. 51)[[249]](#footnote-249)

We return to our the “macro-disk”: let us imagine an “observer” who perceives the microparticles (which belong to the micro-EW), but being unable to perceive the macro-disk. For explaining the movement of all microparticles (which, in reality, correspond to the movement of the macro-disk), the observer would introduce some “dark matter”! With this example, we explain very simple the “dark matter” which in reality does not exist in the macro-EW but in the mega-EW!

**6.2 “Haloes”, “structures”, and the “flat universe”**

Palen indicates that

In Chapters 15 and 16, we learned that there is much more dark matter than normal matter in the universe. Yet our discussion of Big Bang nucleosynthesis in Chapter 14 revealed that the amount of normal matter we see in the universe predicts just the right abundances of light elements. Therefore, dark matter cannot be made of normal matter consisting of neutrons, protons, and electrons. If it were, it would have affected the formation of chemical elements in the early universe. The abundances of several isotopes of the least massive elements would be quite different from what we find in nature. Dark matter must be something else—something that has no electric charge (so it does not interact with electromagnetic radiation) and that interacts only feebly with normal matter. Clumps of such dark matter in the early universe would not have interacted with radiation or normal matter, so we would not see them in the CMB, and they would not have been smoothed out by pressure waves and radiation (Figure 17.8). Dark matter solves the problems of modeling the formation of galaxies and clusters of galaxies. (Palen et al. 2012, p. 448)

This paragraph clearly mirrors the existence of EDWs: dark matter cannot interact with normal matter (neutrons, protons, and electrons) just because dark matter does not exist in the macro-EW, so the “interactions” between dark matter and normal matter is meaningless. The “amount of normal matter” predicts the amount of “light elements” and indeed dark matter is not made of neutrons, protons and electrons, since it does not exist in the micro-EW. Indeed, dark matter could not affect the “formation of chemical elements” in the early universe, since it did not exist for the normal matter. Obviously, dark matter has no “electric charge” just because it does not matter what kind of measurement apparatus we use (always made of “normal matter”), we will never be able to identify it. The “clumps” of dark matter in the early universe did not interact with the radiation and/or normal matter. Therefore, we cannot see the dark matter in the CMB and there were no interaction between the “pressure waves and radiation”. The dark matter had only correspondences with “nothing” at the beginning of “universe” and billions of years later. Because the dark matter does not exist in the macro-EW, we can understand much clear the idea that the “matter” of dark matter is not made of neutrons, protons and electrons. How can dark matter affect the formation of chemical elements in the early universe, if dark matter does not exist in the macro-EW? The same reason is available for the fact that dark matter has no electric charge and did not have interactions with radiation. Maybe the galaxies were formed as entities in the mega-EW, but we could not see this process of formation, even if we can look back in time. We can see only the formation of “galaxies” not as “entities”, but just as amalgams of stars, planets and dust, no more or less! We recall that it is the possibility the galaxies of the macro-EW to be “entities” (mega-entities) in the mega-EW, but we will never see these mega-entities: we can construct tools of observation only using the baryonic matter and this matter does not exist for the non-baryonic matter which composes the entities of mega-EW.

In this context, let us imagine the formation of a planet in the macro-EW: the planet appears spontaneously in the macro-EW. In the same time, in the micro-EW, there were the accumulations of enormous amounts of “microparticles” which correspond to the stars/planets within the same large “place”. Those microparticles still exist today in the micro-EW (with those three micro-forces), while the planet exists in the macro-EW (only with “gravity”). Again, we make an important analogy regarding two relationships, “gravity-microparticles” and “dark matter/energy-macroparticles”: the *gravity (the curvature of spacetime that “belongs” to the macro-EW) for the microparticles (that belong to the micro-EW) is quite similar to the dark matter and the dark energy (that belong to the mega-EW) for the macro-entities (that belong to the macro-EW).* A microparticle (a photon, for instance) does not “perceive”/interact with a planet, therefore “gravity” does not exist for the photon. However, in its trajectory, the photon follows the “curvature of space-time” (empty notion) produced by a planet/galaxy. The photon would “think”: “It has to be a *dark matter, a dark halo* which surrounds this huge amalgam of microparticles!” For the photon, there are no “gravitons” (anyway, gravitons do not exist), and it cannot even perceive that the “space-time” is curved. Even if it could perceive the curvature, the photon would not be able to understand what produced this curvature. We think that there is a halo of dark matter which surrounds a galaxy, but exactly in the same way *an electron which moves around the proton would ask about certain “gravitational force” and the dark entity (a planet) that produces it.* We are in the same situation: the humans on Earth ask about a force (dark energy) and an entity (an amalgam of entities) that produce(s) it, but for humans and the Earth that entity (dark matter) cannot even exist at all!

Let us analyze the famous “bullet clusters” and “superclusters” of galaxies. The cosmologists consider that “large structure forms through mergers” (section 17.5, Palen at al. 2012). “Impressive, the “cluster’s galaxies, hot gas, and dark matter are widely displaced from one another due to the violence of the collision that formed this cluster.” (Palen et al. 2012, p. 450) Again, we have here the mixture of entities which belong to the EDWs. We believe that only through *correspondences* we can deduce, with very high approximations, the structure of the mega-EW, even if we will never be able to observer directly the “matter” from this EW (we have to use normal, baryonic matter that is epistemologically different than the “matter” of the mega-EW). The baryonic matter of the macro-EW does not exist for the non-baryonic “matter” of the mega-EW. Anyway, it seems that the blue figures would correspond to some entities which belong to the mega-EW, that is, the clusters and superclusters of galaxies (which we can observe) just correspond to certain mega-entities which belong to the mega-EW (which we cannot observe)![[250]](#footnote-250) Vera Rubin investigated the velocities of stars close to the center of some galaxies and stars at the margin (or even outside) of that galaxy and found that all stars would preserve the same position one in relation to the others.[[251]](#footnote-251)

Again, let us return to the analogy between “photons-gravitation” and “dark matter-galaxies”. We know that gravitons do not exist for photons. However, the photons follow the spatio-temporal paths (curved “space”) between the planets. From the viewpoint of photons, we can think of certain microparticles (gravitons) which produce this curvature. The photons are “biased” with respect to gravitons. But gravitons do not exist. In the same way, galaxies are “biased” with respect to the dark matter, but dark matter does not exist.

We can make the second analogy referring to the relationship between a table and the corresponding amalgam of microparticles: we cannot compare *directly* the format of that “table” with the corresponding format of an amalgam of microparticles since this relationship has no meaning within the EDWs perspective. Within the micro-EW, we cannot find any meaning for a statement like: “A table is ‘formed’ from an amalgam of microparticles” since the table does not exist within the micro-EW. We can understand the “shape” of that table, but we cannot understand why that amalgam has that shape! Everything gets a meaning if we introduce the *correspondence* between that amalgam of microparticles and the macro-table (obviously, there are EDWs). The galaxies have some “formats”: their constituents (the stars/planets) move with a particular velocity just because the stars and planets correspond to a “disk” which belongs to the mega-EW. If we rotate a disk in the macro-EW, a second person, using an electronic microscopic, will observes an amalgam of microparticles which are arranged under a “disc format”, all planets moving at the same speed! So, we can presupposes that, because of the Big Bang and other phenomena, billions of planets of a galaxy have been moving under the shape of a rotating “disc”.

In these conditions, it is quite strange to claim that “dark matter particles are all around us-in the room in which ‘I am typing’, as well as ‘out there’ in space. Hence we can perform experiments to look for dark matter and for the new type of elementary particle or particles of which it is comprised.” (Krauss 2012, p. 54) It is totally wrong to check for the existence of “new type of elementary particles”. Again, Krauss’ idea mirrors only the “correspondences” between entities, phenomena, and forces which belong to the EDWs. “The good news is that if this odd sort of material is made from some new type of elementary particle, then the ‘dark matter’ that dominates our galaxy is not just ‘out there,’ it is in the room as you read this, traveling through the paper, and through your body.” (Hooper 2006, p. v) The bad news is that this “new type of elementary particles” does not exist. Also, there is no “direct influence” or any kind of “interactions” between the dark matter and any kind of matter that we know just because it is about an EDW than all EDWs that we know and, essentially, one EW does not exist for any other EDWs. Therefore, dark matter does not “dominate our galaxy” (or any other galaxy), it is not “in the room” traveling “thought our body”. In the macro-EW, for instance, there is only the *constant, invariable correspondence* between something which exist in EDW and the “dark matter” (some correspondences in “empty space of our macro-EW, in our galaxy and in our body).

From the EDWs perspective, we can understand much better the dark energy and its “density”: there are some entities/interactions which belong to an EDW and this is the reason the density of “dark energy” is *constant*. *The entities which belong to the EDWs only correspond and these correspondences are always* constant *since, for instance, in the EW of galaxies, “nothing” exists but this “nothing” corresponds to “something” from an EDW (the mega-EW, for instance)!* We can see only some “strange phenomena” (the rotation of galaxies or their expansion) which cannot be fully explained in the macro-EW. There is only the correspondence of these “matters” which belong to one EDW (or more EDWs) and that “matter” cannot be “detected” because it does not exist in the macro-EW or the micro-EW. (Recall SP) More important is the observation about dark matter “haloes”[[252]](#footnote-252), “big blobs of dark matter in which galaxies were embedded—were necessary to keep the structures of many spiral galaxies stable”.[[253]](#footnote-253) (Sheehan and Conselice 2015, p. 334) The “haloes”[[254]](#footnote-254) (no ontological status within the macro-EW) and the galaxies (no ontological status) formed by the planets (the macro-ontologicla status) correspond to the mega-entities which exist in the mega-EW. How each galaxy was formed? The main force was gravitation that “acts and isolates clumps of matter on all scales”. (Sheehan and Conselice 2015, p. 334) This idea mirrors one of Gabriel Vacariu’s main principles from his works (2005, 2008, etc.): in this case, the main principle is: “The *interactions* constitute the entities, the entities *determine* their interactions”.

According to the gravitation, we cannot explain the movements of planets that are at the margin of the disc: these planets have too much speed in relationship to gravitation. “… Hubble wrote in 1934, on the basis of deep studies with the 100-inch over 1000 small fields thinly distributed over the sky north of declination -30°, that the distribution of galaxies on very large scales is homogeneous, i.e., there was no indication of a super-system of the galaxies.” (Sheehan and Conselice 2015, p. 334) Our bodies (our eyes) are particular entities within the macro-EW where we can find the planets and their movements. We cannot see any “super-system galaxies”, since this “super-system” is an entity (or maybe an amalgam of entities or a process of various entities) which exists in the mega-EW. That mega-EW does not exist for our bodies, the planets and galaxies (which we can, indirectly, observe) and for our minds (which are EDWs).

One of the most important actual cosmologists regarding “dark matter” is James Peebles. Peebles mentions that it “might be the DM that gravitationally binds clusters of galaxies15,16” (Peebles 2017, p. 1)[[255]](#footnote-255), but we have to be aware that the dark matter “does not binds clusters of galaxies”, the mega-entities (that belong to the mega-EW) correspond to the clusters of galaxies (planets and empty spaces among them) In 2015, Peebles writes about the “galaxy phenomenology”:

I like the example of pure disk galaxies, in which most of the stars move in streams in directions close to the plane of the disk, as in whirlpools and bars (17). This support by motions close to parallel to the plane is different from galaxies that have a rotationally supported disk centered on a classical bulge of stars supported largely by random motions, as in an elliptical galaxy. The nearby spiral M31 has a classical bulge. Our Milky Way seems to be a pure disk galaxy, with the stars even near the center streaming in near-rotational support (18). The Milky Way also has an extended stellar halo supported by nearrandom motions, but its luminosity is only a few percent of the total… Thin disk galaxies are the puzzle. Despite all of the complications of baryon physics, we can be reasonably sure that the stars that formed in the bits and pieces flowing into a growing galaxy would not end up streaming in the disk; that requires dissipative settling before star formation. Can ΛCDM explain how material streaming together to form a pure disk galaxy “knew” that when the star formation rate was high, star formation had to be almost entirely confined to the one fragment that is going to grow into the present-day disk? I offer this puzzle as a counterexample to the proposition that galaxies are too complicated to add to the probes of fundamental theory. (Peebles 2015, p. 12248)

From the EDWs perspective, the “disk galaxies” have no ontology (the galaxies are formed by planets, but these planets and the “empty spaces” among them correspond to the mega-entities (the mega-EW)! Peebles’ works indicates that

“the subtle fluctuations in the temperature of the CMB – which reflect ripples in the density of matter shortly after the Big Bang – with the way in which matter is distributed on a large-scale throughout the present day universe. The link exists because all the structure we see around us today must have grown through the evolution of those primordial seeds. Peebles advanced the concept of a dark matter component to the universe and its implications for the evolution of structure.” (*The Conversation* 2019)

More interestingly, in an article from 2014, part 4 is called “Island universes”: without presenting details about this topic, we introduce the conclusion that “two broad classes of galaxies, pure disks and ellipticals, have evolved in near isolation from their surroundings, as island universes.” (Peebles 2014, p. 10)[[256]](#footnote-256) Peebles needs the EDWs perspective to furnish the ontology of dark matter, that is, the ontology of “island universes”, that are, in reality, just those mega-entities which belong to the mega-EW![[257]](#footnote-257) Cosmologists believe that

dark matter provides, in a way, the ‘stage’ for the ‘cosmic show’, a stage that was assembled when the universe was young, way before the time when stars started to shine and planets started to form, and this stage is still evolving. It is, in short, *the supporting structure of the universe*. It solves in a single stroke many problems in astrophysics and cosmology, and it provides a self-consistent framework for the structure and evolution of the universe. (Bertone 2013, p. 4)[[258]](#footnote-258)

Again, we can make the analogy between a table and the corresponding amalgam of microparticles: the “format” of that amalgam of microparticles has no meaning within the micro-EW: why this format has that shape? Within the micro-EW, we cannot find any meaning for the format of that amalgam of microparticles. However, everything gets a meaning if we introduce the *correspondence* between that amalgam of microparticles and the macro-table (which belong to an EDW).[[259]](#footnote-259) Also, the galaxies have a particular format: their constituents (the planets) move with a particular speed just because these macro-entities (the macro-EW) *correspond* to a “mega-disk” (the mega-EW).[[260]](#footnote-260) If we rotate a disk in the macro-EW, a second person, using a microscopic electron, will observes an amalgam of microparticles that are arranged under a “disc format”, all planets moving with the same speed! So, we can presupposes that, because of the Big Bangs and other phenomena, the billions of planets of an galaxy have been moving under the format of a disc. Krauss writes that each galaxy has 100 billions stars and hundreds of billions of planets. Using empirical data, in 1998, Tyson et al. constructed a computer model that showed that

more than 40 times as much mass is between the galaxies as is contained in the visible matter in the system (300 times as much mass as contained in the stars alone with the rest of visible matter in hot gas around them) . Dark matter is clearly not confined to galaxies, but also dominates the density of clusters of galaxies… Even though we didn’t have a shred of direct evidence, we all hoped that the amount of dark matter was sufficient to result in a flat universe, which meant that there had to be more than 100 times as much dark matter as visible matter in the universe. (Krauss 2012, p. 53-54)[[261]](#footnote-261)

Krauss concludes that this matter is necessary for the universe of being “flat”.[[262]](#footnote-262)

We are now virtually certain that the dark matter-which, I reiterate, has been independently corroborated in a host of different astrophysical contexts, from galaxies to clusters of galaxies-must be made of something entirely new, something that doesn’t exist normally on Earth. This kind of stuff, which isn’t star stuff, isn’t Earth stuff either. But it is something! (Krauss 2012, p. 54)[[263]](#footnote-263)

Partially, Krauss is right: there is “something” that is “neither stuff”, nor “Earth stuff”, “it is something” which belongs to an EDW and *corresponds* to “nothing” (no ontology!) in the macro-EW.[[264]](#footnote-264) There are only some strange phenomena (the rotations of galaxies, etc.) that are, for us, produced by this “dark matter”, but, very important, dark matter and dark energy do not exist in any EW that we know (the macro-EW, the micro-EW or the field-EW). Again, we can talk only about some correspondences but these “correspondences” (“manifestations” or “effects” but these notions are both wrong) are “nothingness” (no ontologies) in the macro-EW or the micro-EW. We can detect, perceive, some “strange phenomena” that involve objects/entities which belong to the macro-EW or the micro-EW. Physicists are aware that dark matter does not interact “electromagnetically to produce light” (Krauss 2012, p. 54) and they are forced to believe that such interactions are “very weak” and very difficult to be detected. Important, Krauss mentions that even if

we are bombarded every day by millions of dark matter particles, most will go through us and the Earth, without even “knowing” we are here-and without our noticing. Thus, if you want to detect the effects of the very rare exceptions to this rule, dark matter particles that actually bounce off atoms of matter, you had better be prepared to detect very rare and infrequent events. (Krauss 2012, p. 55)[[265]](#footnote-265)

Working within the unicorn world, the physicists logically believe that dark matter does not “emit or absorb electromagnetic radiation” (it is “dark”), it does not have any kind of interactions with the “known matter”. (Sheehan and Conselice 2015, p. 334) Again, dark matter cannot interact with anything from the macro-EW (in which there are the planets that form, for us, the galaxies, for instance), it cannot emit or absorb electromagnetic radiation, since it does not exist for the entities and forces which belong to this particular EW. Anyway, working within the unicorn world, many scientists believe that dark matter does not interact with any kind of matter that we know[[266]](#footnote-266) but it is impossible for us to see the causes of such strange phenomena.

The good news is that if this odd sort of material is made from some new type of elementary particle, then the ‘dark matter’ that dominates our galaxy is not just ‘out there,’ it is in the room as you read this, traveling through the paper, and through your body. (Hooper 2006, p. v)

The bad news is that this “new type of elementary particles” does not exist. Also, there is no “direct influence” or any kind of “interactions” between the dark matter (the mega-entities that belong to the mega-EW) and any kind of matter which belong to the EDWs. There are the macro-EW, the micro-EW, the wave-EW, the mind is an EW, therefore, there has to be the mega-EW, an EW in which there has to be a kind of “matter” (the “mega-matter”) which corresponds to the *indirect effects* (that is, through *correspondences*) of “dark matter” in the macro-EW and the macro-entities like planets which form, for us, the “galaxies” and the “clusters of galaxies”. We can imagine dark matter/energy like a kind of “mega-disk” (macro-macro-disk) which corresponds to the “galaxies”, clusters of galaxies and the “empty space” between them. The entities which belong to the mega-EW are not even “greater” than the macro-objects or “smaller” than the micro-entities (electrons, for instance), since one EW does not exist for any EDW. Dark matter has to be a kind of non-baryonic matter since any star is formed from the baryonic, normal matter. There are no interactions between baryonic matter and “non-baryonic matter” since one kind of matter does not exist for any kind of other matter. The amount of dark matter in a galaxy is determined by comparing the mass of galaxy with its luminosity (mass-to-light ratio). “The evidence of dark matter is by and large gravitational. The discrepancy between the luminous mass and the gravitational mass gives an indication of the presence of a huge unseen mass in the Universe.” (Majumdar 2015, p. 89) Dark matter has an *indirect* influence on the the “empty space”, but this “nothing” corresponds to “something” which belongs to the mega-EW!

Let us consider that the mega-EW (with mega-entities) is the EW in which we can find the “matter” that corresponds to the dark matter which appears in the macro-EW where planets, stars, galaxies and cluster of galaxies were formed in the past. *Within the EDWs perspective, any galaxy corresponds to a mega-entity which belongs to the mega-EW and this mega-entity can be a mega-disk! However, this mega-disk does not exist for the planets and our bodies (the macro-EW)![[267]](#footnote-267)* This is our answer to “dark matter”.[[268]](#footnote-268) We have to notice that the mega-EW is not “greater” in size than the macro-EW, since an EW does not exist for any EDW. However, the entities which belong to the mega-EW (within the macro-EW these entities correspond to the galaxies) are indeed “greater” in “size” than the objects (planets, stars) which belong to the macro-EW. The matter of any star, planet, dust, etc. within a galaxy is called the “baryonic matter”. Because it does not interact with the baryonic matter, the dark matter has to be a *non-baryonic matter*. From our viewpoint, it is essentially that the existence of dark matter cannot be denied and sure it is not composed of “normal” or “luminous” matter:

dark matter cannot consist of normal matter made up of neutrons and protons; if it did, the density of neutrons and protons in the early universe would have been much higher, and the resulting abundances of light elements in the universe would have been much different from what we actually observe. (Palen et al. 2012, p. 376)

At the cosmological scale, the macro-EW, the only “force” that the physicists have believed to exist is “gravitation”. Obviously, within the mega-EW, there are no baryonic matter (the planets, stars, comets, dust, etc. which form the galaxies), but only certain non-baryonic matter which form the entities that correspond to the galaxies. However, we already know that the “non-baryonic matter” does not really exist, it is “nothing” in the macro-EW that corresponds to something which belongs to the mega-EW, for instance. The amount of dark matter in a galaxy is determined by comparing the mass of galaxy with its luminosity (mass-to-light ratio). “The evidence of dark matter is by and large gravitational. The discrepancy between the luminous mass and the gravitational mass gives an indication of the presence of a huge unseen mass in the Universe.” (Majumdar 2015, p. 89)

The main problem is that plotting “the orbital speeds observed at different distances for most spiral galaxies shows that these speeds do not drop off with distance from the center (…).” (Bennett et al. 2010, p. …) Within the EDWs, it is very easy to explain this phenomenon: *the galaxy which belongs to the macro-EW is something like an entity (a disk) in the mega-EW. Dark matter does not exist in the macro-EW, it is “nothing” that apparently determines the features of galaxy’s rotation.* Therefore, it is quite normal the “orbital speeds observed at different distances for most spiral galaxies shows that these speeds do not drop off with distance from the center”. It is believed that in the first billions years of the “universe”, dark matter had no role even if it was present in that period! It would mean that we have to add something else (a new “matter” or a new “parameter”) to dark matter in order to get the “action of dark matter”. But this alternative is even worse for the notion of “dark matter”. Within the EDWs, exactly as the macro-entities (planets and stars) were not formed in the first hundreds of millions of years (in that period, the macro-EW did not exist), the “mega-disks” in the mega-EW were not formed. These entities were formed after the first billions years of the “universe”. So, the mega-EW did not exist in that period.

Let us now writes about dark energy: “Dark energy is the name given to the unseen influence that may be causing the expansion of the universe to accelerate with time.” (Bennett et al. 2010, p. 447)[[269]](#footnote-269)

Some scientists believe that, like Einstein’s cosmological constant, dark energy is a property of space itself and that as space expands, more dark energy is created, accelerating the expansion further. Other experts think that dark energy might make up a changing energy field known as quintessence and other still believe that our current understanding of gravity itself might be wrong. (Complete History of the Universe Vol. 1, 2015, p. 90)

Important in this paragraph is that “dark energy is a property of space itself” means, within the EDWs perspective, this dark energy does not exist in the macro-EW, but there are certain phenomena which correspond to it. There is neither the field as “quintessence”, nor the dark matter particles, but only “nothing” (no ontology) which “belongs” to the macro-EW and corresponds to “something” which belongs to the mega-EW! There are two alternatives for dark energy:

(1) One alternative is that *between various mega-disks, there is a force that we call “dark energy”.* Exactly as we cannot observe the macro-macro-disks (the “mega-disks”), we also cannot observe this “dark energy” (the force between these mega-disks).[[270]](#footnote-270)

(2) As we will see below, the *correspondences* between the electromagnetic waves (which have the speed c), the microparticles, and the macroparticles produce the expansion of galaxies! As we know, the Big Bang took place approximately 13.8 billions years ago. The Big Bang generated a kind of “explosion” which became cooler and cooler and after 380.000 years ago, the first photons and electromagnetic waves started to escape from that cooler and cooler “explosion”. Therefore, the electromagnetic waves were free to run in all directions with the speed of light, c. More exactly, there was an electromagnetic field which started to moved in all directions with speed c from different points that corresponded to the Big Bangs. The electromagnetic waves interacted among them and these interactions produced parts of the waves to become more and more curved. Exactly these “curves” of the electromagnetic waves (which represent the filed-EW having the speed c) corresponded to the microparticles (which represent the micro-EW). The microparticles “composed” (correspond to) the planets which “formed” the galaxies. The planets have ontologies, the galaxies do not have ontologies, within the macro-EW. (See our previous works). The essential point is that the electromagnetic fields had the speed c (i.e., the straight electromagnetic waves have the speed c) while the corresponded microparticles (because of their masses) had much less speed. Since Big Bang, because of these *correspondences*, the speeds of the corresponding microparticles (and the corresponding planets) has continuously increased. This is the direct answer to the dark energy: the speed of galaxies has continuously increased just because of the correspondences between the waves, the microparticles and the macroparticles (galaxies)! So, there is no “dark energy” at all in the “Universe”…

A microparticle (with normal speed, much less than c – obviously, not photons) corresponds to a part of a “curved” electromagnetic wave (the straight electromagnetic wave has the speed c). More exactly, the microparticle corresponds to the “curved” part of the wave. Again, such “curves” (parts of the wave) appeared, probably, because of the interactions between different electromagnetic waves. Essential, a “curve” moves through the electromagnetic wave with the speed of the microparticle. The straight electromagnetic wave, however, moves with the speed c. Again, the entire wave corresponds to the microparticle, but much part of this correspondence is given by this “curve”. The speed of this “curve” tends towards c just because it is part of the straight electromagnetic wave which moves with speed c! Obviously, the curved of the electromagnetic wave (and the corresponding particle) will never reach c because *only a straight electromagnetic wave has c*. Because of this correspondence, the speed of the microparticle increases continuously, but this increases cannot be noticed at the “level” of the microparticle, (the microparticle is too small for our measurement apparatus, and some microparticles have other directions of movement).

**We emphasize that during the increase of the speed of the “galaxies”, the corresponding electromagnetic waves become more and more straight; in the end, maybe the microparticles will disappear just because of the straighten of the waves!** Because a planet corresponds to many microparticles, the increase of the speed of the microparticles can be noticed in the increase of the speed of galaxies! In this context, we introduce two kinds of correspondence as example of supporting the correspondence between the waves, the microparticles and the macroparticles.

(1) Your body (a macro-entity) sits on a bed and does not move. The corresponding microparticles move on small distances (the microparticles and these distances correspond to your body). However, these microparticles correspond to certain electromagnetic waves which moves with the speed of light, c. At one moment, your body moves from the bed and stands up. The corresponding electromagnetic waves continuous move with the speed of light, c. The corresponding microparticles (even if they continuous move before your body moves out of bed), they also move (through the correspondences) in correspondence with your body which stands up from the bed. Without the moving of the body, such movements of the microparticles would not exist. However, we have to recall that the microparticles do not exist for the macroparticles, therefore there is no “causality” between the microparticles and the macroparticles. The same situation is for many correspondences between the electromagnetic waves, the microparticles, and the macroparticles. There is no causality between the electromagnetic waves/fields and the galaxies (since one set of entities do not exist for the other set of entities), but there are certain correspondences between them. This is the reason, the electromagnetic waves (speed c), through correspondence, “expands” the galaxies (increase their speeds). The “expansion of the Universe” is due to the speed of the electromagnetic waves which become more and more straight, the correspondent microparticles increase their speed and the corresponding galaxies expand.

(2) You keep your both hands on a table. At one moment, your self decide to move right hand, and in the next second, your right hands moves. Eliminating the self from discussion, who did move your hand? The eliminative materialists would claim that your brain moved your hand. Our question is: who “decided” to move your right hand? Their answer would be: the brain. Our answer is: the self/mind decided to “move” parts of itself (the image of right hand placed in the mind-EW) which correspond with the hand (part of the body, a macro-entity belonging to the macro-EW). The “decisions” do not exist in the brain, only certain neuronal activation and chemical reactions (which correspond with your decisions), no more or less.

In this context, maybe we can conclude that dark matter/energy does not exist, and the increase of the speed of galaxies is due to the *correspondences* between the planets (that form the galaxies), the microparticles (with particular speeds and various directions) and the electromagnetic field/waves (with speed c in all directions with the centers in many Big Bangs). We repeat, maybe the “curves” becomes more and more straight and this is the reason the speed of the curves of the electromagnetic waves continuously increase. So, the galaxies are in expansion because of their correspondences with the electromagnetic field (speed c). It is completely wrong to believe that “as space expands, more dark energy is created” since, indeed, the “space” is created (ontologically, space does not exist at all), but dark mater does not increase at all: that “something” which belongs to the mega-EW corresponds to “nothing” which is quite “constant” in the macro-EW. It is not the “energy (“dark energy”) related to “space”, as many people believe in, but it is about “correspondence”![[271]](#footnote-271) For instance, the “space” of the macro-EW increases constantly (the “universe” expands continuously), therefore the density of normal matter constantly decreases. However, it is well accepted that dark matter remains constantly. Obviously, it is exactly the *correspondence* which remains constant, i.e., it is “nothing” (which “belongs” to the macro-EW) which remains constant. What would be the status of “nothing” if not “constant”? Only “constant”, this is, the only alternative for “nothing” which belongs to the macro-EW which corresponds to “something” (which belongs to the mega-EW). This “something” does not exist for any entity/process which belongs to the macro-EW, therefore we have “nothing” which is quite “constant”, even the “space” constantly “increases”. We can claim that if the volume continuously increases, the energy increases such as the “density energy” (of dark energy) remains constant (i.e., the energy is growing with the volume/space). Within the unicorn world, this idea seems to be quite correct, but within the EDWs perspective this idea is quite wrong. The energy (dark energy) does not increase at all. It remains “constant” because it is about the “correspondence” which is always constant because “correspondence” is an abstract notion (one EW does not exist for any EDW, therefore “correspondence” is an abstract notion, it does not refer to something which really exist). It is not energy “associated” with “space”, but it is something which corresponds to nothing. Maybe we can talk about an “energy field”, *“quintessence”,* which belongs to the mega-EW, but not to the macro-EW.

Today, there are several reasons for supporting the Big Bang, the phenomenon who did take place approximately 13.78 or 13.82 billions years ago. From our viewpoint, exactly as the gravity does not exist for the electron (there are no “gravitons”), but the “indirect effects” of “gravitation” (the curved “spacetime”) exist for the microparticles.[[272]](#footnote-272) Important is that the cosmologists believe that a star appeared with other planets that “formed in a flattened disk surrounding it”. (Bennett et al. 2010) This idea mirrors exactly the existence of the mega-entities. A galaxy (no ontology) (composed by planets with ontological status in the macro-EW and the “empty space” among them) corresponds to a mega-entity which belongs to the mega-EW. In the same manner, an amalgam of microparticles and the empty spaces between them “composed” a table/planet! Exactly as a microparticle (an electron, for instance) cannot “perceive”/interact with a table (because the table does not exist for the electron), we cannot perceive/interact with a “mega-entity”. The mega-entity rotates exactly as a macro-disk rotates in the macro-EW. The external limits of the disc rotates with much greater speed that its center. This analogy is very approximate because the spiral galaxies, for instance, “do not spin as if they were solid bodies (like, for example, a spinning top), with velocities proportional to distance from the center), and neither do they mimic the motion of the planets around the Sun, where velocity decreases with distance”. (Mazura and Le Brun 2009, p. 21) The “disk” in the mega-EW is not exactly like a disk in the macro-EW: there are different properties of these two disks (the macro-disc and the mega-disc), but we are unable to identify the properties of the mega-disk. In 2007, Gabriel Vacariu wrote a paper about Kant’s philosophy, philosophy of the last 100 years and EDWs perspective. The last footnote of that paper is the following:

I want to briefly analyze a Ptolemaic epicycle constructed among others within the unicorn-world in contemporary physics. It is about dark matter and dark energy. Let us consider some EDWs: at least one micro-EW (with microparticles and their interactions), macro-EW (with microparticles like tables, stones, individual planets and their E interactions), macro-macro-EW (with galaxies and their E interactions). From an EDWs perspective, the galaxies seem to be E entities that are different then the tables, stones and individual planets. In the same way as an electron does not exist in the macro-EW, a planet does not exist in the macro-macro-EW. Between galaxies, probably there are certain E interactions (E laws) that are different then the E laws between individual planets, stones and tables. Within the unicorn-world, at ‘macro-level’, dominated by the macroscopic laws, for solving the anomaly that the “universe” expands faster and faster (i.e., the distances between the galaxies increase faster and faster) we invented such empty notions like dark matter and dark energy. Obviously, there are other EDWs then those I mentioned above. The *existence* of EDWs does not depend on our conditions of observation but on the interactions between ED entities. With new tools of observation, we discover (we do not create) new EDWs. To answer the question, “How many EDWs exist?”, we need heuristic and scientific methods. Therefore, this is a scientific and not philosophical problem. However, following Friedman (with his meta-paradigms) we can now return, with the EDWs perspective, to the long forgotten image of philosophy that was guiding the science. (Vacariu 2007, p. 17)

The reader can understand that Gabriel Vacariu furnished the solutions for dark matter and dark energy even in 2007! We recall that there are no “causation” (that would require direct relationships) between the ED entities which belong to two EDWs, since the entities from an EW do not exist for the entities which belong to an EDW. The entities which belong to the mega-EW do not cause “something” to the entities which belong to the macro-EW (since one EW does not exist for any EDW). We can talk only about the correspondences between the ED entities which belong to the EDWs. However, from indirect observations, we can conclude that the dark matter (the mega-entities) really exists in the mega-EW. If the microentities and the macroentities really exist (in EDWs), nothing can stop to think of the existence of the mega-entities (which exist in the mega-EW), but these mega-entities do not exist for the macro-entities like planets and our bodies (which correspond to our minds).

We return to our analogy between a macro-disk and the corresponding amalgam of microparticles: if a micro-observer observes the rotation of an amalgam of microparticles (without being able of observing the macro-disk), then that micro-observer would introduce certain “dark matter” for explaining the rotation of the microparticles. For the micro-observer, the macro-disk cannot even exist! We can continue the analogy introducing the rotation of a planet which corresponds to a huge amalgam of microparticles. The micro-observer would need to introduce the dark matter/energy for explaining the rotation of that amalgam of microparticles!

We make an important analogy regarding these two relationships, “gravity-microparticles” and “dark matter/energy-macroparticles”: gravity (the curvature of spacetime which “belongs” to the macro-EW) for the microparticles (which belong to the micro-EW) is quite similar to dark matter and dark energy (that belong to the mega-EW) for the macro-entities (which belong to the macro-EW). A microparticle (a photon, for instance) does not “perceive”/interact with a planet, therefore gravity does not exist for the photon. However, in its trajectory, the photon follows the “curvature of space-time” produced by a planet/galaxy. The photon would “think”: “It has to be a *dark matter, a dark halo* that surrounds this huge amalgam of microparticles!” The photon cannot even perceive that the “space-time” is curved. We can think that there is a halo of dark matter that surrounds a galaxy, but exactly in the same way an electron which moves around the proton would ask about certain “gravitational force”, a planet would ask about the “dark matter” that surrounds a galaxy. Exactly as “gravitation” does not exist for photons, dark matter does not exist for planets (and their galaxies). However, the photons follow the spatio-temporal paths (curved space) between planets, even if a planet does not exist for a photon. From the viewpoint of photons, we can think of certain microparticles (gravitons) which produce this curvature, but gravitons do not really exist. In the same way, galaxies are “biased” with respect to the dark matter, but dark matter does not exist for the planets.[[273]](#footnote-273) The galaxies (which do not have any ontological status within the macro-EW, where only the planets have) correspond to the mega-entities which belong to the mega-EW![[274]](#footnote-274)

Within the EDWs perspective, what does it mean the “density” of dark matter? It seems that there are some entities/interactions which belong to an EDW, an EW does not exist for any EDW, therefore, the density of dark energy is constant. The entities and processes which belong to the EDWs only correspond and these correspondences are always “constant” since, for instance, in the macro-EW, where there are the “galaxies” (no ontological status), planets, and “nothing” and all these correspond to “something” which belong to an EDW (the mega-EW, for instance)! It has to be clear that the dark matter/energy belongs to an EDW than the micro-EW (microparticles), the macro-EW (planets) and the field-EW (electromagnetic fields/waves), therefore, dark matter cannot interact with planets, microparticles and electromagnetic waves.[[275]](#footnote-275)

**6.3 Recent cosmological results which strongly support the being of the mega-EW[[276]](#footnote-276)**

In a quite recent article, Hutsemékers et al. indicated that the “quasar spin axes are likely parallel to their host large-scale structures”. (Hutsemékers et al., 2018, p. 1)

Assuming that quasar polarization is either parallel or perpendicular to the accretion disk axis as a function of inclination, as observed in lower luminosity AGN, and considering that broader emission lines originate from quasars seen at higher inclinations, we inferred that quasar spin axes are likely parallel to their host large-scale structures. Galaxy spin axes are known to align with large-scale structures such as cosmic filaments (e.g., Tempel and Libeskind 2013, Zhang et al. 2013, and references therein). Till now, such alignments are detected up to redshift z ∼ 0.6 at scales ≤ 100 Mpc (Li et al. 2013).” (Hutsemékers et al., p. 5)[[277]](#footnote-277)

Since coherent orientations of quasar polarization vectors, and then quasar axes, are found on scales larger than 500 Mpc, our results might also provide an explanation to the very large scale polarization alignments reported in Papers I-III. In this case those alignments would be intrinsic and not due to a modification of the polarization along the line of sight. The existence of correlations in quasar axes over such extreme scales would constitute a serious anomaly for the cosmological principle. (Hutsemékers et al., p. 5)[[278]](#footnote-278)

Maybe, these “host large scale structure” or “cosmic filaments” mirror the existence of the mega-EW. However, if these “cosmic filaments” refer to certain “intergalactic gas filaments” (the baryonic matter), than it is not about the mega-EW.[[279]](#footnote-279) In principle, the mega-entities (the mega-EW) cannot be directly observed by the human beings and their macro-tools! Anyway, the “cosmological principles” have to be changed, since the “Universe/world” does not exist, but the EDWs are. The scientists have noticed that some “galaxies” move together in odd and often unexplained patterns, as if they are connected by a vast unseen force. It is suppose that dark matter was less influential in the first period after the “Big Bang”.[[280]](#footnote-280)

“Galaxies” within a few million light years of each other can gravitationally affect each other in predictable ways, but scientists have observed mysterious patterns between distant galaxies that transcend those local interactions. These discoveries hint at the enigmatic influence of so-called ‘large-scale structures’ which, as the name suggests, are the biggest known objects in the universe. These dim structures are made of hydrogen gas and dark matter and take the form of filaments, sheets, and knots that link galaxies in a vast network called the cosmic web… (Ferreira, 2019)

The “unseen force” has to be some entities or processes which belong to the mega-EW, but we are unable to notice them because they do not exist for the macro-entities (for our bodies and our instruments of observation, for instance). The “cosmic web” has to be something which belongs to the mega-EW, but not to the macro-EW. We emphasize again that the galaxies have no ontological status in the macro-EW, but certain “amalgams of galaxies” correspond to the mega-entities which belong to the mega-EW!

‘That’s actually the reason why everybody is always studying these large-scale structures,’ said Noam Libeskind, a cosmographer at the Leibniz-Institut for Astrophysics (AIP) in Germany, in a call. ‘It’s a way of probing and constraining the laws of gravity and the nature of matter, dark matter, dark energy, and the universe.’… For instance, a study published in *The Astrophysical Journal* in October found that hundreds of galaxies were rotating in sync with the motions of galaxies that were tens of millions of light years away…. Led by Damien Hutsemékers, an astronomer at the University of Liège in Belgium, the researchers were able to observe this eerie synchronicity by watching the universe when it was only a few billion years old, using the Very Large Telescope (VLT) in Chile. The observations recorded the polarization of light from nearly 100 quasars, which the team then used to reconstruct the geometry and alignment of the black holes at their cores. The results showed that the rotation axes of 19 quasars in this group were parallel, despite the fact that they were separated by several billion light years.[[281]](#footnote-281) (Ferreira, 2019)[[282]](#footnote-282)

Again, all these statements supports the existence of certain mega-entities/processes which belong to the mega-EW. The secret of the “synchronized galaxies” is the existence of EDWs, i.e., the existence of certain mega-entities which belong to the mega-EW. We know, for certainty, that the wave-EW, the micro-EW, and the macro-EW really are. Because of the same reasons, the mega-EW should be! Nothing stop us to think that there has been a chain of EDWs, from field-EW, and micro-EW to the macro-EW and mega-EW. *If the dark matter (mega-matter) really exists*, then this matter exists in the mega-EW and has *indirect influence* (through *correspondences*)[[283]](#footnote-283) on the macro-entities and the macro-processes (the trajectories of planets, for instance) which belong to the macro-EW.[[284]](#footnote-284)

Everybody believes in the “standard” Lambda-CDM model of cosmology: the total mass-energy of the “Universe” is 5% ordinary matter and energy, 27% dark matter and 68% of dark energy.[[285]](#footnote-285) Obviously, this idea is constructed within the unicorn world! We strongly emphasize again: the “matter” from the micro-EW does not exist for the “matter” from the macro-EW, the matter from the macro-EW does not exist for the matter from the mega-EW! (The same idea is available for “energy”) Therefore it is meaningless to check for the microparticles which form the “dark matter”![[286]](#footnote-286) An electron will never be able to interact with a planet just because the planet does not exist for the electron! The reader trying to discover the dark matter has to imagine as being a photon (the micro-EW) searching the reason of its “curbed trajectory” near a huge amalgam of microparticles (which corresponds with a planet in the macro-EW). Its curbed trajectory is due to the gravity of the planet, but the planet does not exist for the photon… therefore, this “curved trajectory” has been created by a “dark matter”, but not by the microparticles!

With the EDWs perspective (2002-2005-2007-2008), we generated the new framework of a new *Philosophiae Naturalis* necessary for (1) the main problems of quantum mechanics of the last 100 years (2) the relationship between Einstein’s general relativity and quantum mechanics (3) we furnished a new explanation of dark matter/energy (which presuppose the existence of mega-entities that belong to the mega-EW)[[287]](#footnote-287) (4) many problems of Cosmology today introducing the missing ED ontologies for many ED entities that belong to the EDWs! (See our previous works).[[288]](#footnote-288) The real great problems are hard not only because they require a “crazy new idea” (see the motto), but they require a new paradigm of thinking. Dark matter and many other problems of Cosmology today (Physics, in general) require the replacement of the “Universe” (the “unicorn world”) with our new paradigm of thinking, the EDWs perspective![[289]](#footnote-289)

**6.4 A new alternative for dark energy and dark matter (the mega-EW excluded)**

Within the EDWs perspective, we furnish a new framework for dark energy, different than that which have written in the previous sections.

The galaxies are an enormous amount of planets, and each planet (a macro-entity) corresponds to a huge amalgam of microparticles. Each microparticle corresponds to an electromagnetic wave. We have to be aware that a microscopic particle corresponds to a “curved” electromagnetic wave (not a “straight” wave), therefore the speed of that microparticle cannot be c! Knowing that *the energy tends to move from being concentrated to being dispersed,* we can assume that a curved electromagnetic wave tends to become straight wave just because the straight line of an electromagnetic wave is its natural status. Therefore, because of the correspondence between an electromagnetic wave (speed c) and a microparticle (for instance an “atom”), the speed of the microparticle tends toward the speed of the electromagnetic wave, c. So, indirectly through this correspondence, each atom has an increasing speed toward c! Obviously, because of its mass, the atom will never reach the speed c, but its speed is increasing exactly through this correspondence.

We can think that the planet has a corresponding wave, and because of this correspondence, the speed of the planet tends toward the corresponding speed of the electromagnetic wave, c. Or we can think that the “galaxy” has a corresponding electromagnetic wave (speed c), and the speed of the galaxy tends toward c. We recall certain quite known principles in physics: the second principle of thermodynamics which asserts that the direction of certain natural processes runs only in one direction (not reversible) the heat always moves from a hotter object toward a colder one; *the energy tends to move from being concentrated to being dispersed; the entropy cannot decrease in any system, i.e, the entropy is always increasing.* (About thermodynamics and the EDWs perspective, see Vacariu and Vacariu 2017) We emphasize here that “entropy” means entropy for us, the human being, who judge certain phenomena (that we perceive indirectly). Maybe from the viewpoint of an electromagnetic field, its continuous “extension” is in fact a movement from disorder to order! Imagine a lake without any wave. You will judge the water of the lake is in a “stable order” (not macro-movement). If you draw a stone in that lake, you will disturb the water in a particular region of that lake (“fluctuations in equilibrium”). In that moment, you will judge, the water is in “disorder” but how do we fit “disorder” with “fluctuations in equilibrium”? Using EDWs, only. Anyway, after few seconds, the water will return to its previous state, that of “stable order”, in equilibrium (not macro-movement). In analogy, maybe the electromagnetic field tends from “disorder” (after the Big Bang and plasma) to “order” in analogy with the water from that lake. So, “the entropy” has to be re-defined from the electromagnetic field’s viewpoint: t*he electromagnetic field always moves toward a stable “order” (“equilibrium”)*, i.e., a *straight field* and not a curved one (as it was after the Big Bang and plasma). Obviously, from the viewpoint of a human body or a planet (both macro-entities), the movement of an electromagnetic field is “entropic”, i.e., its moves toward “disorder” for any macro-entity. To the second principle of thermodynamics, we add another principle, the speed of light, c, is constant. This speed is constant, this is the “stable order” for any electromagnetic wave. (For a macro-entity, this speed would be a “disorder”…). Then, through analogy to these principles, we will introduce a new principle related to EDWs, dark energy and dark matter, the principle of “*correspondence toward equilibrium*”:

*The energy (the field-EW) tries to be “dispersed”, i.e., to move toward “equilibrium”, the entropy (“order” for an electromagnetic field) always increases, therefore, the matters (the micro-matters, the macro-matters) corresponding to energy tend to be dispersed. All the microparticles correspond to particular electromagnetic waves (speed c), therefore, in some particular situations, all these micro-entities tend to move toward the speed of light. Since the microparticles correspond to the macroparticles, then, in some particular situations, all the macroparticles tend toward the speed of light.*

If we apply this principle to the galaxies (which do not have any ontological status, at least from our viewpoint[[290]](#footnote-290)) formed by many planets which do have an ontological status (the macro-EW) and correspond to the microparticles (the micro-EW) which correspond to the waves (field-EW), we can understand why the “Universe” is in expansion: because of the above principle, the principle of “correspondence toward *equilibrium*”. In other words, naturally, a planet (within a “galaxy”) has an increasing speed. The Earth moves around the Sun just because the “gravity” is much stronger than this tendency. However, the solar system belongs to a galaxy which its speed is increasing. This increasing is due to the principle of “correspondence toward *equilibrium*”. It means that the directions of the *majority* of microparticles of a “galaxy” tend toward the same direction, therefore the “galaxy” has a direction.

Anyway, we strongly emphasize that, it does not matter which alternative will be confirmed by certain experimental results, we do not need “more energy” to explain the “expansion of the Universe”! We have not to forget that one EW does not exist for any EDW, but even in this case, there are certain *correspondences* (indirect influences) between the ED entities which belong to the EDWs. A human body can moves in the macro-EW exactly as as the corresponding mind wishes and the electromagnetic waves does not directly influences that motion. The problem is that, probably, even the motion of a body is indirectly influenced by the speed of the electromagnetic waves (corresponding to the microparticles which correspond to that body), but these “indirect influences” are so small that we are unable to perceive them. However, we can notice these effects of these correspondences (“indirect influences”) at the galaxies’ “level”![[291]](#footnote-291) In our opinion, it seems that this alternative is the best one for explaining the existence of dark energy.

In our previous works, we introduce the alternative of “mega-EW” for dark matter: we do not need more “matter” since in the mega-EW, the macro-matter (the same matter from the macro-EW which is the same matter from the micro-EW which is the same matter from the field-EW) represent the mega-entitites! However, in this new alternative, we can exclude the mega-EW from our explanation. In this new alternative, the “glue” of a galaxy can be furnish by the combination of different correspondences (no ontologies) between the *continuous* electromagnetic field (the field-EW), the microparticles (the micro-EW) and the planets (the macro-EW)! Exactly such combinations would represent the dark matter. The “continuity” of electromagnetic field (the entire “Universe”) is limited by the “discreetness” of planets which represent the “galaxy” (no ontology). Each planet corresponds to an huge amalgam of microparticles, but each microparticle corresponds to an electromagnetic waves (speed c)! In other words, the galaxy moves like an “ideal” CD disk just because the planets and the space among them correspond to a continuous electromagnetic field, which it is spreads in the entire “Universe. So, the planets and the space among them would represent an “ideal disk” (it has no ontology like in the mega-EW). The positions of the planets being at the margin of galaxy indicate the “margins” of that “ideal disc”. The electromagnetic field is just the “glue” for the corresponding planets and “empty space” among them. We recall, in the field-EW, there are neither planets, nor microparticles, nor “empty space”, but just an electromagnetic field with different parameters for the “straight” waves (corresponding to that empty space) and the “curved” waves (corresponding to the microparticles which correspond to the planet).

*We strongly emphasize that, even if the any kind of correspondence does not have any ontology, the relationship between an electromagnetic field (the field-EW) and an amalgam of microparticles is different than that we can conceptualize!* In other words, the relationships between the electromagnetic field, the microparticles and the macroparticles is different than we can even think! **For an electromagnetic field, for instance, there are other EDWs than there are for all human beings: even if the macro-EW and the micro-EW do not exist for the field-EW, these EDWs do not even exist as EDWs for the electromagnetic waves, but there are other EDWs than these two EDWs!** (The physicists have to verify this alternative…)[[292]](#footnote-292) The existence of the field-EW, the micro-EW and the macro-EW, for instance, are only from the viewpoint of human beings. From the “viewpoints” of ED entities, there are “different sets of EDWs”!

**6.5 The Martian, dark matter and dark energy**

According to Siegel

Dark matter — despite the enormous indirect evidence for it — sounds like a colossal misunderstanding. It’s clear that data from

* gravitational lensing,
* galaxy clustering,
* individual galaxies,
* and the cosmic microwave background,

all require masses that don't interact electromagnetically. However, a longstanding alternative suggests modifying gravity could explain them without dark matter. (Siegal 2020)

Introducing different photos (realized by different teams), Siegal indicates that the investigation of two cluster galaxies colliding should heat up and emit X-rays. Analyzing those photons, Siegal declares that if

there were no dark matter, this gas, comprising the majority of normal matter, should be the primary source of gravitational lensing. Instead, gravitational lensing maps indicate that most of the mass is displaced from the normal matter… Only if gravity is non-local, or gravitating where the matter isn't, could the Universe not contain dark matter. But in pre-merger clusters, [we clearly see that gravity is local](https://www.forbes.com/sites/startswithabang/2017/11/09/the-bullet-cluster-proves-dark-matter-exists-but-not-for-the-reason-most-physicists-think/): matter and gravity line up. Colliding clusters cannot obey different gravitational rules from non-colliding ones. Inescapably, dark matter must therefore exist. (Siegal 2020)

From our viewpoint, the “most mass” that is “displaced from the normal matter” is not a “dark matter” within the macro-EW, but a “mega-matter” within the mega-EW. The gravity of the clusters is not “non-local”, there is no “gravitation” “where the matter isn’t”, but but there are these “mega-entities” which do not exist for the “clusters” (in reality the planets which compose the galaxies) which belong to the macro-EW. Obviously, the “colliding clusters cannot obey different gravitational” laws from the non-colliding one, but the mega-entities (that correspond to the clusters of galaxies, in this case) belong to the mega-EW (with different entities and laws than the macro-EW). “Dark matter” does not exist in the macro-EW, but only in the mega-EW!

In a documentary 2014 (BBC)[[293]](#footnote-293), Prof. Ellis created an empirical experiment to illustrate, through analogy, dark matter. Within a vase, there is a mechanism producing whirlpool. Using a pipe, Prof. Ellis throws some bits of fluorescent liquid on the whirlpool. The image produced is quite similar to a galaxy (mirrored by fluorescent liquid) within dark matter (mirrored by water). From our viewpoint, the image mirrors perfectly the relationship between the dark matter and the galaxy (the “normal” macroscopic matter).

We can imagine again a Martian having the size of an electron with advanced knowledge about quantum mechanics. The very little Martian has no tools to observe the macro-objects. Therefore, these entities do not even exist for the little creature. At one moment, the Martian observes two conglomerates of microparticles quite closed situated in a static positions. There are only the electrons moving around the protons. (In fact, these amalgams correspond to a table and a human organism.) The Martian could explain certain phenomena using quantum mechanics without any problem. At one moment, the human organism moves around the table. What does the Martian observe? An amalgam of particles moving around the other amalgam of particles, but the Martian has no idea what “forces” acted on the first amalgam, since the quantum forces could not produce such movements. Using the entire knowledge furnished by quantum mechanics, the Martian (a genius) has no idea how to explain that movement. Therefore, the Martian feels free to introduce the “dark matter” and the “dark energy”.[[294]](#footnote-294)

**6.6 An interrelated explanation of some irreversible thermodynamics processes, quantum nonlocality, dark energy and dark matter**

In this chapter, we want to indicate that the quantum nonlocality, certain thermodynamical processes (temperature and heat), dark energy and dark matter can be explained using the correspodences between certain well-now EDWs: the field-EW, the micro-EW and the macro-EW. In this way, we want to eliminate the empty notions of dark matter and dark energy from Physics.

**6.6.1 The correspondences between some thermodynamics processes (temperature and heat), quantum nonlocality and dark energy**

From our EDWs perspective, we try to indicate the correspondences between certain particular phenomena (ED entities and ED processes) which belong to the EWDs and involve particular theories: the macro-objects and their temperature (Thermodynamics, the macro-EW), the microparticles and their motions plus the corresponding electromagnetic fields (Quantum Mechanics, the micro-EW and the field-EW), and dark energy (our EDWs perspective [9], probably, the macro-macro-EW[[295]](#footnote-295) and/or the pre-Big-Bang-EW).[[296]](#footnote-296) Through identifying these correspondences, we can explain the reason why the laws of thermodynamics are so certain (and irreversible), the quantum nonlocality (see our work [1-12]), the spread of the galaxies (dark energy, see our work [9] or our work [12]) and the correspondences and evolution of the EDWs.

*Thermodynamics* is the "study of the transformation of energy, particularly of heat, into work". [13] It refers to the laws of heat motion and the conversion of heat into other types of energy. Thermodynamics studies the way in which a system moves from one state to another state. It has to be clear that classical thermodynamics and statistical thermodynamics explain the entities/processes and their interactions which belong to the EDWs: classical thermodynamics refers to the macro-objects (the macro-EW), statistical thermodynamics refers to the microparticles (the micro-EW). (see [10]) Before investigating the main "laws" of thermodynamics, we have to specify that these "laws" aren’t "real" laws, but some unproved principles ("axioms"). Atkins describes the correspondence between the temperature (a property of macro-objects in the macro-EW) and some notions of *Quantum Mechanics*: the temperature corresponds to the energies of atoms (the micro-EW) on different "shelves" of energies (β parameter).

shelves fixed at different heights on a wall, the shelves representing the allowed energy states and their heights the allowed energies. The nature of these energies is immaterial: they may correspond, for instance, to the translational, rotational, or vibrational motion of molecules… the most probable distribution of populations (the numbers of balls that land on each shelf) for a large number of throws, subject to the requirement that the total energy has a particular value, can be expressed in terms of that single parameter β. The precise form of the distribution of the molecules over their allowed states, or the balls over the shelves, is called the *Boltzmann distribution.* ([14], p. 10)[[297]](#footnote-297)

Essentially, the "nature of these energies is immaterial". Obviously, within the unicorn word, Atkins introduces the notion of "immaterial". In fact, we have, on one side, the energies (fields, waves etc. but, as we will see below, "energy" is quite difficult to be defined[[298]](#footnote-298)), on the other side, the molecules (atoms, microparticles), finally the temperature (property of the macro-objects) and the "correspondences" between the entities/processes which belong to the EDWs: the field/wave-EW (or energy-EW), the micro-EW, and the macro-EW. Related to temperature (the macro-objects) it is this parameter β (Boltzmann distribution) explains the corresponding micro-entities (the micro-EW). Atkins defines "temperature" as

*the parameter that tells us the most probable distribution of populations of molecules over the available states of a system at equilibrium*. When the temperature is high (β low), many states have significant populations; when the temperature is low (β high), only the states close to the lowest state have significant populations… Temperature, then, is just *a parameter that summarizes the relative populations of energy levels in a system at equilibrium.* ([14], p. 11)

If "temperature" is just a "parameter", does it refer to something that really exists? In other words, does "temperature" have an ontological status? Again, it has to be very clear that the temperature is a *property* of some particular entities[[299]](#footnote-299) which belong to the macro-EW and *corresponds* to certain properties of entities (molecules, atoms) which belong to the micro-EW. The parameter β (the micro-EW) corresponds (in the opposite direction) to temperature (macro-EW). If "temperature" is "just a parameter that summarizes the relative populations of energy levels", then the temperature of our bodies (usually around 37° Celsius) is just an "approximation" of the motion of microparticles and even our body (brain) does not really exist.

McEnvoy and Zarate present "Thermodynamics" before "Quantum Mechanics". Among other things, they write about the "principle of conservation energy". ([16] , p. 17) Within the EDWs perspective, we have to be aware that the principle of conservation energy has to be somehow changed. In a particular EW, a system can loose some energy in that EW, but this energy can correspond (in other format) to something else which belongs to an EDW. Also, the essential notion of "entropy" (a particular case being about heat: heat transferred from a hot body to a cold one) ([16], p. 18) has to be explained within the EDWs perspective. (See our work [10])

The entropy of an isolated system always increases, reaching a maximum at thermal equilibrium, *i.e.* when all bodies in the system are at the same temperature. ([16], p. 18)

This famous law has to be re-interpreted within the EDWs perspective. We can consider a particular case just a system formed by the macroscopic bodies. The second thermodynamic law ("the heat flows from the hot body to the cold body", an irreversible process) has to be translated within the EDWs perspective. We explain the "entropy" for the electromagnetic waves (the field-EW): the electromagnetic waves (speed c, always) tend to become straighter and straighter because a straight electromagnetic wave is natural, while a curved electromagnetic wave needed a cause to become "curved". Probably, there is a phenomenon from the pre-Big-Bang which corresponds to the straight electromagnetic wave. Between these EDWs, there is also the micro-EW. The EDWs perspective furnishes neither a classical view, nor a quantum view (both constructed within the "unicorn-world") about quantum processes, but a new perspective on the eternal classical problems of quantum mechanics (QM). The behavior of the microparticles correspond to the behavior of the electromagnetic waves (the field-EW) and the macro-bodies (the macro-EW). Thus, the correspondences have to be equivalent to some previous scientific laws constructed within the unicorn world. About J. C. Maxwell (an atomist) referring to his atomistic view about "kinetic theory of gases", we have these two statements:

- "But Maxwell’s analysis, based on Newton’s mechanics, showed that temperature is a measured of the microscopic *mean squared velocity* of the molecules."

- "Heat is thus caused by the ceaseless random motion of atoms." ([16], p. 22)

From our viewpoint, the temperature is a feature of the macroscopic bodies/entities (human body has a temperature), while the motions of microparticles (for instance, "atoms") belong to the micro-EW. The "fire" and the body belong to the macro-EW, but in the same "place", at the same "time", there are the microparticles (the micro-EW) and the radiations (the electromagnetic field-EW). The authors start this chapter with a very problematic sentence: "Each involved the interaction of radiation and matter as reported by reliable, experimental scientists. The measurements were accurate and reproducible, yet paradoxical…" ([16], p. 26) Obviously, we have to strongly emphasize that "radiation" and "matter" belong to the EDWs, and even "matter" in general belongs to the EDWs. With this wrong sentence (constructed within the unicorn world), we can understand the wrong way of QM, even at the beginning. Certain phenomena like the black-body radiation, the photoelectric effect, the bright line spectra, and Zeeman effect can be explained using the EDWs perspective (see our previous works): it is just the *correspondence* between the microparticle (the micro-EW) and the electromagnetic wave (the field-EW).

In 1923, de Broglie "discovered" that any microparticles needed to be *associated* with an electromagnetic wave (more exactly, it would be the "wrapped up" of a small part of that wave which better corresponds with that microparticle): "It seems certain to me that the propagation of a wave is associated with the motion of a particle of any sort… photon, electron, proton or any other." (de Broglie) (in [16], p. 111) Obviously, in the micro-EW, each microparticle corresponds to a particular "wrapped up" wave (all waves represent the field, that is the field-EW). Important is that, the next section has the title "An associated wave". Within the unicorn world, this expression has no meaning. De Broglie believes that these "waves I call ‘pilot’ waves which guide the particle in its motion" ([16], p. 112), but there are the "phase velocity of wave" and the "group velocity of wave packet" ([16], p. 113). A wave cannot "guide" the particle since the wave does not exist for the particle. De Broglie introduces the "pilot wave" that is always "attached" to or "associated" with a microparticle (an electron, for instance). (see [17], p. 223) What does it mean "attached" or "associated"? Both notions are wrong terms used by physicists working within the unicorn world. In reality, the notion has to be the "correspondence" between the electron and the pilot wave. The entire wave corresponds to the particle, but the particle corresponds, mainly, to the "wrapped up" part of the electromagnetic wave. If two microparticles (the micro-EW) are placed together, a coresponding electromagnetic wave (the field-EW) between them is established. If we move one particle in the micro-EW, at the same time, we move a part of that corresponding electromagnetic wave (indivisible entity), therefore, the other particle moves almost instantly just because of the correspondence between both microparticles and the electromagnetic wave. Through this correspondence, Gabriel Vacariu and Mihai Vacariu explained, very clearly, the famous (and old, 100 years) problem of "nonlocality" of certain processes from Quantum Mechanics. ([1-12])

In the same way, through the correspondences between the phenomena which belong to the macro-EW and the field-EW, we can explain not only the principles of Thermodynamics and but also the "*dark energy*": there is no "dark energy" somewhere, but only certain *correspondences (no ontological status!)* between the macro-entities (planets), the micro-particles and the electromagnetic waves (always having the speed c). An entire electromagnetic wave moves with speed c, the "wrapped up" part (inside it, the wave moves with speed c) corresponds mainly to a microparticle with a particular speed (obviously, not c). Because of this correspondence, the speed of that microparticle is constantly increasing up. The same argument is available for the speed of a planet (the macro-EW): from a galaxy, the speed of each planet corresponds to an amalgam of microparticles always associated with the corresponding electromagnetic wave (which always has the speed c). Because of their masses, neither the microparticle nor the planet could reach the speed c. However, because of the correspodences between the electromagnetic waves (speeds c), the microparticles and the planets, the planets increase continously their speed.[[300]](#footnote-300)

We have to recall that after 380.000 years after many Big Bangs (in his books, Gabriel Vacariu insisted in introducing many Big Bangs exactly for avoiding Guth's "inflation"), the first things that evaded from that plasma were the electromagnetic waves (all having speeds c). Always there have been certain correspondences between the speeds of the electromagnetic waves (speed c), the speeds of the microparticles (less than speed c, except the photons which had speed c) and the speeds of the planets (much less speed than the microparticles). Because of these correspodences, the planets increase continuously their speeds. Therefore, there is no dark energy. All galaxies moves in different directions with increasing speeds since the corresponding electromagnetic field moves in all directions with speed c. This natural motion of the electromagnetic field/wave (moving in all directions with speed c) (motion which appeared after the plasma became cooler, approximately 380.000 years after the Big Bangs) corresponds to a phenomena which belong to an EDW, probably, the pre-Big-Bang-EW. Knowing that *the energy tends to move from being concentrated to being dispersed,* we can assume that a curved, wrapped up electromagnetic wave tends to become straight wave just because the straight line of an electromagnetic wave is its "natural status". Therefore, because of the correspondence between an electromagnetic wave (speed c) and a microparticle (for instance an "atom"), the speed of the microparticle tends toward the speed of the electromagnetic wave, c. So, indirectly, through this correspondence, each microparticle has an increasing speed toward c. Obviously, because of its mass, any microparticle (except the photon) will never reach the speed c.

The second principle of thermodynamics asserts that the direction of certain natural processes runs only in one direction (not reversible) the heat always moves from a hotter object toward a colder one; the energy tends to move from being concentrated to being dispersed; the entropy cannot decrease in any system, i.e, the entropy is always increasing. We emphasize that here the "entropy" means entropy for us, the human being, who judge certain phenomena (that we perceive indirectly). Maybe from the viewpoint of an electromagnetic field, its continuous "extension" is in fact a movement from disorder to order. Imagine a water lake without any wave. You will judge the water of the lake is in a "stable order" (not any macro-movement). If you throw a stone in that lake, you will disturb the water in a particular region of that lake ("fluctuations in equilibrium"). In that moment, you will judge, the water is in "disorder", but how do we fit "disorder" with "fluctuations in equilibrium"? Only using the EDWs. Anyway, after few seconds, the water will return to its previous state, that of "stable order", in equilibrium (which exclude any macro-movement). In analogy with the water of that lake, maybe the electromagnetic field tends from "disorder" (after the Big Bang and plasma) to "order". So, "the entropy" has to be re-defined from the electromagnetic field’s viewpoint: in a free state, *the electromagnetic field always moves toward a stable "order" ("equilibrium")*, i.e., a *straight field* and not a curved or wrapped up one (as it was after the Big Bangs and plasma). Obviously, from the viewpoint of a human body or a planet (both macro-entities), the movement of an electromagnetic field is "entropic", i.e., its moves toward "disorder" for any macro-entity. To the second principle of thermodynamics, we add another principle, the speed of light, c, is constant. This speed is constant, this is the "stable order" for any electromagnetic wave. Then, through analogy to these principles, we will introduce a new principle related to the EDWs, dark energy (and dark matter), the principle of "*correspondence toward equilibrium*":

*The energy (the field-EW) tries to be "dispersed", i.e., to move toward "equilibrium", the entropy ("order" for an electromagnetic field) always increases, therefore, the matters (the micro-matters, the macro-matters) corresponding to energy tend to be dispersed. All the microparticles correspond to particular electromagnetic waves (speed c), therefore, in some particular situations, all these micro-entities tend to move toward the speed of light. Since the microparticles correspond to the macroparticles, then, in some particular situations, all the speeds of the macroparticles tend toward the speed of light (which cannot be reach by the macroparticles because of their macro-masses).*

After many "Big Bangs" (which took place at the same time, approximately 13.82 billions years ago), the cosmic background radiation had certain "irregularities" (i.e., "anisotropies") in its directional distributions ([18], p. 156) and these anisotropies indicates "how gravitational attractions led slightly denser than the average to grow" ([18], p. 156) which led, finally, to the formation of planets (which composed the galaxies). However, each planet corresponds to an huge amalgam of microparticles and each particle corresponds to an electromagnetic wave (all these waves have always the speed c!). The electromagnetic waves move in all directions (with speed c) since their electromagnetic field moves in all direction with speed c. Why an electromagnetic field moves in such way? Because it corresponds with certain phenomenon which belongs to an unknown EDWs (maybe the pre-Big-Bang-EW). When we produce a "fire", the corresponding electromagnetic field moves in all directions with speed c. Why? Because the nature of a fire (the nature of the electromagnetic fields) corresponds to a phenomena which belongs to an unknown EDW.

There are some physicists who, working within de Broglie’s approach, have used the notion of "correlation" or "association" between the wave (mainly the "wrapped up" part, more exactly, the entire wave) and the particle. Nevertheless, all physicists have been working within the unicorn world! Many physicists have believed that "the electron is *both* wave and particle", but this description has been constructed within the unicorn world and it has lead to certain strong ontological contradictions.[[301]](#footnote-301)

Duality wave-particle

A particle is described between the measurements only by its probability wave. The wave can have a process of interference with any other wave. At one measurement, we will find the particle localized in one place or another, with a probability furnished by its probability wave. Now there it is its corpuscular manifestation. ([17], p. 229)[[302]](#footnote-302)

With the EDWs perspective: the microparticle is not "described between measurements" "only" by its "probability wave". It would means that the particle does not exist between these measurements. Within the unicorn world, if the particle "exists between measurements", there would be obviously a strong ontological contradiction. Within the EDWs perspective, the "microparticle" is just a microparticle between our measurements because the microparticle has always been a microparticle before and after our measurements in its EW, the micro-EW. From our viewpoint, essentially, the electron, for instance, *corresponds* to the entire electromagnetic field which is spread[[303]](#footnote-303) in the entire "universe". Moreover, the electromagnetic wave is an *indivisible* entity, therefore, the electron corresponds to something which exists in the entire universe. Because of its correspondence, we can find the particle either on the Earth or on the Moon, with different probability (obviously, there are greater probability the microparticle to be in the place where it is the corresponding "node" or the "wrapped up" wave). Presura emphasizes an essential detail: an electromagnetic field can be *associated* with more particles (not only one), these microparticles are not classical balls, but discrete packets of energy placed in different places. ([17], p. 334) From the "theory of the field", we move to the "theory of particles". ([17], p. 336)

In reality, however, the particle is just a packet of energy of the field which represents it, the packet of energy that moves from one place to another… If we look with more attention, the "movement" of the particle does not happen, it is, better said, an illusion! The "movement" of the particle is then, in reality, the successive observations of the energy of this field in different places in space. All that exists is the field, according to Steven Weinberg... ([17], p. 338)

Within the unicorn world, the reductionists claim that the macro-objects (the table and the planet) do not really exist, but only the microparticles have ontological status. This framework would the one we called the "unicorn world". Within this framework, we have the so called "reductionism" that reduces everything that "apparently exists" to either microparticles or to neurons. The person who writes this chapter does not exist, but only an amalgam of microparticles, or better, an electromagnetic field (but in this case, who can we make the difference between two individuals places very close one to another? Also, the reductionists claim there is no "mind". We can talk only about neurons or microparticles that really exist. However, as we showed in our previous works, quantum gravity does not exist, so we cannot "reduce" a planet to its "microparticles.[[304]](#footnote-304) Therefore, the macro-objects really exist (in the macro-EW), an EDW than the micro-entities (the micro-EW). Within the EDWs perspective, on the contrary, temperature is really a property of the macro-entities (the body/macro-objects) that really have ontological status within the EDWs framework. We have to change a notion from Atkins’ following sentence: "temperature, and specifically β, is a parameter that expresses the equilibrium distribution of the molecules of a system over their available energy states" ([14], p. 13). This reductionism[[305]](#footnote-305) has to be replaced with the EDWs: β is a parameter which "corresponds" to the "distribution of the molecules of a system over their available energy states".

That states of higher energy are progressively populated as the temperature is raised means that more and more molecules are moving (including rotating and vibrating) more vigorously, or the atoms trapped at their locations in a solid are vibrating more vigorously about their average positions. ([14], p. 15)

Different kinds of motion of the microparticles (the micro-EW) correspond to the temperature (the property of the macro-objects which belong to an EDW, the macro-EW). The "higher temperature" means (that is, corresponds to) either the molecules extending up to higher energy states or, in a solid, the atoms vibrating more and more vigorously.[[306]](#footnote-306) Again, different kinds of motion of the microparticles (the micro-EW) correspond to the temperature (the property of the macro-objects, the macro-EW).

According to the first law of TD, the conservation of energy (internal energy, U), energy can neither be created, nor destroyed. That is, the amount of energy in the entire "Universe" is the same.[[307]](#footnote-307) It seems that nobody can deny the existence of "energy" even if we are not able to precisely define this notion! Does "energy" have any ontological status? If yes, what kind? Is "energy" an entity, a process, or a field/wave? Or maybe we would better define "energy" as something "immaterial" indeed (that belongs to a particular EW) and corresponds to something material (the behavior of some microparticles or macroparticles or waves). Energy is related with "work". Atkins introduces this essential notion of "work": "*Work* is motion against an opposing force. We do work when we raise a weight against the opposing force of gravity." ([14], p. 16, his italics) Obviously, the "magnitude of work" depends on certain physical parameters that belong to the macro-EW: the mass of the object, the strength of the gravitational force and the height at which the object is raised. All kinds of "work" are "equivalent of raising of a weight". ([14], p. 17) James Joule established the "mechanical theory of heat" ([19] p. 19). He was able to show that work could be transformed into heat.[[308]](#footnote-308) ([13], p. 100) Indeed, we cannot consider that "work" has an ontological status; work is neither an entity, nor an interaction. "Work" is an act that involves some entities (an engine, for instance) that really exist and their actions. The problem is that "heat" is a *process*, not a property of a thing. Heat requires a macro-object that has temperature and the external environment (or another macro-object) in which it is transferred. Atkins believes that "heat" is

energy transferred as a result of a temperature difference, with energy flowing from hot (high temperature) to cold (low temperature). There is no heat stored in the source before the event; there is none stored in the receiving object after the event. There was energy stored in the source before the event; the heated object has a higher energy after the event-some water, for instance, might have evaporated or some ice melted. Energy has been transferred from source to object through the agency of heat: heat is the agent of transfer, not the entity transferred. ([13], p. 103)

The problem is that Atkins works within the *reductionist* framework in the unicorn word: he believes that the macro-objects are nothing more than an amalgam of microparticles: the "macroscopic, observable motion is the uniform motion of innumerable atoms". ([13], p. 103) Thus, "work" has to be associated with the "uniform motion of atoms (or electrons)", it is "the transfer of energy that stimulates *uniform* motion of atoms in the surroundings." ([13], p. 103) Within this reductionism framework, the macro-entities (and their "temperatures") do not really exist, i.e., they cannot have any ontological status. From a reductionist viewpoint, the temperature cannot be a property of a macro-entity, but the motion of an amalgam of microparticles (which really exist[[309]](#footnote-309)). From our viewpoint, the macro-objects really exist and the "temperature" is just the property of these macro-entities which just correspond to certain microparticles (which correspond to certain electromagnetic waves/fields)!

Atkins also defines the apparently "mysterious" notion of *"energy": the capacity of a system to do work.* ([14], p. 18) Anyway, it is quite difficult to define "energy" of any kind. Energy has to be either a property of certain entities which belong to a particular EW or a process which belongs to an EDW. Related to the notion of "work" is the notion of "internal energy": "the internal energy is simply the total energy of the system, the sum of the energies of all the molecules and their interactions." ([14], p. 35) Does the internal energy (the "capacity of a system to do work"), as a kind of energy, really exist? Is this "capacity" an entity or a process? Does this "capacity" have any ontological status? We have to pay great attention to the way we interpret the main concepts that are used in thermodynamics! The internal energy can be changed by doing some "work", that is by *"heat"*: the transfer of energy of the system into its surrounding "due to the difference in temperature caused by the work".[[310]](#footnote-310) ([14], p. 21) We cannot talk about "heat" in itself as having any ontological status. Always, heat has to be associated with something, it has to be a property of an entity that has an ontological status which belongs to a particular EW.

In one form, the first law of thermodynamics is this one: "the internal energy of an isolated system is constant." ([14], p. 22) Obviously, all these notions refer to entities and processes which belong to the macro-EW. Heat and work, as well as temperature, are properties of entities which belong, in general but not always, to the macro-EW. Obviously, these macro-notions (and their properties like heat) *correspond* to certain micro-notions that describe entities and processes which belong to the micro-EW. Rather briefly, Atkins indicates that "*work*" is the "*transfer of energy that makes use of the uniform motion of atoms in the surroundings*" ([14], p. 24), while *"heat"* is the "*transfer of energy that makes use of the random motion of atoms in the surroundings"* ([14], p. 25).[[311]](#footnote-311) So, the difference between "work" and "heat" is the difference between the "uniform" motion of atoms and the "random" motion of atoms (the micro-EW). Without the EDWs perspective, it seems that notions like "energy" and "work" have no ontological status since, within the unicorn world, everything is reduced to the micro-entities (or to the electromagnetic fields/waves like Penrose). We believe that, within the unicorn world, these concepts have produced strong (but unnoticed) ontological contradictions!

The notion of "work" can be applied also to dark energy: there is some work regarding the accelerated motions of the galaxies. However, this work corresponds to the *natural* motion of the electromagnetic waves/fields (speed c). In reality, dark energy does not even exist! It is "nothing" which corresponds to the *natural* motion of the electromagnetic waves/fields (speed c). A "fire" (the macro-EW) (which produces "heat") corresponds to some electromagnetic waves (the field-EW). The heat corresponds to those electromagnetic waves. Both the heat and the electromagnetic waves spread in all directions. There is no static electromagnetic wave (all have the speed c) and this is equivalent with the "spread of heat" (having certain masses, like all macro-objects, the molecules representing the heat cannot reach speed c).

Thermodynamics is related to the notion of "time".[[312]](#footnote-312) Atkins indicates that according to Noether’s theorem, any law of conservation is related to the concept of "symmetry". The conservation of energy is related to the "uniformity of time". ([14], p. 35) The process of rising entropy cannot be identified with "time". Entropy is just a physical process, no more or less, and as we indicated in our book [9], space and time (spacetime) cannot even exist. "Time" is not "bunch up and run faster then spread out and runs slowly", since time does not exist at all (see [9]). We recall that the "Universe" does not exist. So how can we find the "symmetry" that would provide the foundation to the conservation of energy? The question is: do we need such symmetry in order to preserve the conservation of energy? We believe that we need to replace these kinds of symmetries with *correspondences* between the EDWs. However, we have to recall that "correspondence" is an abstract notion which has no ontological status. The main idea about entropy is that it cannot decrease in any process. It is quite common to relate entropy to the "arrow of time" just because these thermodynamic processes are *irreversible* (i.e., they imply the distinction between past and future). ([20], p. 2) However, this distinction has no ontology, in other words, "past" and "future" have no ontology. Moreover, "present" has no ontology, therefore "time" does not exist. Relating thermodynamics to the "arrow of time" is just a simple human mind association between a real process (laws of thermodynamics) and an invented notion (time). There are, indeed, "irreversible processes" (irreversible just because of their correspondences with processes from EDWs), but these processes do not involve/require "time" at all (which anyway does not have any ontological background).

It is believed that the laws of thermodynamics are not proven, but they are not wrong. Very roughly speaking, entropy is the measure of (a) a system’s disorder; (b) the degree the energy is wasted; (c) how much energy is not available to do work. The first law refers to internal energy (U, the quantity of energy), the second law refers to entropy (S, the quality of energy): "low entropy means high quality; high entropy means low quality".[[313]](#footnote-313) ([14], p. 38) If a system is more disordered, it has less energy to do useful work. That is, *energy is necessary to move a system from disorder to order.[[314]](#footnote-314)* If a "system" changes its phase state naturally (for instance, a piece of ice under higher temperature changes its phase state from solid to liquid and to gas), the entropy increases. Essentially, *matter and energy disperse over time!*[[315]](#footnote-315) We return to our correspondences: the "dispersion" of some matter or energy has to correspond to certain phenomena which belong to the pre-Big-Bang-EW. We have to be aware that any electromagnetic wave/field disperses (spreads) over "spacetime". This dispersion (spreading) with speed c has to be included in the definition of electromagnetic wave: whenever an electromagnetic wave is produced, in general, it will spread in all directions with speed c. For instance, a burning star spreads light (electromagnetic waves in the field-EW and photons in the micro-EW both kinds of entities having speed c) in all directions.

The processes of the "universe" (the macro-EW) are all irreversible, while a system (a local part of the macro-EW) can be in a reversible state. If S increases, the number of microstates of the system tends to increase with the increases in temperature, volume, and number of independently moving molecules (of the system).[[316]](#footnote-316) Related to the second law of thermodynamics is the "heat engine". Dugdale summarizes the main ideas about the "heat engine":

(i) A heat engine requires a temperature *difference* in order to operate. (ii) When the engine operates it takes in heat at the high temperature and gives out some heat at the low temperature so that it tends to reduce the temperature difference, i.e. to restore thermal equilibrium. (iii) Any temperature difference can, in principle, be used to produce work. (iv) Temperature differences tend to disappear spontaneously by heat conduction without producing useful work. ([19], p. 29)

*At 0°K, there is no entropy and no energy at all.* However, in principle, it is not possible to construct a heat engine to convert the entire heat to work. In such cases, wasting energy cannot be avoided. The "natural order" is to waste energy, i.e., the processes go in one direction: from high energy to low energy, from hot to cold, from order to chaos.[[317]](#footnote-317) We can construct a system that goes from "chaos" to "order", but we need to use energy. The main statements of the second law are the following:

"Kelvin statement: *No cyclic process is possible in which heat is taken from a hot source and converted completely into work."* ([14], p. 41)

"Clausius statement: *Heat does not pass from a body at low temperature to one at high temperature without an accompanying change elsewhere."* ([14], p. 42)

These statements are logically equivalent. [14] Atkins unifies the statements of Kelvin and Clausius in a single version of the second law: *The entropy of the universe increases in the course of any spontaneous change.[[318]](#footnote-318)* ([14], p. 49)[[319]](#footnote-319) Again, since the "universe" does not exist, we have to replace this notion with the correct EW (either the macro-EW or the micro-EW, depending on what phenomena we want to explain). Moreover, we have to understand what does it mean the "spontaneous change elsewhere". From our viewpoint, this expression mirrors certain phenomena which belong to an EDW (maybe to the macro-macro-EW or the pre-Big-Bang-EW). Anyway, those phenomena (changing of certain states from the macro-macro-EW) correspond to the increase of entropy in the macro-EW. The changes in the macro-EW are "spontaneous" and the "entropy always increases in the Universe" (the macro-EW, for instance) just because of these correspondences.

because the temperature of the sink is lower that of the source, the increase in entropy is larger than the original decrease (remember the parable of the quiet library). Overall, the entropy of the device will increase, because the decrease in entropy of the source is overcome by the larger increase in entropy of the sink. So, the flow of heat from source to sink is spontaneous. ([13], p. 127)[[320]](#footnote-320)

The expansion of a gas increases the space of possibility for molecules to be in one place or another; in this case, precisely these increases in the unpredictability of the places of molecules mean increases in entropy. According to the laws of thermodynamics, the "Universe" started with a low entropy which increased continuously (even if, in some places, certain planets and living beings have been created). It seems that there was a corresponding phenomenon that we have to associate with the Big Bang and that phenomenon belonging to an EDW (the pre-Big Bang-EW) rather than the field-, micro-, macro-EW. That phenomenon from the pre-Big-Bang-EW was *ordered* and corresponded to the entities and processes belonging to the field-, micro-, macro-EW. The expansion of a gas increases the space of possibility for molecules to be in one place or another. In this case, precisely these increases in the unpredictability of the places of molecules mean increases in entropy. According to the laws of thermodynamics, the "Universe" started with a low entropy which has continuously increased (even if, in some places, according to different natural laws (the ED laws belonging to the EDWs), certain planets and living beings have been created). The increase in entropy means that energy will become less usable over time. However, according to the law of the conservation of energy, the quantity of the energy will remain the same. The "universe" constantly loses usable energy and thus it becomes less and less organized. Anyway, we have to be aware that the Universe does not exist, so we have to rewrite this summary. The "Universe" does not exist and, in general, "energy" merely corresponds to the ED entities which belong to the EDWs.

We introduce now Boltzmann’s famous formula of entropy (elaborated by Max Plank, [14], p. 55) in statistical thermodynamics: S = k log W. "W" is the "number of ways in which the molecules of a system can be arranged to achieve the same total energy (the ‘weight’ of an arrangement)." ([14], p. 54) Again, if the space (volume) of that system increases, then W increases. *The increase in entropy means the increase in the unpredictability of the positions of these microparticles.* Essentially, it is the "expressions for the changes in entropy correspond exactly to those deduced from Clausius’ definition, and we can be confident that the classical entropy and the statistical entropy are the same." ([14], p. 55) In this statement, the expression "the same" is wrong: only within the unicorn world can we talk about certain identities (the identity between mind and brain, between a planet and a huge amalgam of microparticles, etc.). Within the EDWs perspective, we can only talk about the correspondences between classical and statistical thermodynamics. That is, the macro-EW (more exactly, the entities and processes that represent the macro-EW) only corresponds to the micro-EW (more exactly, the entities and processes that represent the micro-EW) which correspond to certain "wrapped up" waves (the field-EW). These sets of ED entities and their interactions really exist, but one set of entities does not exist for any epistemologically different set of entities and their interactions. Importantly, there are

two principal contributions to this increase in entropy. One is the release of energy, which disperses into surroundings and raises their entropy. The other is the dispersion of matter, as long, orderly chains of atoms are broken up and the individual atoms spread away from the site of combustion as little gaseous molecules. The combustion is portraying the content of the Second Law. ([13], p. 129)

In this paragraph, Atkins attributes the Second Law to the micro-entities (atoms) which belong to the micro-EW. The "energy disperses into surroundings" just because of its correspondences with certain phenomena belonging to the EDWs, for instance, the pre-Big-Bang-EW or the macro-macro-EW. In general, energy and matter belong to the EDWs. We recall Guggenheim’s "spread" of energy and matter (it depends which EW is involved) from a previous footnote: the electromagnetic field has the tendency of "spreading", of becoming more and more straight. Obviously, the "natural" position of an electromagnetic field is as being straight. Why? Because this position corresponds naturally to a phenomena from the pre-Big-Bang-EW. If it is curved, the field tends naturally toward becoming straight without the need of any additional force just because if this correspondence. Maybe the "combustion" (i.e., the Second Law, the "dispersion of energy/matter") is directly mirrored by the correspondences between the phenomena from the micro-EW and the phenomena from either the pre-Big-Bang or the macro-macro-EW (or EDWs which we cannot know yet).

**6.6.2. More details about dark energy**

The "dark energy" (which is "nothing" in the macro-EW, but corresponds to "something" in the field-EW that "expands" the "Universe" (which does not exist) is associated with "time" (which does not exist).[[321]](#footnote-321) So, there is not an "ideal thermodynamic bath", but the EDWs. It seems that "the Second Law of Thermodynamics and dark energy might be two facets of the same phenomenon, some mysterious quantity of our universe that imparts or requires an arrow of time." [23] "It has been suggested that thermodynamic irreversibility is due to cosmological expansion." (Peter Theodore Landsberg, "Thernodynamics, Cosmology, and the Physical Constants" in J. T. Fraser (ed.), *The Study of Time III* (1973), 117-8) We can associate "thermodynamic irreversibility" with "cosmological expansion" but not with "time" (which has no ontological status). "Dark energy is the name given to the unseen influence that may be causing the expansion of the universe to accelerate with time." ([24], p. 447)[[322]](#footnote-322) Dark energy and time cannot have any kind of ontology within the EDWs perspective but, in the previous section, we have seen the correspondences between the irreversible thermodynamic processes, quantum processes and dark energy.

Some scientists believe that, like Einstein’s cosmological constant, dark energy is a property of space itself and that as space expands, more dark energy is created, accelerating the expansion further. Other experts think that dark energy might make up a changing energy field known as quintessence and other still believe that our current understanding of gravity itself might be wrong. ([26], p. 90)

Important in this paragraph is that "dark energy is a property of space itself", but within the EDWs perspective (space or spacetime cannot have any ontological status - see [9]), this dark energy does not exist in the macro-EW, but there are certain phenomena (from EDWs) which only correspond to (not the "cause" of) certain "phenomena" in the macro-EW (i.e., the acceleration of galaxies). There is neither the field as "quintessence", nor the dark matter "particles", but only "nothing" (no ontology) which "belongs" to the macro-EW and corresponds to "something" which belongs to an EDW. If we apply the principle of "*correspondence toward equilibrium*" to the galaxies (which do not have any ontological status, at least from our viewpoint[[323]](#footnote-323)), each being composed of many planets (the macro-EW), each planet corresponds to a huge amalgam of the microparticles (the micro-EW), each microparticle corresponds to the waves (field-EW), we can understand why the "Universe" is in expansion: because of these correspondences. In other words, a planet (within a "galaxy") has a *natural* increasing in speed. Why "natural"? Because this "natural" motion corresponds to the motion of electromagnetic field which is very *natural in the field-EW.* The Earth moves around the Sun just because the "gravity" is much stronger than this tendency. However, the solar system belongs to a galaxy which its speed is increasing. This increasing is due to the principle of "correspondence toward *equilibrium*". It means that the directions of the *majority* of microparticles of a "galaxy" tend toward the same direction, therefore the "galaxy" has a direction of its motion.

We strongly emphasize that, even if the any kind of correspondence does not have any ontology, the relationship between an electromagnetic field (the field-EW) and an amalgam of microparticles is different than that we can conceptualize. In other words, the relationships between the electromagnetic field, the microparticles and the macroparticles is different than we can even think! *For an electromagnetic field, for instance, there are other EDWs than there are for all human beings: even if the macro-EW and the micro-EW do not exist for the field-EW, these EDWs do not even exist as EDWs for the electromagnetic waves, but there are other EDWs than these two EDWs.* (The physicists have to confirm this alternative…) The existence of the field-EW, the micro-EW and the macro-EW, for instance, are only from the viewpoint of human beings. From the "viewpoints" of ED entities, there are "different sets of EDWs".

**6.6.3 The explanation of "dark matter" through the correspondences between the macro-EW, the micro-EW and the field-EW**

About dark matter, we wrote an article last year at the invitation of a physicist from Great Britain, Michael Smith. In that article [12], our solution was that maybe there is the macro-macro-EW in which there are macro-macro-objects which cannot observe exactly as an electron cannot observe/interact with a table. In this section, we furnish a new solution for explaining "dark matter". We would like to incorporate the dark matter within the same explanation as we furnish for the dark energy in the previous sections of this article. The dark matter which corresponds to each galaxy is not an entity within the macro-macro-EW, but it is just "nothing" within the macro-EW (where the planets, which "compose" the galaxy, are) and this "nothing" corresponds to many amalgams of microparticles (the micro-EW) which all correspond to the electromagnetic waves (the field-EW). It has to be clear that the electromagnetic field which correspond to a galaxy is just part of the electromagnetic field which corresponds to the all galaxies. Exactly as if we put together two electrons between them an electromagnetic wave/field "is formed" (in fact, that wave corresponds to those two electrons since there are the field-EW and the micro-EW and, in this way, we solve the great mysteries from quantum mechanics like "nonlocality" and "entanglement"), in the same way, there is an electromagnetic field which corresponds to an entire galaxy. In the micro-EW, all the microparticles (which correspond with all planets from the galaxy) correspond to an electromagnetic field, exactly as between two particles placed together, an electromagnetic wave is created between them. This electromagnetic field is an indivisible entity created in correspondences with all the microparticles which correspond with all the planets of the galaxy. Because of certain macro-laws, the planets rotate 360 grades around the center of galaxy. The corresponding amalgams of microparticles and the corresponding field (an indivisible entity) rotates 360 grades due to the correspondence with the planets. Therefore, the planets of a galaxy rotate all *simultanously* 360 grade around the center of galaxy. That is, because the field is an indivisible entity, the corresponding microparticles rotates simultaneously with the electromagnetic field 360 grades. In the same time, the corresponding planets rotates all simultaneously 360 grades. In the same time, each galaxy corresponds to the general electromagnetic field which spreads in all directions (380.000 years after many Big Bangs). As we indicated above, because of this correspondence, the speed of each galaxy has been continuously increasing.

The question would be: what is the relation between the electromagnetic field which corresponds to the galaxy (the field and the galaxy rotates 360 grades) and the electromagnetic field which corresponds to all galaxies (this field and all galaxies spread in all directions in straight lines)? As we indicated above, the electromagnetic field of the galaxy is part of the electromagnetic field of all galaxies, even if that part rotates 360 grades, while the general electromagnetic field spread in all directions in straight lines. However, there can be EDWs, since when two microparticles are posted one near to the other, an electromagnetic wave is establish beteween them. This wave has nothing to to with the wave between the microparticles correspoding to a planet, for instance. The difference between this electromagnetic fields is that the part rotates 360 grades, while the general field spread in all directions in straight lines. It means that while the part (or an EDW) is rotating 360 grade, in the same time, as part (or an EDW) of the general field, that part which is rotating is also moving in the direction in which the general field (and the corresponding galaxy) is moving. Somebody can ask: "Is this relations between part and whole possible?" Our answer would be: "Yes, within the electromangetic field, such part-whole relation is possible (maybe we talk about EDWs)".

We emphasize another essential aspect: for short distances[[324]](#footnote-324) (solar systems), the "gravity" produced by the planets (the macro-EW) is more powerful than the corresponding electromagnetic field (field-EW). (We have to remember that between this correspondence, there are the correspondences between the field-EW and the micro-EW and between the micro-EW and the macro-EW.) For short distances, the laws of "gravity" dictate the behaviour of the planets. This is the reason, the planets do not rotates simultaneously around the Sun, they follows the gravitational laws. For long distances, (the surface of a galaxy or the entire macro-EW), the electromagnetic field is more powerful than the gravity of the planets. (Obviously, these EDWs correspond with pre-Big-Bang-EW and the macro-macro-EW, but we do not have any information yet about these EDWs.) The laws of electromagnetic fields are more important than the laws of "gravity". This is the reason, the planets rotates simultanously around the center of galaxy. For short distances, the electromagnetic waves are more wrapped up and they do not form an "indivisible entity". For long distance, the gravity is weaker, therefore the electromagnetic field becomes an indivisible entity, therefore, the microparticles which correspond to the electromagnetic waves (parts of this electromagnetic field within the field-EW) follow, through correspondence, the movement of this electromagnetic field. So, the planets follow, through correspondence with the microparticles, the movement of the indivisible electromagnetic field. It means the planets in the galaxy move simoultaneously around the center of galaxy, throught the correspondence with the microparticles with move simoultaneously with the indivisible electromagnetic field (more powerful than the "gravity" between planets.)

The same explanation is for dark energy: for long distances, the electromagnetic field (with speed c in all directions) imposes through correspondences, the increase of the speed of microparticles which correspond with the planets (which also increase their speed).

**Conclusion**

We start our conclusion with Feynman's famous statement about "energy" and "blobs": "It is important to realize that in physics today, we have no knowledge what energy is. We do not have a picture that energy comes in little blobs of a definite amount." For the first time in the history of Physics (and human thinking), with our EDWs perspective (our previous works), we furnished the picture of "energy" (it is an EDW, the field-EW, but it can be more EDWs) and "blobs" (the microparticles in the micro-EW).

**In this chapter, we argue tha**t there are no dark matter and no dark energy, but only the correspondences (no ontological status) between the ED entities which belong to three EDWs: the field-EW, the micro-EW and the macro-EW.[[325]](#footnote-325) Even without the existence of the macro-macro-EW or the pre-Big-Bang-EW (see our works [12, 27]) (we don't know if these EDWs exist or not, even if we believe these EDWs existed in the past or even have been still existing), the correspondences between the ED entities (which belong to these three EDWs) can definitely replace notions like dark matter and dark energy in Physics today.

**Chapter 7**

**The hyperspace (superstring theory) versus the EDWs**

Trying to unify quantum mechanics with the general theory of relativity, the physicists created the „string theory“. Kaluta and Klein were among the first who proposed the unification of these two theories by introducing new dimensions of space, certain „compacted dimensions“. In their view, the electromagnetic field is nothing more than a manifestation of one more dimension of space, i.e., the „spacetime“ has five dimensions. From the EDWs perspective, it has to be very clear: since spacetime does not exist, it is not about many dimensions, but about the EDWs! Obviously, there has to be an EDW than the micro-EW or the field-EW, but this EW is not composed of „multidimensional string“ since “spacetime” (space and time) cannot have any kind of ontology.

Let us describing the figure (19.1) from Presura about the „relativistic string theory“ (Chapter 19): a macro-object (an apple), composed of atoms (composed of proton and electron), the proton composed of quarks, the electron, the quarks composed of relativistic open string, while the photon is composed of relativistic closed string.[[326]](#footnote-326) (p. 353) The main idea of relativistic string theory is that all elementary particles are composed of the same type of string which vibrates with the speed close to the light speed.[[327]](#footnote-327) (p. 554) However, the vibrations of relativistic string would be different from one particle to another. (idem)[[328]](#footnote-328) Also the theory presupposes the existence of graviton.[[329]](#footnote-329) However, according to the EDWs perspective, the graviton is a meaningless notion.

The problem for the (Super)String Theory was that the mass of the particles described by this theory is billion of billions smaller than the mass of a relativistic string. (Presura 2014, p. 557) The solution to this problem was: (a) the introduction of supplementary dimensions of space and time (b) the introduction of the notion of „superstring“, the first revolution in this theory. (p. 557) The relativistic strings have null masses and the know particles are „approximations“ of these strings.[[330]](#footnote-330) (idem) However, for preserving the consistence of this theory, it was necessary the introduction of ten dimensions of space and time. Therefore, the new theory was the „superstring theory“. The string theory describes only the bosons. The superstring theory describes the bosons and the fermions.[[331]](#footnote-331) (p. 557 or p. 574) There is also a „supersymmetry“ in the superstring theory. So, in this new alternative, the strings have rest energy much smaller than the Planck energy, and thus they can represent the know elementary particles. (p. 557)

Witten introduces a new alternative with 11 dimension.[[332]](#footnote-332) Another problem of this theory is that there have been many other alternatives, in fact too many...[[333]](#footnote-333) The existence of a particle is given by the mode of the vibration of these strings. (Presura 2014, p. 564) “This process represents nothing else than the transformation of one particle in another.” (p. 564) The broken of a string would generate the appearance of two strings; the unification of two strings can generate one string. In this way, we can use a single description for a single law of the universe using only one parameter: the tension of relativistic string! (p. 565) This element is quite important. We can believe that the superstring theory describes the EW0.[[334]](#footnote-334) This idea would be quite wrong since: (1) the physicists have reached this point by unifying the quantum theory and the general relativity (a unification based on certain mathematical equations, i.e., on a lot of “pure” mathematics, not even on “applied” mathematics) (2) the essential notion of this theory is “spacetime”, but it does not have any ontology! Even in Vacariu and Vacariu (2010), we showed that the (super)string theory is the supreme pseudo-theory in physics of all time!

One is reminded of what happens when the fabled blind wise men confront an elephant. Touching the elephant in different places, each comes up with his own theory. One wise man, touching the tail, says that the elephant is a one-brane (a string). Another wise man, touching the ear, says that the elephant is a two-brane (a membrane). Finally, the last says that the other two wise men are wrong. Touching the legs, which feel like tree trunks, the third wise man says that the elephant is really a three-brane. Because they are blind, they cannot see the big picture, that the sum total of a one-brane, two-brane, and three-brane is nothing but a single animal, an elephant. Similarly, it’s hard to believe that the hundreds of membranes found in the M-theory are somehow fundamental. At present, we have no comprehensive understanding of M-theory. Our own point of view, which has guided our current researches, is that these membranes and strings represent the “condensation” of space. Einstein tried to describe matter in purely geometrical terms, as some kind of kink in the fabric of space-time. If we have a bed sheet, for example, and a kink develops, the kink acts as if it has a life of its own. Einstein tried to model the electron and other elementary particles as some kind of disturbance in the geometry of space-time. Although he ultimately failed, this idea may be resurrected on a much higher level in M-theory.” (Kaku 2005, pp. 238-239)

This elephant is in fact the unicorn world and nothing else!

To Rees, the anthropic principle is one of the most compelling arguments for the multiverse… Weinberg seems to agree on this point. Weinberg, in fact, finds the idea of a multiverse intellectually pleasing. He never did like the idea that time could suddenly spring into existence at the big bang, and that time could not exist before that. In a multiverse, we have the eternal creation of universes. There is another, quirky reason why Rees prefers the multiverse idea. The universe, he finds, contains a small amount of “ugliness.” (Kaku 2005, p. 253)

We agree, partly, with Rees: the “universe” is indeed “ugly”, but we have to replace it with the EDWs and not with “multiverse” or “hyperspace” (M-theory[[335]](#footnote-335))… The perfect image about the hyperspace: “Ten dimensions might sound exciting, but they would cause real problems if you forgot where you parked your car. If they are present, why don’t we notice these extra dimensions?” ([Hawking](https://www.goodreads.com/author/show/1401.Stephen_Hawking) and Mlodinov 2010, p. 46) (Against the string theory, see Vacariu and Vacariu 2010, last sub-chapter) More about this “elephant”: With 18 additional parameters, the “Standard Model of Elementary Particles” describes all the interactions between different particles. (Oerter 2006, p. 18)

The so-called “symmetry” possibly belonged to the “pre-Big Bang-EW” that corresponded to the “after Big Bang”-EDWs, i.e. the plasma-EW, wave-EW, the microparticle-EW, etc. The “grand unification” immediately sends the reader to the string theory. In our book (2010), we showed that the (un)famous “(super)string theory” is a pseudo-theory. (“…many leading physicists of the previous few generations objected to the theory. Feynman, for instance, wrote in 1988 that string theory ‘doesn’t produce anything, it has to be excused most of the time. It doesn’t look right’.” (Weatherall 2016, p. 67) In our previous works, we showed that trying to unify Einstein’s theory of general relativity and quantum mechanics (a wrong theory that mirrors the mixture of the wave-EW and the particle-EW) is a huge mistake (a mixture of the macro-EW and the micro-EW). Moreover, we have to remember that even Einstein’s both theories of relativity refer to EDWs! (See Vacariu 2014 or Vacariu 2016) (Vacariu and Vacariu 2017)

However, we are sure that before the Big Bang there was at least one pre-Big Bang-EW and therefore the speed of electromagnetic waves, c, corresponds to the ED entities/processes which belonged to that EW. And so on, until we reach the EW1 which hypercorresponds to the Hypernothing (the EW0)

As we wrote at the beginning of this book, we are not specialists in (philosophy of) physics and much less in the (super)string theory. However, just because the (super)string theory has dominated the academic environment during the last twenty years[[336]](#footnote-336), we inquire some general problems of this theory in a very philosophical framework: the EDWs perspective. The application of this perspective to the (super)string theory shows that something is wrong with this theory (from a philosophical background). The main idea from the (super)string theory is that the fundamental elements which constitute any microparticle in the Standard Model are some 10-dimensional strings (or 11-dimensional, according to Witten’s work at the middle of the ‘90s, or 26 later). Different modes of oscillations of fundamental strings produce different masses/power of forces. The string theory unifies all those forces, including the “gravitational force”.

We make a brief presentation of the main steps: in 1919, Kaluza sent Einstein an article regarding the theory of fifth dimensions that unifies the theory of gravity with Maxwell’s equations for electromagnetic fields.[[337]](#footnote-337) Later (in 1926), Klein improved this theory, but the theory failed because “The fifth dimension was curled up into a tiny circle the size of the Planck length was not testable.” (Kaku 1994, p. 107) In the ‘60s, the theory re-started with Veneziano and later Susskind, Schwarz, Scherk, Michael Green and others. (Greene 1999, pp. 154-9; 2004, Chapter 12; Kaku 1994) Between 1984 and 1986 the “first revolution” took place in the string theory with Green and Schwarz who showed that the quantum conflicts from this theory can be eliminated. (Greene 1999, p. 156-7)

The second revolution took place in 1995 and it was made by the famous Edward Witten who made some suggestions about the M-theory, unifying all five particular string theories, increasing the number of dimensions from 10th to 11th Dimensions. For us, the amazing thing is that such incredible theory in physics, the superstring theory (from now on in this chapter, the “string theory”), without any empirical results or even support, has dominated physics in the academic environment of USA for so many years (20-25 years)! We do not make any history about this theory, but we will analyze some essential notions which not only do not have no empirical support, but in reality these notions are just pseudo-notions which have nothing to do with “reality” (the EDWs).

The most important notion of this theory is the 10 or 11 spatio-temporal framework. Coming from a mathematical combination of Einstein’s theory of general relativity and quantum mechanics, the string theory is totally abstract.[[338]](#footnote-338) As we saw above, there have been different reasons for combining these two incompatible pillars of physics, one referring to the big entities (planets, stars) and the other to the micro-entities (photons, electrons, etc.). The main reason is a merge of the main theories of physics, the general theory of relativity (that explains the gravitational “force”) and quantum mechanics (electromagnetic, weak and strong forces). It would be the unification of all four forces. The main problem is that the unification of all these forces produces the “infinities”. Why do we need to unify these two physical theories? The dream of many physicists is exactly to unify these forces. “Dividing the universe into two separate realms seems both artificial and clumsy.” (Greene 2004, p. 336) We consider that this framework of thinking would be quite interesting if the unicorn-world really existed!

Another reason for the string theory would be the explanation of the extreme conditions of the “universe” during Plank’s time. “(…) the early universe falls on both sides of the divide: The enormous density of the early universe requires the use of general relativity. The tiny size of the early universe requires the use of quantum mechanics.” (Greene 2004, p. 338) So, it is understandable that the planets and the electrons are in the same “universe”, at the same time. In the unicorn-world, the trajectory of a photon is curved by the gravity produced by different planets/stars. Thus, to explain its trajectory, we need the general theory of relativity. Nevertheless, in one unique world, the electron interacts not only with the other microparticles, but also with planets and tables, so we need quantum mechanics. For explaining the black holes, we need the general theory of relativity, the gravitational collapse produces the spacetime “singularities”. However, these singularities cannot be explained by the general theory of relativity, the “principle of equivalence” is not valid. (Hendrich 2006) At such dimensions, maybe we can use quantum mechanics. Nevertheless, using both theories great contradictions cannot be avoided.[[339]](#footnote-339) Greene underlies the philosophical reason for combining the theory of general relativity and quantum mechanics:

If we ever hope to understand the origin of the universe – one of the deepest questions in all of science – the conflict between general relativity and quantum mechanics *must* be resolved. We must settle the differences between the laws of the large and the laws of the small and merge them into a single harmonious theory. (Greene 2004, p. 338, his emphasize)

Within the unicorn-world, we really need indeed to solve this infamous conflict. Such “Leibnizian harmony” is possible only within the unicorn-world! Greene argues that with the Standard Model we have no explanation why the elementary particles have their properties which produce particular nuclear processes, what produced the appearance of planets and life. In the string theory, such properties are “determined by string vibrational patterns”, and thus we can have the required explanations. (Greene 2004, p. 353)

From the EDWs perspective, each class of entities exists and these entities have certain properties just because of their interactions within a particular EW. In other words, the epistemological interactions of each EW are constitutive with regard to the fundamental ontological principle of each class of epistemological entities (their existence) and ontological property principle (their properties). However, as we saw in Vacariu (2008), we have to transform the “ontology” (available for the unicorn-world) in a “hyperontology” (there are many EDWs). From our viewpoint, the micro and the macro-entities belong to the EDWs, so it is quite absurd to combine these two theories (which refer to the EDWs). We have to remember the essential thing that the “viewpoint of a microparticle”/“planet” is different than our viewpoint (the electron interacts with a sum of microparticles which *correspond* with a planet or a table) and all such viewpoints have the same “objective reality” regarding each EW. Even today we can see the photons which were free to travel into the universe 300.000 years after Big Bang: the temperature decreased a few thousand grades, the first neutral atoms appeared and the photons could move freely within that “universe” which became transparent (this idea is proved by the cosmic background radiation). After one billion years, the first planets, stars and galaxies and their gravity were formed. We recall that the gravity is produced only by the massive objects like planets/stars. So why do we need to insert “gravity” when we explain the first EW – a micro-EW – without any planet/star? We do not know any of those characteristics of that special-EW where the temperature and density were so high, and we cannot deduce them by comparing that EW with the micro-EW or the macro-EW! As we saw above, because of the Heisenberg’s principle, the physicists consider that below the Planck’s scale (ultramicroscope space), there is a kind of “quantum foam”, i.e. those quantum fluctuations (Wheeler) that represent the notorious “incompatibility” between the principles of the main theories: the geometrical space without curvature available for great distances (the general theory of relativity) and the uncertainty principle (quantum mechanics).[[340]](#footnote-340)

We analyzed above the issue on the relationship between Riemann’s geometry, the mathematical points and gravity (the “infinities”). The string theory eliminates this problem: the strings are the smallest entities that exist in the “Universe” and so, from a pragmatic reason at least, we can conclude that the quantum fluctuations at ultraquantum level do not exist! (Greene, pp. 174-5) The mathematical formalism with the infinitesimal points from Riemann’s framework which explained the curvature of space is avoided through the limitations imposed by the dimensions of the strings. Thus, “the Riemannian geometry” of infinitesimal particles based on the distance between points is modified at ultramicroscope scale by the string theory.[[341]](#footnote-341) (Greene 1999, p. 253)

The interactions between two microparticles are replaced by the interactions between two strings. To avoid these “infinities” produced by the gravitational force and gravitons, the strings create a flat area of interactions, so we do not have any kind of fluctuations at ultra-quantum level. (Greene 1999, p. 182-4) With the relativistic string theory, the physicists would be able to eliminate the “singularities” from the “corpuscular theory”.

If in the corpuscular theory the worldline of the electron is suddenly interrupted by the appearance of a line of an emitted photon, in representation of the closed strings all the surface of the tree (trunks, branches) is continue, without sudden breaks. The intersection between two worldlines is replaced with a surface that continuously covers both the surfaces of the world of both particles, the first particle (“trunk”) and the second particle (“branch”). (Presura 2014, p. 566)

From the EDWs perspective, there is the micro-EW (with those microparticles, the “trunk” and the “branch”), but there is also the field-EW and other EDWs than the microparticles. However, before the micro-EW there was the well know EW, the field-EW. The field-EW is something totally different than the string theory, that is, we cannot believe that the superstring theory describes the field-EW. If, in the micro-EW, the microparticles are placed in “nothing” (as we have called until now, the “space”) and thus we have the discontinuity between them, in the field-EW there is only “continuity” of the electromagnetic field. However, the distinction “discontinuity-continuity” is mirrored by the EDWs and not by the mathematical tools transformed, *illegally*, in “ontology”. Maybe we can associate the string theory with the field-EW, but in this case, the string theory would be nothing than the quantum electrodynamics, no more or less. As we concluded before, we can avoid some of such infinities with the existence of EDWs. Such methods of creating odd abstract (mathematical) theories with applications to an extravagant landscape of “reality” contain some illicit extension of the relationships between mathematics and the world. In general, in these cases, the Kant-Hanna’s rule is avoided. In Chapter 2 of his book, Kaku wrote the incredible story about Riemann’s life, his metric tensor for n-dimensions space, his idea of the equivalence between geometry and force and about a geometrical unification of all forces. Trying to unify all the forces from that time, Riemann believed that electricity, magnetism and gravity “are caused by the crumpling of our three-dimensional universe in the unseen fourth dimensions”. (Kaku 1994, p. 36) He was convinced that the laws of nature are simple when expressed in higher-dimensional space.[[342]](#footnote-342) (Kaku, p. 37) Einstein applied successfully the same principle in the elaboration of his special theory (creating the framework with four dimensions), but we believe that the extension of this principle to a higher dimension for explaining all four forces is totally illicit! In reality, this extension has to be replaced with the EDWs!

We saw above that trying to unify those three forces from the micro-EW with gravity (that belongs to the macro-EW) is a mistake. Moreover, we have to take into account that Riemann (and Einstein) could not unify gravity with electromagnetism. The extension of Riemann’s principle (the string theory) to more than what Einstein did is really a myth![[343]](#footnote-343) We believe that the same wrong paradigm of thinking is applied for creating other notions from physics like supersymmetry[[344]](#footnote-344) and superparticles, supergravity and the interpretation of black holes. For the string theory, it has been the same problem for understanding black holes: the incompatibility between the big objects (the area of a black hole) and the small objects (“its” singularity) that reflects the incompatibility between Einstein’s general theory and quantum mechanics. Greene (with Morrison and Strominger) discovered a direct relationship between black holes and elementary particles. They showed that a new type of vibration of the strings with mass zero that appears due to a special transaction with the “broken space” of a Calabi-Yau form of space is “*a microscopic description of a particle with mass zero in which the black hole has been transformed.*” (Greene 1999, p. 348) They introduce an analogy regarding the phase transition (due to the variations of temperature) between the water-ice and the black hole-microparticles. Greene is convinced that the topological forms of supplementary dimensions of Calabi-Yau determine some physical structures to appear as black holes (the first phase of Calabi form) or as elementary particles (the second phase). (Greene, p. 349)

There are thousands of thousands of Calabi-Yau forms and nobody has any idea which of these forms fit with the equations from the string theory. (Greene, p. 238) We can speculate this situation saying that the transition from one EW to another presupposes a “broken space” of Calabi-Yau that is the imaginary space of the hyperverse! Greene is even wrong in saying that the black holes and elementary particles are two sides of the same coin. (Greene, p. 349) We have here again the theory of identity (philosophy of mind) within the unicorn-world. The microscopically compactification of six dimensions in a form of Calabi-Yau is realized by appealing to the pure mathematics.[[345]](#footnote-345) When analyzing in detail the possibility of selecting one alternative among thousands and thousands of Calabi-Yau forms that corresponds to our world, Heinrich concludes that

(…) in absence of any reasonable selection principle, is seems very improbable that a complete elimination of contingency can be achieved in the context of string theory. String theory does not support the idea that our world and its specific features are necessary. (Heindrich 2006, p. 23)

Or in Smolin words,

(...) the number of string theories for which there is some evidence for has been growing exponentially as string theorists developed better techniques to construct them. (Smolin 2004, p. 10) (Heindrich, p. 12)

The problem with a pure abstract theory from physics is the corresponding empirical facts. Without any selection criterion among many theoretical (mathematical) possibilities, what can physicists do?

Every point of the configuration space of possible moduli combinations of supersymmetric string theory, the so-called “supermoduli-space”, represents in the context of the compactification picture a specific sixdimensional Calabi-Yau space and corresponds to a resulting effective low energy nomology for the extended four-dimensional spacetime: a string vacuum. (Heindrich 2006, p. 14-5)

Heinrich emphasizes that to compare all the string vacua to the observable phenomena, we have to calculate the low energy implications for all possible moduli combinations. And this cannot be done with the perturbative string theory. (p. 15) Moreover,

(…) even if the calculation of the low energy implications of a specific compactification scheme (or even of all compactification schemes) were possible, the problem would remain that there are a lot of different string vacua among which we had to look for the symmetries and the coupling parameters of the standard model, or for the phenomenologically adequate scenario respectively. And we would probably have to explain afterwards what distinguishes the identified vacuum from all the others.

We would have to explain, why exactly the identified vacuum is realized in our world. And it is a massive understatement to talk about a lot of string scenarios: recent estimations suggest between 10^100 and 10^500 effective four-dimensional string vacua. For this spectrum recently the terms “landscape” and “discretuum” were introduced. (Heindrich 2006, pp. 14-15)

Without providing more details from Heinrich’s presentation, we write his conclusion:

If there are 10100 or 10500 string vacua, and if there are no constraints which exclude vacua resembling our world on principle, then, even after a preselection which leaves only those vacua which resemble more or less our world, there will probably still remain an immense multitude of possible vacua, compatible with the observable phenomenology, but with different nomology. And, if this preselected ensemble of vacua corresponds to a continuum or a dense discretuum of parameter values, it will be impossible to identify by empirical means the vacuum representing our world (…). (Heindrich 2006, p. 21)

We clearly see here the final outcome of mathematics pushed at the extreme cases in physics (when pure mathematical thinking has nothing to do with reality). Being in an analogue position with the “infinities”, the number of string vacua is huge and there are no criteria for selecting the alternative that fits somehow our “observed world”. Following Kaku[[346]](#footnote-346), Heinrich draws the attention that if the general theory of relativity has the fundamental principle, the “equivalence principle” and “the dynamics described by quantum field theories is based on local gauge invariance”, the string theory does not have any such principle. (Heindrich 2006, p. 7) Moreover, the “equations don't even determine the size of the extra-dimensions”. If we do not see them, they must be very small. (Greene 2004, p. 372) From our viewpoint, gravity and quantum forces belong to the EDWs. Probably long time ago, (immediately after Big Bang) at least some of these forces did not even exist. Maybe there were other EDWs (with ED forces and ED entities, epistemologically different from the actual entities and forces) than the actual EDWs. It is sure that immediately after the Big Bangs, there was no gravity in any EW that existed! The appearance of the big macrocosmic objects like planets and stars mean the appearance of the macro-EW, an epistemologically different world than the micro-EW, the EW of microparticles like electrons and protons and their interactions.

From our EDWs perspective, the conclusion regarding the string theory is the following: all alternatives of the (super)string theory have been created within a wrong framework (the unicorn world) using wrong notion (the “spacetime” with 10, 11 or 26 dimensions)! Since the unicorn world is a totally wrong framework, and the spacetime has no ontology at all, then we believe that it is really meaningless for physicists to waist their time working within this pseudo-theory!

**Chapter 8**

**Primas and Atmanspacher’s approach under**

**Spinoza’s “dual aspects” approach and Bohr’s “complementarity”**

In 1984, Primas had a presentation at one conference about the reductionism of scientific theories. Even in the first paragraphs, he emphasizes “most theoretical concepts from chemistry” could not be reduced to Quantum Mechanics theory. For Primas, “reductionism” refers to the “levels of explanation”, no more or less. Primas is aware that chemistry deals with “microstructure and macrostructure of matter” (p. 6), but obviously he has no idea about the EDWs. Certain properties of macroscopic entities cannot be explained using quantum theory. (Primas 1984, p. 7) Also, the same observation is available for thermodynamic properties (temperature, etc.), but he writes these “theories refer to “*different levels of description*” in Russell’s sense. (p. 8) As we will see in the entire chapter, Primas and Atmanspacher worked within the unicorn world (i.e., the Universe) and they used only “levels of description”. In fact, working under this framework of thinking, they were aware they could not use other kinds of “levels” without reaching strong ontological contradictions!

The thermodynamical theory and the mechanical theory describe the “same object” but, according to Bohr, these descriptions are “mutually exclusive”. “We can say that thermodynamical features of the macroscopic matter stand in a complementary relationship to the underlying molecular structure.” (Primas 1984, p. 8) This sentence has a footnote, the first sentence being: “It is difficult to find the works of Bohr a really satisfying characterization of the notion of complementarity.” Anyway, Primas indicates that we can interpret the “formal logical structure of quantum complementarity” just as a “logic of complementarity”. (p. 9) Obviously, Primas investigates an “epistemological complementarity”, not an ontological one! From our viewpoint, very important it is this paragraph:

The world cannot be describe by a single compartmentalization but has to be viewed from a number of mutuali exclusive perspectives. Different perspectives imply different abstractions which yield different nonisomorphic decompositions of the world into parts. In a quantum-theoretical description, the corresponding abstractions are made by dismissing some of the Einstein-Podolsky-Rosen correlations. The possibility of mutually incompatible viewpoints is related to the existence of incompatible properties in quantum systems. Maximally incompatible properties are called complementary. In exactly the same sense (which easily can be formalized), maximally incompatible viewpoints of subtheories are complementary. (p. 12)

This paragraph is written under the unicorn world’s umbrella, i.e., under an epistemological framework, even if, following Bohr, Primas talks about the “existence of incompatible properties in quantum system”. Anyway, we strongly emphasize that Bohr worked also within the unicorn world! We recall Bohr embraced Kantian noumena-phenomena distinction (phenomena belonging to the human subject point of view). In the next, sections Primas indicates that it is necessary to grasp “this unavoidable compartmentalization” of the world in a unifying perspective (in a “dialectical thinking”) which can avoid “contradictions in nature” using different “frames of references”. (p. 13) Again, Primas’ mode of thinking is just a description, an epistemological way of thinking one nature.

In the next section, Primas believes that we cannot reject certain the “existence” of certain macroproperties (crystality, chirality of molecular structure of crystals[[347]](#footnote-347)). Even if he uses non-Boolean propositional system and introduces “ontic interpretations” of the formalism of quantum mechanics, Primas works within the unicorn world. Apparently, these “ontic interpretations” are quite close to the EDWs, but we strongly emphasize it is just about “interpretations”/“descriptions”[[348]](#footnote-348) and not about the EDWs. Anyway, working within unicorn world, Primas has no idea about that on EW does not exist for any EDW!

In a nonseparable system not all proposition of the system ca be truth-definite (i.e., either true or false) at the same instant. The ontic intepretations posits that propositions which are true at a certain time t correspond to the system has at time t. Propositions which are not truth-definite correspond to potential properties not actualized. Hence only the actualized properties are identified with elements of reality, the set of all truth-definite propositions characterizes the ontic state of the system. (p. 16)

In this paragraph, we see an interpretation of Bohr’s “complementarity” in relationship with the measuring apparatus used at one moment. It has nothing to do with the EDWs! Instead of inventing other “worlds” like Everett, Primas prefers to deal with “actual” versus “potential” properties/phenomena of the same “noumena”. This approach is very close to Bohr’s approach, therefore, we believe Primas just try to extend somehow (or better, to introduce more details about) Bohr’s “complementarity” view. Within the unicorn world, Primas introduces the “emergent quantities” (the classical observable”). (p. 21) In the conclusion of his presentation, Primas believes that “every description of the world’ “is true only within the adopted partition of the world, that is, within the chosen context” (p. 26), and there are new “complementary contexts”. Such “partitions” (chosen contexts) of the world are just some “contextual phenomena” constructed within the unicorn world. Working under Primas’s umbrella, in his article from 1989, working within the unicorn world, Atmanspacher is forced to introduce “information” (an abstract concept): “This bit of information is produced on a virtual (nonreal) sub-quantum level of physical description.” (Atmanspacher 1989, p. 555) The author uses the “concept of infinite alternatives” for describing the production of a “bit of information”. (idem) The EDWs perspective has nothing to do with such SF vocabulary! In the same article, the author uses “spatiotemporal framework”. Also, “complementarity” and “levels” are used within the unicorn world. (p. 556 and p. 557) We strongly emphasize that Atmanspacher has also always been working under the unicorn umbrella!

In his article from 1991, Atmanspacher introduces also certain abstract notions like “complementarity of structure and dynamics as a lattice theoretical duality in an algebraical feature” (p. 206) This “duality” is a “conceptual level of this complementarity”! (p. 206) We strongly emphasize that the author has worked within the unicorn world, even if he “transfers” the dualities from algebra to geometry. (section 5 of this article)

In the context of cosmology and as trophysics of the early universe, the role of human observers is predominantly that of an internal observer, an approach which has particularly been stressed under the heading of a participatory anthropic principle [21]. Corresponding empirical consequences have been indicated recently [22,23]. On a microscopic scale, an internal observer might be thought of as a particle within a many - particle system with its specific dynamical features. … It is important to emphasize that the cases of purely internal as well as of purely external viewpoints are limiting cases, and, as such, of approximative value only. A pure exosystem description is relevant in the hypothetical case of a system completely decouplcd from its environment. Strictly speaking, such a system is unrealistic since it would exclude any interaction with an observer. Hence, no measurement would be allowed and no knowledge could be inferred about the system. On the other hand, a pure endosystem approach seems ill-defined since it would require a sufficiently separable subsystem of the entire system which could - as an exosystem - be used to check detailed predictions. As in the algebraical framework, strict duality is artificial insofar as structure and dynamics, space and time, endosystem and exosystem are inseparably interwoven . (p. 216)

The endo- and exo- systems are constructed within the unicorn world. The “microscopic scale” refers to a particular “level”, obviously, it cannot be an ontological one. So, all these notions are constructed within a general framework, the “unicorn world”.[[349]](#footnote-349) At page 219, the author mentions the difference between “algebra complementarity” and “geometrical complementarity”, but both are constructed within the unicorn world. To avoid ontological contradictions, Atmanspacher introduces again “information” and “emergence” in the next sentences. (p. 219) Following somehow Rössler and Finkelstein, Primas definitions for exo and endo-systems are these:

Definition 1: A system without accessible external observers is called an endosystem.

Definition 2: A part of the world which is split into an observed system and an observing system is called a universe of discourse.

Definition 3: The tools of observation and communication (which may or may not include human observers) constitute an exosystem.

Definition 4: The system observed is called object. Definition 5: A metatheoretical distinction generating an object and an exosystem from an endosystem is called a cut. (p. 1)

Primas writes about the “basic theories” (universal validity) and the “phenomenological theories”, context-dependent which involves “

abstractions evoked by the pattern recognition devices necessary for the observation of phenomena. Such context-dependend abstractions do not falsify our description of the material reality but they create the exophysical patterns by means of which we interpret the world. (Primas 1994, p. 4)

Again, we have “phenomena” which are “depended abstractions” which “interpret the world”. Then Primas introduces the “contextual topology” related to the “abstractions” realized by the “cognitive apparatus or pattern recognition devices”.

The closure of such a higher-level description in the contextual topology generates new context-dependent entities which are not already present in the fundamental description. In this mathematically precise sense, one can speak of the emergence of novelty in descriptions on a higher level. The task of higher-level description is not to approximate the fundamental theory but to represent this contextual novelty. Yet, the universally valid first principles are never sufficient for deducing higher-level theories since, of course, the context is never given by first principles. *The laws of nature do not determine uniquely the world we encounter, the specification of the context is at least of equal importance as the first principles.* (p. 5, his italics)

Again, we have here only “levels”, but epistemological levels not ontological ones, of course, because “ontological levels” sends directly to Descartes and strong ontological contradictions would appear. This “contextual novelty” is just at the “higher level” (“in a mathematical precise sense”, at “higher-level description”). This “context” is a kind of “weak emergence”, no more or less. The author reject “reductionism”, but only from an “epistemological viewpoint”. He can talk about “endophysics”[[350]](#footnote-350) and intrinsic-extrinsic descriptions only within an epistemological perspective. Essentially, later Primas introduces the definition of “interpretation”:

An interpretation refers to a logically consistent theoretical formalism which is in a mathematically rigorous way codified. I adopt the following characterization:

Definition: An interpretation of a mathematically formulated physical theory is characterized by a set of normative regulative principles which can neither be deduced nor be refused on the basis of the mathematical codification. We distinguish between epistemic and ontic interpretations. Epistemic interpretations refer to our knowledge of the properties or modes of reactions of systems, while ontic interpretations refer to the properties of the object system itself, regardless of whether we know them or not, and independently of any perturbations by observing acts. The operationalistic view requires an epistemic interpretation and usually works with a statistical ensemble description. (Primas p. 8)

We have here just epistemic interpretation. Following D’Espagnat, Primas writes about “weakly objective” (“empirical reality”) and “strongly objective” (“endophysical reality”). We have to understand that Primas (and Atmanspacher) write about the subiect-object relationship within the unicorn world! They have no ideas about the EDWs.[[351]](#footnote-351) Primas writes about a table with

* endo-description: related to Plato’s view, Platonian simplicity of abstract and general, fundamental first principles, Platonic truth criterion, ontic natural interpretation, description universal but with limits and not operational, few universal constants, Newtonian time, no facts;
* exo-description: related to Aristotle’s view, Aristotle’s contextuality rich and diverse, phenomenological laws, concrete, perceptible, and empirical objects, for truth there is a “verum fact principle”, it is an epistemic interpretation, operational description (context-dependent), many context-dependent operational constants, “Bergsonian time”, emergence of facts.

Again, it is very clear Primas works within the unicorn world! Primas applies his view to quantum mechanics. There are some endophysical principles (abstract principles which cannot identify) and experimental physics

In contradiction to quantum endophysics, quantum exophysics is associated with experimental physics. Every experiment and every operationally meaningful description requires a division of the endo-world into an object system and an observing system. Yet, the endoworld does not present itself already divided – we have to divide it. Therefore endophysical first principles are not sufficient for an operational description of an exosystem, we have to add the particular context which characterizes the cut between the material object and the material observing tools.

In quantum theories, the concepts of «object» and «observing tools» are conceptually highly nontrivial since a material system qualifies as an observing tool only if it is not entangled with the object by Einstein–Podolsky–Rosen correlations. An exophysical object is characterized by a cut which separates it from its environment, it owes its existence to the interaction with the environment. In particular, the separability and localizability of the exoobjects of our everyday experience are generated by interactions of the separated object with the environment. The cut between object and environment can not be chosen arbitrarily, nevertheless it is not prescribed by endophysical first principles. Exophysical objects are clearly abstraction-dependent, hence contextual, but they are not free inventions. They have no endophysical existence, but they represent patterns of the endo-reality. (Primas, pp. 10-11)

Can somebody tell us that we have here the presence of EDWs? Not at all, there are just “epistemological descriptions” (see the table). More exactly, there are Kantian descriptions (“phenomenological descriptions”)! This is the reason, just two sentences later, Primas writes about “no universal valid principles for exotheoretical descriptions of matter, but only the “contextual phenomenological laws”! (p. 11) There are only “parts of the world we experience”, just in a Kantian sense.[[352]](#footnote-352)

In the next sections, Primas discusses about the ontic quantum endophysics and the epistemic quantum exophysics and about the Heisenberg cut between object and environment, but the framework is again the unicorn world. For instance, the Heisenberg cut involves the object-subject famous distinction, but within the EDWs perspective, there is no such cut! For Primas, this “cut” is “inevitable contextual”.

That is, endophysical first principles are insufficient for a theory of human knowledge. A theory which describes observable phenomena cannot keep the human means of data processing out of consideration. Heisenberg’s cut is necessary for the description of the patterns of the exophysical reality, it determines what we consider as relevant and what was irrelevant. The need for contingent elements is the price we have to pay for the operationalization of the endophysical first principles. In quantum endophysics, the notions “patterns” and “phenomena” have no meaning. In order to get observable patterns, we have to break the holistic symmetry of the endoworld by dividing it into an object system and an observing system. The associated pattern recognition projects the holistic, non-Boolean endoworld into an exophysical Boolean registration system. This projection is neither arbitrary nor unique. It is not arbitrary since all possible patterns are preexistent in the endoworld. But these preexistent patterns become manifest only in the appropriate exophysical tensor product decomposition. The relationship between the endophysical first principles and the directly observable patterns is, however, notoriously difficult. (Primas 1994, p. 17)

We have again the strong clear distinction between the epistemological and the ontological viewpoints under the “subject-object distinction” (“the Heisenberg cut”) umbrella! With these “preexistent patterns” which manifest only when human subject measures something, we move from an ontological viewpoint to an epistemological viewpoint. In this context, we recall that Bohr indicated that, into the definitions of “different entities”, we have the include the measurement apparatus! In the next section, Primas emphasizes the role of the environment in quantum mechanics, but there are only certain “phenomenological different” “objects” in their environment, and therefore, the framework is again the unicorn world.[[353]](#footnote-353)

The connection between fundamental endophysical theories and exophysical descriptions is nontrivial. It is related to the old enigma of the relationship between the simple, eternal, unchanging, absolute universals of Plato’s reality and the rich complexity of particular spatiotemporal material objects of our direct experience. As recent science has moved to more and more abstractions, its basis has become more and more endo-theoretical, and the connection with directly perceptible phenomena has become less and less evident. The predicates of the endotheory cannot anymore be considered as approximately satisfied by palpable exophysical objects. That is, the endophysical reality is quite distinct from the exophysical reality, so that the explanatory and predictive power of endotheories needs to be explained.” (Primas 1994, p. 20)

Someone can claim that in this paragraph, there are EDWs, but we strongly reject this supposition: Primas writes about “phenomenal different worlds” versus the “noumenal world” but not about the EDWs! The distinction between the endophysical reality and exophysical reality is exactly the between noumena-phenomena distinction (object-subject distinction in a Kantian frame strongly related to Heisenberg cut!).

That is, all endophysical observables appear also in exophysics but in addition there are new observables, also classical observables which commute with all observables, and spontaneously broken symmetries. However, inequivalent representations lead to different new observables and to different symmetries. We call such contextual new observables emergent in the sense that they are generated by the endophysical algebra A of intrinsic observables together with a context which selects a particular representation…. Every representation, hence every exophysical description, is related to a particular abstraction and idealization. (p. 20)

Again, we have clearly Kantian noumena-phenomena distinction. Primas uses notions like “emergence”, “infinities” and “spacetime”, concepts rejected by us within the EDWs perspective! We introduce another paragraph in which Primas indicates directly the works within an abstract framework (under the unicorn world’s umbrella):

Our ability to describe the world cannot go farther than our ability to isolate exophysical objects which have individuality and properties. They may change their actualized properties but they keep their identity. We adopt the view that exophysical objects are carriers of patterns, they arise in interaction with the rest of the world, and are always contextual and inherently fuzzy. Nevertheless, they reflect structures of the world. Nature’s pattern emerge and become intelligible only with the active participation of the human mind. Contextual objects are constructed, not «things in themselves», they are phenomenal entities posited by the theory. (p. 21)

Within the EDWs, there are no “emergence” at all, and the human body and certain measuring macro-apparatus has certain interactions with the macro-objects (within the macro-EW), but there are certain ED entities and not “phenomenal entities posited by theory”! Within Primas’ framework without the human being as an observer, everything would be just the noumena, and this indicates us how close he was to Bohr’s complementarity, Kant’s noumena-phenomena distinction, the subject-object distinction and the “Heisenberg cut”![[354]](#footnote-354) Moreover, we strongly emphasize that Primas and Atmanspacher accept the strong epistemology-ontology distinction rejected by the EDWs perspective.

In his article from 1997, Atmanspacher introduces certain epistemological arguments (for understanding complex systems) discussing the Cartesian cut and the Heisenberg cut (object-subject distinction). In their work (1999), Amann and Atmanspacher work also using abstract notions within the unicorn world, even if certain notions seem to send directly to the EDWs. Following Primas (1994), these two authors “strictly isolated systems”, “intrinsic observable” and endo-systems” related to certain mathematical notions. (p. 59) They make the distinction between “ontic states with intrinsic observable” and “epistemic states with contextual observables”.

… we have three categories of quantum systems: isolated endo-systems with pure states, open exo-systems with non-pure states, and exo-objects that are open systems with pure states. From a conceptual point of view, the pure states of endo-systems are ontic in the sense that they are independent of (epistemic) information or knowledge that observers may have about them. By contrast, the states of exo-systems and exo-objects are obviously epistemic, however in different ways. While states of exo-systems are described by density operators, states of exo-objects are described by probability distributions of pure states. (p. 64)

Obviously, all these concepts are constructed within the unicorn world, and therefore there are epistemological notions.

In 2003, investigating the notion of “time” in Physics and Psychology, Primas follows Pauli considering that “mental and material domain” (p. 90), i.e., the mind and the brain, are “complementarity aspects of the same reality”.[[355]](#footnote-355) Then, Primas introduces Jung’s idea (body and mind are “two aspects of the living being” which involves Leibniz’ pre-established harmony discussed by the author in next section.[[356]](#footnote-356) It seems that Primas develops Pauli’s view about the mind-brain problem[[357]](#footnote-357), no more or less:

“Our point of departure is the hypothesis that there is a *timeless* holistic reality which can be described in terms of the non-Boolean logical structure of modern quantum theory. Neither time, nor mind, nor matter and energy are taken to be *a priori* concepts. Rather, it is assumed that these concepts emerge by a contextual breaking of the holistic symmetry of the unus mundus. This symmetry breaking is not unique; there may be different separations, leading to complementarity descriptions of the unus mundus which do not use the concepts “mental” and “material”.” (p. 93)

When someone write about “concepts emerge” and “complementarity descriptions”[[358]](#footnote-358), then she is obviously working under the unicorn world framework! In the next, section, Primas indicates his investigation about “language of quantum theory” (p. 93) He believes that time “emerge from a timeless theory”. (p. 93) Again, Primas writes about theories and descriptions not about what really “exist”! The title of another section is “Mind-matter entanglement”, another wrong view about the EDWs! The conclusion of this article refers to the mind and the matter as two aspects of the same reality (Spinoza’s dual aspects view): “In the proposed non-Boolean description, the concepts time, mind and matter are not given *a priori*. They refer to a symmetry-broken description of the unus mundus.” (p. 114) Again, it is clear Primas works within the unicorn world with a “noumena” like “unus mundus”.

In 2005, Atmanspacher and Primas writes a paper about Einstein’s *versus* Bohr’s (and other scientists working on quantum mechanics) views on the “world”: we grasp independent view about Nature (Einstein) or it is quite impossible to observe directly the “noumena” (Bohr, many from QM). Einstein claimed that if Bohr’s physics referred only to “what we can say about nature”, then this approach would be “incomplete”![[359]](#footnote-359) (p. 2) The authors indicate that Bohr believed QM referred to “individual system”, while Einstein believes QM refers to “statistical ensembles of experiments”. (p. 3) Anyway, the title of this section indicates that it is about “individual and statistical descriptions”, so we deal with an epistemological dispute!

The next section is more important: “Distinguishing epistemic and ontic perspectives”. At the beginning, the authors indicate the difference between “epistemology” and “ontology”.[[360]](#footnote-360) Then, they introduce Scheibe’s approach (1964, 1973) on QM who writes about the “epistemic” and the “ontic” states of a system which can be regarded from an epistemological or ontological viewpoint. “States of a system to which *epistemic descriptions* refer are called *epistemic states*.” (p. 5) We can talk about “statistical descriptions” and “statistical states”. The epistemic descriptions involves observations and measurements which depend on an empirical “context”. So, the “properties associated with an epistemic state are contextual.” (p. 5) “Ontic descriptions” (intrinsic properties) are “ontic states” of a system without depending on certain measurement apparatus. “In this sense, ontic states are empirically inaccessible.” (idem) Essentially for us is that the authors emphasize that they “do not propose an ontic description as an absolutely context-free, ultimately fundamental theory of matter.” (p. 5) “Based on such contexts, an epistemic state refers to the knowledge that can be obtained about an ontic state.” (p. 5) Again, working within Kantian noumena-phenomena distinction, these statements indicate clearly that the authors work within the unicorn world! For them, “*any epistemic description requires an ontological commitment*.” (p. 6, their italics) For us, the distinction between epistemology and ontology is totally wrong, a distinction which was created by philosophers and scientists working only within the unicorn world! In fact, the entire article is constructed under this distinction. The authors write, for instance, that quantum “theory is well established only in its statistical epistemic formulations.” (p. 11) and there “are many physically equivalent representations of quantum theory.”[[361]](#footnote-361) (p. 14) Moreover, the authors introduce “contextual topology” (related to mathematics), and the “emergence of *qualitatively new properties*.” (p. 16) Again, even if the “specification of a context” is as important as the “underlying ontic description” (p. 17), these statements indicate us, directly, the framework of the authors: the unicorn world! The authors use notion like “emergence”, but we we indicated such notion is a meaningless concept within the EDWs perspective! “The simplicity of natural laws manifests itself only in the ontic description, while a representation of the richness of observable phenomena requires the multitude of inequivalent representations.” (p. 18) Also, this statement indicates us the wrong framework these authors: the unicorn world! In fact, the authors introduce nothing new in their approach. However, quite close to the EDWs perspective, there are certain statements referring to the “relative onticity” (section 5.3).

This difficulty can be resolved if it is realized that the distinction of epistemic and ontic descriptions can be applied to the entire hierarchy of (perhaps partially overlapping) domains leading from fundamental particles in basic physics to chemistry and even to living systems in biology and psychology. Ontic and epistemic descriptions are then considered as relative to two (successive) domains in the hierarchy. (p. 18)

Only the “fundamental particles” have an ontologically existence, but in quantum mechanics it was the wave-microparticle relationship wrong interpreted until the appearance of the the EDWs perspective! We cannot accept that biology and psychology deal with real entities since everybody has been working within the unicorn world. Their “ontic-epistemic” distinction is just a linguistic turn within the unicorn world. These two authors furnish an example: atoms and molecules viewed from a physical viewpoint and chemical viewpoint. In the first case, atoms and molecules are “objects in a highly contextual properties” which can be described by interactions of electrons, nuclei and their environments.” (p. 18) A chemist would consider certain properties of molecules as being “intrinsic properties” in an “ontic description” and not epistemologic one. (p. 19) Also, water has properties which the molecules do not have. (idem) This is an “emergent, contextual property from an underlying ontic description”. (p. 19) Again, these ideas indicates the unicorn world framework. In this context, the authors mention Quine’s “ontological relativity” and Putnam’s “pragmatic realism”.[[362]](#footnote-362) For them, the scientific theories indicate different “phenomena”, but the “thing-in-itself” cannot be observable. So, their approach is just an extension of Quine’s “ontological relativity”, but it would be quite absurd someone to compare this approach (constructed within the unicorn world) with the EDWs perspective!

Let us investigate, in detail, article from 2006 (Bishop and Atmanspacher). From the beginning, it has to very clear that Bishop and Atmanspacher work within the unicorn-world! In all this article, they talk about the “relations between properties of systems at different descriptive levels” (in the “Abstract”)! Their main point is the “contextual emergence”. In the first paragraphs, the authors indicate the difference between the “fundamental level” and and the non-fundamental level or “or in descriptive approaches beyond physics (such as chemistry, biology or psychology)” (1754) In this context, the authors introduce notions like reductionism, emergence, hierarchy of descriptions, higher-level and lower-level. It is very clear, all these notions are constructed within the unicorn world and are just epistemological notions, no more or less!

In the philosophical literature, the usual guiding idea behind reductionist approaches is to “reduce” higher-level features to lower-level features. In contrast, emergentist approaches emphasize the higher-level features by stressing the irreducibility of (some of) their aspects to lower-levels. In this way, the emergence of features at higher levels is related to the emergence of novelty. (Bishop and Atmanspacher 2006, p. 1755)

Again, it is very clear that this statement is constructed within the unicorn world! There are many discussions on “levels” (epistemological, ontological, etc.) and “emergence” (weak, strong, epistemological, ontological, etc.), but all these notions, including “strong emergence” are constructed within the unicorn world! The authors indicate Chemistry (molecular structure and liquidity[[363]](#footnote-363)) and “thermodynamics” (temperature[[364]](#footnote-364)) cannot be reduced to quantum mechanics:

there are properties of the higher-level theories (chemistry and thermodynamics) for which the full arsenal of the fundamental theories (quantum mechanics and statistical mechanics) provide no sufficient conditions for their derivation or definition. Our examples illustrate the significance of a rarely discussed kind of interlevel relation we call contextual property emergence. We propose this category embedded in a framework classifying the relations between properties at different levels of description in Sec. 2. It allows us to reconsider standard characterizations of property emergence in the light of modern developments in physics (Secs. 3 and 4). (Bishop and Atmanspacher 2006, p.1755)

Also, this paragraph indicates that the authors work with “levels of descriptions” (being only one fundamental level studied by Physics), no more or less! Their “contextual property emergence” is introduced within this epistemological “context”, i.e., a “descriptive” one. The same observation is available for the next sentence referring to the mind-brain problem:

Specifically, one may think of relations between different levels of descriptions in brain physiology, e.g., relations between properties of neural ensembles or populations and properties of individual neurons and synapses. An even more ambitious application would be to the emergence of the mental from the physical. (Bishop and Atmanspacher 2006, p.1755)

After relating notions like “reduction”, “emergence”, “levels of descriptions” (epistemology) and “levels of reality” (ontology), the authors emphasize a classical notion (many discussions) in philosophy: “different types of features”. (1756) The “property relations” are either epistemological or ontological. (1756)

A standard candidate for discussing epistemological theory relations is the relation between special relativity and classical mechanics. A standard candidate for discussing ontological part/whole relations is the relation between molecules on the one hand and nuclei and electrons on the other. A standard candidate for discussing ontological property relations is the relationship between thermodynamic properties such as temperature and mechanical properties such as momenta; its epistemological variant would be the relationship between the descriptive terms referring to those properties. In this essay, we will mainly focus on epistemological property relations: reduction and emergence in the description of properties. (Bishop and Atmanspacher 2006, p. 1756-57)

It is about the “descriptions of properties”, so the authors work within an epistemological framework of the unicorn world. Their “levels of descriptions” are related to four classes of “relations”: (1) reduction, (2) contextual emergence (high level properties cannot be described by lower-level properties) (3) supervenience (4) radical emergence. For them, the “higher-level features” both supervene and emerge from the “lower-level features”. (1757) Even if the authors work with low-level and high level properties, there are neither “ontological levels”, nor EDWs, but epistemological/descriptive “levels”. Anyway, their “contextual property emergence” is related to Kim’s “emergence property”.[[365]](#footnote-365)

All the main notions in their article refer to different “epistemological entities” within the unicorn world, even if, later, the authors related, within a “weak (epistemological) emergence” framework, their descriptive levels with “topologies of their corresponding spaces” (Primas’s notion). In Primas’s words, “the description in the coarser, contextual topology allows us to define new context-dependent features (novel properties) of a higher-level description that are not defined in the original state space under the finer topology (cf. Refs. 46 and 51)”. (pp. 1761-2) Obviously, there are epistemological “high-level properties” which cannot be explained by the “lower-level properties” (a very discussed topic in philosophy).

Invoking a new contextual topology, then, accommodates novel properties as such within a higher-level description rather than approximating them as a limiting case in the topology of a lower-level description. It is important to realize that “the task of higher-level descriptions is not to approximate the fundamental theory but to represent new patterns” (Ref. 46, p. 87). In general, these patterns are not reducible to a more fundamental level in the strict sense of class (1). Such reducibility would mean that only the first principles of the fundamental description are needed to describe new patterns exhaustively. If higher-level contexts in addition to first principles must be considered in order to rigorously derive descriptions of these new patterns, then reduction according to class (1) fails. (1762)

Even in this paragraph, there are only “levels of descriptions”, within an epistemological non-reductive framework! Moreover, within a “dynamical framework”, the “emergent novel properties” are related to new “contingent context” (not available at the lower levels), but these “contexts” are also epistemological notions[[366]](#footnote-366) which send directly to Spinoza’s dual aspects! Obviously, the “molecular structure” cannot be explain using notions from quantum mechanics.[[367]](#footnote-367)

In the next sections, the authors show that “temperature” cannot be defined at the level of statistical mechanics since it “emerges as a novel property at the level of thermodynamics”. (Bishop and Atmanspacher 2006, p. 1770)

Thermodynamic temperature is an example of a contextually emergent property, which is neither contained in nor predicted by the exhaustive lower-level mechanical description alone. However, given the lower-level mechanical description and an appropriate contextual topology (based on the KMS state), thermodynamic quantities can be rigorously derived. Again, the contextual topology is a contingent condition not implied by the lower-level theory with the original topology as neither the concepts of thermal equilibrium nor of KMS states are applicable at the lower level. This is precisely the conceptual scheme of contextual emergence, where the emergent property is the temperature (or other thermal features) of thermodynamics. At this point let us emphasize that the contextual emergence of temperature does not exclude or contradict the possibility of conceiving temperature as supervenient. As supervenience is based on sufficient conditions at the lower-level description, it takes into account that different statistical mixtures (distributions) of particles can be considered as multiple realizations of a thermal state with the same temperature. (Bishop and Atmanspacher 2006, p. 1770-1)[[368]](#footnote-368)

Using supervenience and “epistemological levels”, the authors indicate they are working within the unicorn world: “the description of properties (and laws) at a particular level of description offers necessary but not sufficient conditions to derive properties at a higher level of description”. (Bishop and Atmanspacher 2006, p. 1771)

At the end of their article, the authors move to a very dangerous problem for their framework: the mind-brain problem. They write about the new emergence properties between the neuronal ensembles and the individual neurons, but also between the mind and the brain:

Examples of contextual property emergence such as those discussed here can serve as models for generalizations concerning ideas related to ontological relativity and downward causation in broader contexts. Both notions have been addressed in recent work (Ref. 5, 9, and 46), and they have been illustrated for examples from physics and chemistry. Eventually such a line of investigation might yield steps toward a better understanding of how mind can emerge in and have an influence on a physical world. (Bishop and Atmanspacher 2006, p. 1775)

Within the unicorn world, the “ontological relativity” and the “downward causation” are very strange notions which lead directly to certain strong ontological contradictions. For a much better explanations, the authors needed the EDWs perspective, not “ontological relativity” and “downward causation”, just empty notions in the EDWs perspective or even in the unicorn world!

In his article from 2014, under Pauli-Jung’s umbrella, Atmanspacher investigates the notion of “correlation” (instead of “causal relations”). Pauli and Jung transformed Cartesian ontological dualism in an epistemological dualism (a neutral monism and two different “aspects”, physical and mental[[369]](#footnote-369)). (Atmanspacher 2014, p. 431) Therefore, Atmanspacher introduces the “structural correlations” (“synchronicities”, pp. 431-2) between the mental and the physical states. (idem) In their article 2019, Atmanspacher and Martin investigate different kinds of “correlations”: diachronic correlations (which involves time, i.e., the “dynamical laws”, with causal and a-causal “models”), synchronic correlations (time is not involved, therefore no predictions or causal aspects are implied, with Nagel’s “ ‘bridge laws’ for laws connecting domains of discourse”. (Atmanspacher and Martin 2019, p. 8) Anyway, the relationships between “different domains of scientific descriptions of a particular phenomena are expressed by atemporal, synchronic correlations”.[[370]](#footnote-370) (p. 9) There are the lower (more fundamental) and the higher “levels”. Essentially, the authors introduce four kinds of relationships between the lower-level and the higher-level properties: reductionism; radical emergence; lower level properties furnish sufficient but not necessary conditions to derive the description of properties in a higher level domain (multiple realizations, i.e., many-to-one correlations between lower and higher levels); contextual emergence. “The description of properties in a particular higher-level domain of description (including its laws) offers necessary but not sufficient conditions to derive the description of properties in a lower-level domain.”[[371]](#footnote-371) (Atmanspacher and Martin 2019, p. 9) In this article, Atmanspacher and Martin adopt the same Spinoza’s dual-aspect approach regarding the mind-brain problem.[[372]](#footnote-372)

Our conclusion about Primas and Atmanspacher is that they have been working under unicorn world, within an epistemological “dualism”, but they did not have any idea about the EDWs perspective! It seems that Chalmers’ approach is quite closed to the EDWs, but even so, it is constructed within the unicorn world:

As the physical stuff combines, according to physical laws, into ever more complex structures like the brain, these tiny protophenomenal properties inside matter combine into conscious experience and sensation. Chalmers suggests that there must be principles for how these protophenomenal properties combine, which would run in parallel with, but be independent of, the way that the physical dispositions combine:

This is . . . the combination problem for panpsychism. To answer it, it seems that we need a much better understanding of the compositional principles of phenomenology: that is, the principles by which phenomenal properties can be composed or constituted from underlying phenomenal properties, or from protophenomenal properties. (Chalmers, 2003, p. 266)[[373]](#footnote-373) (Banks 2010, p. 181)

However, Banks asks

Why would we need two completely different, parallel orders of composition if the protophenomenal properties are exactly the occupants of the known causal roles of physics? Won’t the principles of combination be just the same? I can’t see how there could be a second ordering besides that by which physical dispositions ordinarily configure by known physical laws.16 Moreover the idea that physical dispositions in matter are little ‘‘proto-sensations’’ seems wrong, much less proto-sensations in little ‘‘proto-egos’’ (Strawson, 2006). (Banks 2010, p. 182)

So, within the unicorn world, Banks rejects Chalmers’ dual aspect approach!

The authors of this chapter, as all philosophers and scientist from all particular sciences have been working under the unicorn world, even those who accepted and developed Spinoza’s dual aspect approach and Bohr’s complementarity. It has to be very clear neither of them had any idea about the rejection of the “Universe/world” and the discovering of the existence of the EDWs! Gabriel Vacariu is the only one who discovered the existence of EDWs!

**Chapter 9**

**Based on Einstein’s general relativity, about Rovelli’s[[374]](#footnote-374) rejection**

**of the ontology of “spacetime”**

Rovelli informs us about several essential steps in the history of human thinking referring to space and time (or spacetime): Galileo, Newton, Einstein followed by his rejections of “spacetime”. From Aristotle to Descartes, “space” was stated from the relational viewpoint: “space” is the relation between objects. In this context, it was defined the “relative motion” (the motion of an object is view as going from the contiguity of one object to the contiguity of another object). (Rovelli, p. 28) If space is viewed as something that has its ontology, the motion of an object (“absolute motion”) is defined as it going from one part of the space to another part of that space. (idem)

Democrat and Newton supported the absolute motion which required an “absolute space” (for Newton, “absolute space” had to be “truly distinct from moving bodies” (Newton in Rovelli 2006, p. 29) and “absolute time”. Rovelli investigates the “un-famous” Newton’s example of “bucket experiment”, “the bending of the surface water in the bucket”: “Newton insists in supporting the idea the the water in its circular motion is bending in relationship with the absolute space. (Rovelli 2006, p. 29) Rovelli mentions Leibniz and Mach as opponents to Newton’s idea of “absolute space”.[[375]](#footnote-375) (2006, p. 30)

After three centuries, Einstein introduced his special and general relativities which “relativized” space and time (“spacetime”). Rovelli interprets Einstein’s general relativity in the following sense: the “spacetime” is just a “local configuration of […] the gravitational field - very similar to the electric and the magnetic field”. (Rovelli 2006, p. 27) More exactly, the “curved spacetime” is just the “curved gravitational field”, no more or less.

The clean way of expressing Einstein’s discovery is to say that there are no space and time: there are only dynamical objects. The world is made by dynamical fields. These do not live in, or on, spacetime: they form and exhaust reality.

One of these fields is the gravitational field. In the regimes in which we can disregard its dynamics, this field interacts with the rest of the physical objects as if it were a fixed background. This background is what Newton discovered and called space and time. We can keep using the evocative terminology “spacetime” to indicate the gravitational field. But it has practically none of the features that characterized space and time. Relativistic spacetime is an entity far more akin to Maxwell’s electric and magnetic fields than to Newtonian space. (Rovelli 2006, p. 27)

From our viewpoint, this idea is quite wrong: indeed, we can reduce “spacetime” to something else, but not to the “gravitational field” (which do not have any ontology!). Within the EDWs perspective, in our book 2016, we replaced “spacetime” with the “curved nothing” (within the macro-EW with no ontology) which corresponds to the “curved electromagnetic field” (an entity with its ontology and belonging to the field-EW). (For more details, see 1.4 of this book) Therefore, the last sentence of the above paragraph is much better, but it has to be translated in the following: “a planet (a macro-entity within the macro-EW) curves ‘nothing’ which surrounds it, and this ‘nothing’ (no ontology) corresponds to the electromagnetic field (an entity within the field-EW)”.[[376]](#footnote-376)

According to Rovelli, within the general theory of relativity, the “absolute space” can be replaced with the “gravitational field”: the water is concave just because if its interactions with the “gravitational field”, not with the “absolute space”. Therefore, we do not need even Einstein’s relative “spacetime”! Rovelli argues that the relativistic “space” and “time” coordinates (“spacetime”) “have no direct physical meaning”![[377]](#footnote-377) (Rovelli 2006, p. 31) The wrong Einstein and Rovelli’s idea is that the “gravitational field gμυ(x) determines a four-dimensional continuum with a metric structure”. (Rovelli 2006, p. 31) In this way, Rovelli can reject the notion of spacetime (the ontology of spacetime): “what disappear with GR is the idea of space as the ‘container’ of the physical world”. (Rovelli 2006, p. 32)[[378]](#footnote-378) From our viewpoint, Rovelli’s great mistake is that, working within the unicorn world, he accepts the existence of the gravitational waves! In section 1.4 of this book, we indicate that these “gravitational waves” cannot even exist. The “gravitational waves” are just “nothing” (no ontology) which *correspond* to the electromagnetic field (which belong to the field-EW) which has the speed of light, c.

Rovelli informs us that Newton needed to add “God” to his absolute space and absolute time, i.e., space is “the position of objects in the eyes of God”. (Rovelli 2006, p. 32) However, Rovelli insists in claiming that “spacetime” does not exist, we do not need it, “reality” being just a “net of interactions” between certain objects, no more or less. “We do not need Space to hold the Universe.” (Rovelli 2006, p. 32) Rovelli believes that rejecting the existence of “spacetime”, Copernican revolution is “finally being completed”. (p. 32)

From our viewpoint, there is neither “spacetime” nor “gravitational field”, but just this “curved nothing” (no ontology) which is “curved by a planet” but corresponds to the “huge concentration of electromagnetic field”, a “toroidal electromagnetic field” and this “toroidal electromagnetic field” is surrounded by an electromagnetic field much less “curved” by this toroidal electromagnetic field (within the field-EW). Therefore, Einstein’s “curved spacetime” (which, for him, is “gravitation”) does not exist (since spacetime does not exist, see Vacariu and Vacariu 2016 and 2017), Newton’s and Rovelli’s “gravitational field” cannot even exist, but the “gravity” is about “nothing curved” (the distance between the apple and Newton’s head) which corresponds to the “curved electromagnetic field” by the toroidal electromagnetic field (which corresponds to the planet), no more less!

**Conclusion**

**EDWs, no more or less!**

Very shortly, let us investigated, from our perspective, some problems of actual physics mentioned by Presura at the end of his book.

* The properties of Higgs boson: it has to be clear that the Higgs bosons correspond to the field-Higgs.
* Dark matter and dark energy: see chapter 6 of this book or our book 2016.
* The collapse of the wave function: is has to be clear there is no “collapse”. There is a waves and the corresponding particle and the human observer who observe either the field-EW or the microparticle-EW (EDWs).
* The essence of “renormalization”:

within the quantum field theory renormalization represents the association of other values to masses, charges or fields for the particles describes by those fields. “The renormalization tell us that our theory, as we know it, is an approximation of a theory that has to be discovered. Which is that theory? (Presura 2014, p. 610)

This new theory is, of course, the EDWs perspective! We need this “renormalization” just from a pragmatic reasons, but in reality, there are real values of masses and charges for all particles (which belong to the micro-EW) which corresponds to certain electromagnetic fields (which belong to the field-EW).

* The strengthens of gravitational interaction (see above)
* Quantum gravity (see above)
* Why there is something than nothing? In other works, we discussed about the fact that the “Universe” could not appear from “nothing”. The” matter” (the field and the microparticle) has appeared from the Hypernothing. (See also chapter 1 of this book)

From the viewpoint of quantum mechanics, there is no empty space, there is, better, a space in a minimum energy state, state which has a finite energy and it is a “soup” of microparticle under their virtual form. All we need is that those particle exist potentially… this alternative is close to the approach of some physicists that the Universe appeared from a quantum instability of … nothing. (Presura 2014, p. 613)

As we indicated above and in other works, such alternative would lead to certain strong ontological contradictions!

* The origin of fundamental equation of Universe: Who generated these final laws? What are their basis? Who wrote them? From the EDWs perspective, these questions are meaningless, since there is no “ultimate laws”. Any law is just an approximation of reality, no more or less.
* Causality and the perception of time: why is the causality cemented in the laws of Universe? Why there is only one dimension of time? (there are other questions…) We furnish the answer from the EDWs: time does not exist, and we can talk about ED causalities (each causality involves entities that has to exist within the same EW!), but neither about “causality” in general, the Kantian terms, nor in the language of quantum mechanics (all alternatives are quite wrong, according to the EDWs perspective).
* Why is the Universe describable mathematically? We reply with Einstein’s words: “As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality.” (Albert Einstein, address to Prussian Academy of Sciences 1921) In other words: mathematics is a large knowledge developed by the human beings during millennium. Just some small parts of “mathematics” fit (with great approximations) with some parts of reality, but in general, mathematical knowledge has nothing to do with reality, the EDWs! The reader has not to forget: nature (the EDWs) has (have) no idea about mathematics:

Within the EDWs perspective, we cannot talk about “fundamental entities”, “spacetime”, “infinite”, “emergence”, and many other notions from Physics! If we use even one of these notions, we reach strong ontological contradictions! It is as if we believe in God, but “God cannot even exist”! (See Vacariu and Vacariu 2019 or Vacariu 2015)

In the “Conclusion” of this book, we want to say few words about the two postulates of Einstein’s special relativity:

The postulates of special relativity:

1. The principle of relativity

The laws of physics are the same in all inertial frames of reference.

2. The constancy of speed of light in vacuum

The speed of light in vacuum has the same value c in all inertial frames of reference.

Why Einstein introduced these two postulates? Einstein worked within the “Universe”, the unicorn world. This is the reason he introduced the first postulate. From our viewpoint, we can extend the first postulate, the “extended first postulate”: “*Each EW has its own laws of physics.*”

Regarding the second postulate about the speed of light: Einstein was under Maxwell’s influence, of course. However, it seems that the second postulate contradicts our extended first postulate since the speed of light is the same in all EDWs! It seems that the speed of light in “vacuum” is “absolute”, the same for all observers, even if they are in EDWs! As we indicate in this work (and in our previous works), the speed of light is the same because the electromagnetic waves are all in the same EW, the field-EW. The light has the same speed in all “inertial frames of reference” just because when the speed of an entity increases, it is not “time which dilates” (and “space which contracts”), but the movement of arc of a clock has motion, no more or less. The light has the same speed c in all EDWs because its correspondence (“nothing”) has the same speed, c: **indirectly**, our body (in the macro-EW) measures the speed of light, anyway.[[379]](#footnote-379) The light is “absolute” just because it **corresponds** to all entities and their “empty space” between them which belong to the EDWs. However, “vacuum” does not exist (it has no ontological status), anyway, the electromagnetic waves are not in “vacuum” or in “space”, since the electromagnetic field fills the entire “Universe”. From our viewpoint, the electromagnetic field is an EW that fills everything and corresponds to all entities that belong to the EDWs. There is no place for “space” or for “vacuum”. The light exists only in the field-EW, while the corresponding photons (the micro-EW) belong to the micro-EW. In the macro-EW, there is neither light nor photons, but, in the mind-EW, we can “perceive” some macro-objects just because of the correspondence between the light from the field-EW, the photons (the micro-EW) and the lighted macro-objects (the macro-EW)! Our body is in the same EW as the macro-objects, but the light does not interact with the macro-objects, since the light and the macro-objects are in EDWs. The straight electromagnetic wave (light) interacts with the curved electromagnetic waves (microparticles which correspond to the macro-object which we “observe” because of the “light”).

The field-EW appeared before the micro-EW, the micro-EW appeared before the macro-EW in the Hyperverse. So, the electromagnetic fields just *correspond* to all microparticles which correspond to all macroparticles. Also, the macroparticles correspond to the electromagnetic fields, and in this sense, “light is absolute” in all EDWs. Therefore, *“light having speed c” corresponds to all macro-entities.*[[380]](#footnote-380) We have not to forget, the Hyperverse is like a “tree” with many “branches” (each branch with many sub-branches, and so on), but a branch does not exist for any other branch! This is the Hyperverse. We recall the motto of this book: “Matter will be spiritualized when the true theory of physics is found.” (Gödel) If so many physicists (and people from cognitive neuroscience and philosophy) have plagiarized our ideas, then EDWs perspective is indeed “the true theory of physics” for the next 200 years!

With this book, we overwrite the entire Physics![[381]](#footnote-381) The physicists has been working within the wrong framework of the unicorn world. We replaced this wrong framework with the EDWs. We discovered the existence/being of EDWs only trying to solve the mind-brain problem. We believe a physicist could not discover the existence of EDWs working only on the problems from physics. Why? Because all problems of physics refer to the entities that are external to the human observer. Only trying to solve the mind-brain problem could someone discover the existence of EDWs. We could apply the EDWs perspective not only to the mind-brain duality (that requires two EDWs) problem but to all external dualities like the wave-microparticle or the microparticle-macroparticle. (Recall SP) In this way, we overwrite the main theories in Physics. We believe the discovery of the EDWs, it has been the greatest challenge in the history of human thinking, it has been the greatest Copernican revolution! From now on, all physicists will think and work within a new paradigm of thinking, the EDWs perspective...

We end with book two observations. The first one is with Edwin Hubble. He claims that: “Observations always involve theory.” Obviously, Hubble was right. However, the reverse is accepted by everybody. We have seen many theories (constructed on experimental results) as being wrong human mind’s construction! Any scientific theory is a mixture of empirical results and mental concepts. In the end, the most important element is the framework of human thinking in which the scientists has been working and constructing both empirical and theoretical results!

The second observation is about Richard Feynman. We recall the motto of the introduction: “The present situation in physics is as if we know chess, but we don't know one or two rules.” (Richard Feynman) The problem was that, every physicists from all countries played a wrong game until Gabriel Vacariu wrote his first articles and his second PhD thesis (2007) in which he indicates that the wrong framework for everybody has been the unicorn world (the Universe, the world), a wrong framework!

I must say, I'm concentrating on discovering fundamental laws. There's a whole range of physics, which is interesting and understanding at another level these phenomena like super conductivity in nuclear reactions. But I'm talking about discovering trouble, something wrong with the fundamental law. So nobody knows where to look there, therefore all the experiments today– in this field, of finding out a new law– are in high energy. (Feynman 1964)

In reality, it is not about new “fundamental laws”, the “trouble” is not only “something wrong with the fundamental law”, and indeed, during the last 100 years, regarding, for instance, the dispute between Einstein’s general relativity and quantum theory, “nobody knows where to look there”, it is not about “high energy”, but about the most general framework (the unicorn world) in which everybody has been working until Gabriel Vacariu discovers the existence of EDWs! Feynman continues in his article with this paragraph:

What we need is imagination. But imagination is a terrible straitjacket. We have to find a new view of the world that has to agree with everything that's known, but disagree in its predictions, some way. Otherwise it's not interesting. And in that disagreement, agree with nature. If you can find any other view of the world which agrees over the entire range where things have already been observed, but disagrees somewhere else, you've made a great discovery. Even if it doesn't agree with nature. It's darn hard, it's almost impossible, but not quite impossible, to find another theory, which agrees with experiments over the entire range in which the old theories have been checked and yet gives different consequences in some other range. In other words, a new idea that is extremely difficult, takes a fantastic imagination. (Feynman 1964)

Gabriel Vacariu discovered another “view of the world which agreed over the entire range where things have already been observed, but disagreed somewhere else” and indeed, he “made a great discovery” the greatest in Physics and Philosophy, in fact, in the entire human thinking, until today.[[382]](#footnote-382) His EDWs perspective “doesn’t agree with nature”, since “nature”, i.e. the world, does not exist. Feynman was right: this “new idea that is extremely difficult, takes a fantastic imagination”! Gabriel Vacariu has been the human being who had this “fantastic imagination” for discovering the EDWs! He discovered the EDWs working on the mind-brain problem. He believed that working in Physics (it did not matter which problem you tried to solve), it was quite impossible to discover the EDWs just because the physical EDWs had been all “external” to the subject. Anyway, since Descartes until our days, nobody has been able to solve the mind-brain problem (a problem much older than all physical problems) just because they have been working within the wrong framework, the unicorn world. All physicists have been working within the same wrong framework and this has been the reason nobody could have clarified field quantum mechanics mysteries, nobody could decide between Einstein’s general relativity and quantum mechanics, and nobody could have solved all other great problems of Physics. Discovering the EDWs, in his works (2002-2020) and in this book, Gabriel Vacariu and Mihai Vacariu have been able to solve all great problems of Physics!

The reader has to be aware that each ED entity corresponds to something which belongs to an EDW and the life-, macro-, micro-entities corresponds to the electromagnetic field with different properties (the field-EW) which is present everywhere in the known “Universe”. When you move your macro-body (because of the correspondence between the mind (an EW) and the body) on the street within the macro-EW, some parameters of the corresponding electromagnetic field (the field-EW) have been changing and this field-EW hypercorresponds to the Hypernothing, even if it is quite wrong to ask about “changes” or “no changes” which have taken place within the Hypernothing-EW.

It has to be very clear nobody discovered the existence of EDWs before (or later) Gabriel Vacariu and everybody has been working within the unicorn world, i.e, the Universe/ world. Primas and Atmanspascher’s dual aspect approach unified with Bohr’s complementarity is constructed within the unicorn world under an epistemological umbrella. In order to avoid great ontological contradictions, they used just “epistemological levels” or “levels of descriptions”. They had no idea about the EDWs! With EDWs perspective, we have solved the greatest problems of physics: the most difficult problems of quantum mechanics (entanglement and nonlocality), the relationship between Einstein general relativity and quantum mechanics, the missing ontology of spacetime (using motion, we re-wrote both relativities without spacetime), we indicated that the theory of hyperspace is a totally wrong theory, and we showed that the TOE is a missing notion. Since “Universe” does not exist, an unifying theory is an absurd framework. Obviously, the majority of physicists will adopt the EDWs, even if it is something totally against the great “unification myth”[[383]](#footnote-383) of the last 100 years.[[384]](#footnote-384)

Obviously, following a Kantian line, if Bohr writes that “It is wrong to think that the task of physics is to find out how Nature is. Physics concerns what we say about Nature”[[385]](#footnote-385), then we recall our idea from section 6.4: for an electromagnetic field, there are other EDWs than there are for any human being or for other ED entities than macro, for instance. Then the physicists have to accept this new paradigm of thinking, the EDWs perspective, if they want to go further in their research for extracting new ED laws which involved ED entities. We recall Einstein’s verdict (the first motto of this book): “A clever person solves a problem. A wise person avoids it.” With the EDWs perspective, we indicated that many essential problems from Physics, Cognitive Neuroscience and Philosophy have been pseudo-problems constructed within a wrong framework, the “Universe” or the “unicorn world”! We replace this wrong framework with a new one, the EDWs perspective. We believe the EDWs perspective will be the new paradigm of thinking not only for physicists but also for cognitive neuroscientists and philosophers in the next 200 years. All essential laws of Physics will be re-written within this new paradigm of thinking, the EDWs perspective![[386]](#footnote-386)

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1. Discovering the EDWs, Gabriel Vacariu HAS CHANGED EVERYTHING in human knowledge! His EDWs is the greatest CHALLENGE in the history of human thinking. Many people have published UNBELIEVABLE similar ideas to our ideas long time after we published and posted our first works on Internet. About the UNBELIEVABLE SIMILARITIES here: <https://www.academia.edu/s/0c1502ea90>

   <https://www.researchgate.net/publication/340621608_April_2020_2014_Gabriel_Vacariu_UNBELIEVABLE_similarities_odf>

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   All our main ideas (the mind-brain problem, main problems of cognitive science and quantum mechanics, Einstein’s relativity vs. quantum mechanics, etc.) from my Springer’s book (2016) can be found in my PhD thesis (2007), UNSW (Sydney, Australia, posted on university’s website, free, by the university’s team in 2007) <https://www.unsworks.unsw.edu.au/primo-explore/fulldisplay?vid=UNSWORKS&docid=unsworks_5143&context=L>

   Nobody discovered the EDWs during 2500 years, Gabriel Vacariu discovered them in 2002 (first publication), 2003 and 2005. Amazing, in the last years, many people also “discovered” the existence of EDWs! Statistically, it is quite impossible, so many people (hundreds!) to “discover” the EDWs! (Don’t forget, we have been working within the Internet’s world, therefore, communication is much faster than 20 years ago...) “I don't care that they stole my idea. I care that they don't have any of their own… The present is theirs; the future, for which I really worked, is mine.” (Nikolai Tesla) What these authors have been missing comparing with Gabriel Vacariu? They have been either physicists or cognitive neuroscientists or philosophers while Gabriel Vacariu is a philosopher working Cognitive Neuroscience and Physics! This is the main reason they have been unable to discover the EDWs and to think and write the “Metaphysics of EDWs” (our book 2019)! [↑](#footnote-ref-1)
2. Large parts of this chapter can be found in our previous works (2002-2008-2016-2017). [↑](#footnote-ref-2)
3. These principles appeared in Gabriel Vacariu’s previous works 2005, 2006, 2008, etc. [↑](#footnote-ref-3)
4. As we indicated in our Metaphysics (2019) in the last chapter, it does not matter religion, “God” cannot even exist”! [↑](#footnote-ref-4)
5. For more details, see Gabriel Vacariu’s book 2016. [↑](#footnote-ref-5)
6. As we indicated in our previous work (Vacariu and Vacariu 2016b), and in chapter 2 of this book, “time” does not exist. However, we use this notion here just for pragmatic reasons. The reader should not make the confusion between pragmatism and ontology… [↑](#footnote-ref-6)
7. Everett’s many worlds and also the “multiverse” approach are approaches TOTALLY different from the EDWs perspective. The “many worlds” are placed within the unicorn world. Also, in the multiverse, all the “universes” are within the same macro-EW, i.e., they are all “placed” within the same “spatio-temporal framework”. In our EDWs perspective, one EW does not exist for any other EDW, and spacetimes has no ontology! (For more details see section 4.8 of this book or our book 2019.) [↑](#footnote-ref-7)
8. Obviously, the appearance of our “Universe” from “nothing” (as many physicists and philosophers believe in our days) is a very strong ontological contradiction! (see below) [↑](#footnote-ref-8)
9. The Hypernothing is something beyond existence vs. non-existence, being vs. non-being, material-immaterial. [↑](#footnote-ref-9)
10. Because of some pro-arguments, many physicists believe there was a beginning: the quantification of energy (light), the reason why the dark night is night and not lighten (the “Universe” is dark during night, means the Universe has a finite period. Otherwise, if nights were lighten, the Universe would be infinite. In an infinite and static “Universe”, the lights of the stars would have time to cover the entire space of the Universe. (Presura 2014, p. 596) [↑](#footnote-ref-10)
11. A formal logic is a system that has a set of symbols, the possibility of combining them, and rules for such combinations. (Clark 2001, p. 9) [↑](#footnote-ref-11)
12. Friedman mentioned Hopkins who invokes “visual” or “phenomenal” geometry to explain Kant’s preference for Euclid. (Friedman 1992, p. 103) Against Kantian pure intuition of space, he asks how, through pure intuition, is it possible to distinguish between the sum of the angels of two triangles, one being 180º and the other being 180.000001º? Thus, in the post-Kantian period we have completely rejected both a) the necessity and the universality of certain principles (basic principles of geometry and mechanics) and b) the necessary relationship between the intuitions and concepts that are applied in exact science and the their apriority. Many philosophers, from Carnap to Friedman, have tried to save certain elements from Kant giving up on the necessity and universality of these principles. With Einstein’s theory, it becomes clear that, in physics, a scientific theory is true even if it does not directly involve any spatio-temporal framework. [↑](#footnote-ref-12)
13. “To Einstein, the stage itself would become an important part of life. In Einstein’s universe, space and time were not a static arena as Newton had assumed, but were dynamic, bending and curving in strange ways.” (Kaku 2005, p. 35) [↑](#footnote-ref-13)
14. “Reichenbach eliminates the Kantian intuitions and relativizes Kantian constitutive principles. With his “constitutive of the concept of the object of knowledge”, he makes a step toward Wittgenstein’s “linguistic turn”. Carnap formulates a further step in defining the meaning of logical empiricism, so that “the sense provides the material of cognition but mathematics and logic form the organized system of knowledge”. (Carnap 1928a/1967, v-vi in Friedman 1999, p. 9) The “linguistic turn” eradicates the constitutive elements in constituting the external world. Wittgenstein and Carnap (with his “linguistic framework”) are emblematic of “linguistic philosophy”. (Hanna 2001) One might add other important approaches that follow this unique direction compelled by the unicorn-world: Goodman’s “ways of worldmaking”, Kuhn and Feyerabend’s incommensurability of scientific theories, Davidson’s conceptual schemes and Friedman’s relativized a priori principles.” (Vacariu 2008) [↑](#footnote-ref-14)
15. We mention here, even if, in later chapters we develop this idea, within the macro-EW, the planet curves nothing, but within the field-EW, the planet corresponds to a concentrated electromagnetic field and increasing the distance from the planet, the corresponding electromagnetic field becomes more and more straight! Anyway, the electromagnetic field which surrounds that concentrated field (which corresponds to the planet) is curved. Therefore, an apple falls on Earth just because the corresponding activation of the electromagnetic field for that apple moves toward the much more concentrated electromagnetic field corresponding to the Earth. These activation of the electromagnetic field corresponds to two amalgams of microparticles (which correspond to the apple and to the Earth). [↑](#footnote-ref-15)
16. We reach another ontological contraction if we posit the table and the amalgam of microparticles (that “compose” the table) in the same place at the same time. Usually, for avoiding this ontological contradiction, many people reject the ontological existence of “table” and accept only the existence of the microparticles (the reductionists). However, exactly on the same grounds, we have to reject the existence of either the table or the space-time! Spacetime is not an EW, just because it cannot have any entity… [↑](#footnote-ref-16)
17. “Einstein was thus led to believe that gravity was more like a fabric than an invisible force that acted instantaneously throughout the universe. If one rapidly shakes this fabric, waves are formed which travel along the surface at a definite speed… by reducing gravity to the bending of space and time, Einstein was able to reconcile gravity and relativity.” (Kaku 2005, pp. 35-6) [↑](#footnote-ref-17)
18. “Many physicists believe that the smallest possible distance is the Planck length of 10^-33 cm. At this incredibly small distance, space-time is no longer smooth but becomes ‘foamy,’ resembling a froth of bubbles. We can divide up the spherical surface of the horizon into tiny squares, each one the size of the Planck length. If each of these squares contains one bit of information, and we add up all the squares, we find roughly the total information content of the black hole. This seems to indicate that each of these ‘Planck squares’ is the smallest unit of information. If this is true, then Bekenstein claims that perhaps information is the true language of physics, not field theory. As he puts it, ‘Field theory, with its infinity, cannot be the final story.’”(Kaku 2005, p. 235) Like space and time, “distance” has no ontological background, therefore, it is quite wrong to talk about “foamy space-time”. What really is the criterion which pushed physicists to believe in the “Planck length”? Is it an ontological one? The “smallest unit of information”? Does nature (i.e., the EDWs) has any idea about “information”? Indeed, “field theory with its infinity cannot be the final story”, since infinite does not really exist (i.e., it has no ontological background). We have to give up to the story, the unicorn world… “Olbers’ paradox, like Bentley’s paradox, is deceptively simple but has bedeviled many generations of philosophers and astronomers. Both Bentley’s and Olbers’ paradoxes depend on the observation that, in an infinite universe, gravitational forces and light beams can add to give infinite, meaningless results. Over the centuries, scores of incorrect answers have been proposed. Kepler was so disturbed by this paradox that he simply postulated that the universe was finite, enclosed within a shell, and hence only a finite amount of starlight could ever reach our eyes.” (Kaku 2005, p. 27) “In 1901, Scottish physicist Lord Kelvin also discovered the correct answer. He realized that when you look at the night sky, you are looking at it as it was in the past, not as it is now, because the speed of light, although enormous by earth standards (186,282 miles per second), is still finite, and it takes time for light to reach Earth from the distant stars. Kelvin calculated that for the night sky to be white, the universe would have to extend hundreds of trillions of light-years. But because the universe is not trillions of years old, the sky is necessarily black. (There is also a second, contributing reason why the night sky is black, and that is the finite lifespan of the stars, which is measured in billions of years.)” (idem, p 29) [↑](#footnote-ref-18)
19. The cosmic microwave background radiation is the “residual radiation left over from the big bang which is still circulating around the universe, first predicted in 1948 by George Gamow and his group. Its temperature is 2.7 degrees above absolute zero. Its discovery by Penzias and Wilson gave the most convincing ‘proof’ of the big bang.” (Kaku 2005, p. 385) Gomow thought that “if the big bang was so incredibly hot, perhaps some of its residual heat is still circulating around the universe today. If so, it would give a ‘fossil record’ of the big bang itself. Perhaps the big bang was so colossal that its aftershocks are still filling up the universe with a uniform haze of radiation. In 1946, Gamow assumed that the big bang began with a superhot core of neutrons. This was a reasonable assumption, since very little was known about subatomic particles other than the electron, proton, and neutron. If he could estimate the temperature of this ball of neutrons, he realized he could calculate the amount and nature of radiation that it emitted. Two years later, Gamow showed that radiation given off by this superhot core would act like ‘black body radiation.’ This is a very specific type of radiation given off by a hot object; it absorbs all light hitting it, emitting radiation back in a characteristic way.” (Kaku 2005, p. 56) “On one hand, Gamow, Alpher, and Hermann had laid out the theory behind the microwave background back in 1948; they had predicted the temperature of the microwave radiation to be 5 degrees above absolute zero. They gave up trying to measure the background radiation of space, however, because the instruments back then were not sensitive enough to detect it. In 1965, Penzias and Wilson found this black body radiation but didn’t know it. Meanwhile, a third group, led by Robert Dicke of Princeton University, had independently rediscovered the theory of Gamow and his colleagues and were actively looking for the background radiation, but their equipment was too woefully primitive to find it. This comical situation ended when a mutual friend, astronomer Bernard Burke, informed Penzias of the work of Robert Dicke. When the two groups finally connected, it became clear that Penzias and Wilson had detected signals from the big bang itself. For this momentous discovery, Penzias and Wilson won the Nobel Prize in 1978.” (Kaku 2005, p. 68) [↑](#footnote-ref-19)
20. In quantum gravity theory we would need to notice the “curvature of space produced by quantified particles (being ni sates of quantum superposition). Or, here its appears the first problem, since a particle is not placed in a precise place, on the contrary, it is placed in all places of the Universe! What can we do?” (Presura 2014, p. 604) Moreover, “it is difficult to relate the indeterministic of quantum mechanics with the deterministic character of the curvature of spacetime...” (Presura, p. 604) “… in quantum mechanics, any dynamic thing is quantified, reaching the state of superposition, which is available also for space.” (Presura, p. 605) Obviously, the alternative is the EDWs perspective: the microparticle is not placed in all places of the Universe, but only in one place and it corresponds to an electromagnetic wave. Such deterministic property is available for ED entities that belong many EDWs (the macro-EW, the micro-EW, the field-EW)! Again, we indicated that Heisenberg’s uncertainty relationships would not be available for quantum mechanics (which it is a pseudo-theory constructed within the unicorn world! The space is not in “superposition” (a pseudo-notion in quantum mechanics) just because (1) superposition is a pseudo-notion and (2) space itself has no ontology. [↑](#footnote-ref-20)
21. In reality, the Sun (in the macro-EW) does not exist for the electromagnetic field (in the field-EW), therefore, it is not the Sun which curves that electromagnetic field, but a “concentrated” electromagnetic field curves the other part of the same electromagnetic field (both belong to the field-EW). [↑](#footnote-ref-21)
22. There is not a part of the electromagnetic field which “moves” within the field-EW. More exactly, the movement of a human body (the macro-EW) corresponds only to the activation of successive parts of electromagnetic field (the field-EW)! Since the “entire space” is covered with the electromagnetic fields, a part of this electromagnetic field does not “move” somewhere, but only it becomes “more and less active”, but there is no motion within this electromagnetic field! These activations correspond to the “motions” of microparticles (which correspond to the motions of macro-objects). [↑](#footnote-ref-22)
23. If these entities (space, electromagnetic field and your body) would exist in EDWs, then we cannot claim that “your body moves in space”. What would be the substance of space that moves through your body? Is space something like an electromagnetic field? Then it would not be space, but an electromagnetic field! Space cannot even exist for your body, that is, your body does not “move in space”. There cannot be any kind of interaction between your body (which really exists in the macro-EW) and space (in what EW would be?). The notion of space and time (spacetime) are all wrong notions even within the Universe/world! [↑](#footnote-ref-23)
24. “Woit quotes a famous mathematician Michael Atiyah (‘Atiyah is one of the greatest mathematicians of the second half of the twentieth century...’ – Woit 2006, p. 265) who gave a talk ‘The interaction between geometry and physics’ at a conference at Harvard University on ‘The unity of mathematics’ in September 2003. ‘If we end up with a coherent and consistent unified theory of the universe, involving extremely complicated mathematics, do we believe that this represents ‘reality’? Do we believe that the laws of nature are laid down using the elaborate algebraic machinery that is now emerging in string theory? Or is it possible that nature’s laws are much deeper, simple yet subtle, and that the mathematical description we use is simply the best we can do with the tools we have? In other words, perhaps we have not yet found the right language or framework to see the ultimate simplicity of nature.” (Atiyah 2003 in Woit 2006, p. 265 in Vacariu 2008, p. 366) [↑](#footnote-ref-24)
25. Large parts of this chapter are from Vacariu and Vacariu 2017, but many ideas are from Vacariu 2014. [↑](#footnote-ref-25)
26. Even in his book from 2014, Gabriel Vacariu wrote that space (and time) or spacetime cannot have any ontological status. [↑](#footnote-ref-26)
27. “In the same way that Newton’s breakthrough unified Earthbound physics with heavenly physics, Einstein unified space with time. But he also showed that matter and energy are unified and hence can change into each other. If an object becomes heavier the faster it moves, then it means that the energy of motion is being transformed into matter. The reverse is also true—matter can be converted into energy.” (Kaku 2005, p. 33) [↑](#footnote-ref-27)
28. “At the turn of the century, there were two great pillars of physics upon which everything rested: Newton’s theory of mechanics and gravity, and Maxwell’s theory of light. In the 1860s, Scottish physicist James Clerk Maxwell had shown that light consists of vibrating electric and magnetic fields constantly changing into each other. What Einstein discovered, much to his shock, was that these two pillars were in contradiction to each other, and that one of them had to fall.” (Kaku 2005, p. 32) “In the spring of 1905, Einstein recalled, ‘a storm broke out in my mind.’ In one stroke, he finally found the solution: *time beats at different rates, depending on how fast you move.* In fact, the faster you move, the slower time progresses.” (Kaku 2005, p. 32) “If time could change depending on your velocity, Einstein realized, then other quantities, such as length, matter, and energy, should also change. He found that the faster you moved, the more distances contracted (which is sometimes called the LorentzFitzGerald contraction). Similarly, the faster you moved, the heavier you became.” (Kaku 2005, p. 33) [↑](#footnote-ref-28)
29. In 2014 and 2016, Gabriel Vacariu analyzed the relationship between Einstein’s both special and general relativities and the EDWs perspective. With his transcendental apperception, the main intention of Kant was to provide the ontological background for Newton’s physics. Through an analogy, in the works mentioned above, Gabriel Vacariu tried to provide the hyperontological background for Einstein’s special and general theory of relativity. [↑](#footnote-ref-29)
30. Einstein emphasizes these two principles in his papers. (Some of these papers are mentioned in Vacariu and Vacariu 2010) “At that time I firmly believed that the electrodynamic equations of Maxwell and Lorentz were correct. Furthermore, the assumption that these equations should hold in the reference frame of the moving body leads to the concept of the invariance of the velocity of light, which, however, contradicts the addition rule of velocities used in mechanics. Why do these two concepts contradict each other? I realized that this difficulty was really hard to resolve. I spent almost a year in vain trying to modify the idea of Lorentz in the hope of resolving this problem.” (Einstein 1922, p. 86) As Norton emphasizes, the main sources of special relativity is not the work on light and clocks, but on 19th century electrodynamics. (Norton 2003, p. 3) “Einstein (1917, p. 41) wrote that special relativity had been ‘developed from electrodynamics as an astoundingly simple combination and generalization of the hypotheses, formerly independent of each other, on which electrodynamics was built’.” (Norton 2003, footnote 4, p. 43) One day, talking to his friend Michele Besso and looking at the famous public clock-tower in Bern, Einstein discovered instantly that time is the problem. “Time cannot be absolutely defined, and there is an inseparable relation between time and signal velocity.” (Einstein 1922, p. 86) It is important to realize that Einstein first worked on time and later on space. “He recalled in his Autobiographical Notes (1949, p. 51) how his analysis had been decisively furthered by reading the philosophical writings of David Hume and Ernst Mach… Both Hume and Mach stress that concepts are only warranted in so far as they are anchored in experience. Einstein now saw that the classical notion of time incorporated a concept of absolute simultaneity that had no basis in experience. Emboldened by Hume and Mach’s critiques, Einstein discarded the classical notion and the path to the completed theory was opened.” (Norton 2003, pp. 26-7) [↑](#footnote-ref-30)
31. The special relativity “provides the foundations for particle physics and for Einstein’s general theory of relativity; and it is the last point of agreement between them. It has also received considerable attention outside physics. It is the first port of call for philosophers and other thinkers, seeking to understand what Einstein did and why it changed everything. It is often also their last port. The theory is arresting enough to demand serious reflection and, unlike quantum theory and general relativity, its essential content can be grasped fully by someone merely with a command of simple algebra. It contains Einstein’s analysis of simultaneity, probably the most celebrated conceptual analysis of the century.” (Norton 2003, p. 2) “That means that any process that can occur in one frame of reference according to these laws can also occur in any other. This gives the important outcome that no experiment in one inertial frame of reference can distinguish it intrinsically from any other.” (Norton 2003, p. 4) [↑](#footnote-ref-31)
32. Norton makes an important observation: Einstein worked on motion in Maxwell’s electrodynamics and founded a serious problem regarding the relationship between magnetic, electric fields and the ether. Maxwell’s electrodynamics offers different status for a magnet in rest (surrounded by a magnetic field only) than a magnet moving in ether (magnetic field + induced electric field). (Norton, “Einstein for everyone”, “Einstein's Pathway to Special Relativity”, Norton’s webpage we downloaded on February 2014) [↑](#footnote-ref-32)
33. The special theory of relativity “was already implicit in Maxwell’s electrodynamics—so much so that Lorentz was able to discover its essential mathematical structure without realizing that he had chanced upon a new theory of space and time. On the basis of this theory, Henri Poincaré had also begun to speak of the principle of relativity as one of the principles to which all physics must be subject.” (Norton 2003, p. 36) “… it is deduced from the in-variance of Maxwell’s laws regarding the transformation of inertial system of reference.” (Presura 2014, p. 114) In 1887, Michelson-Morley experiment indicated that the speed of light is the same (i.e., the motion of Earth in space does not matter for the speed of light, c!) Einstein knew the results of this famous “Michelson and Morley experiment”: the speed of light does not depend on the state of its source. “I did not doubt the existence of the ether or the motion of the Earth through it. I thought of the following experiment using two thermocouples: Set up mirrors so that the light from a single source is to be reflected in two different directions, one parallel to the motion of the Earth and the other antiparallel. If we assume that there is an energy difference between the two reflected beams, we can measure the difference in the generated heat using two thermocouples. Although the idea of this experiment is very similar to that of Michelson, I did not put this experiment to the test. While I was thinking of this problem in my student years, I came to know the strange result of Michelson's experiment. Soon I came to the conclusion that our idea about the motion of the Earth with respect to the ether is incorrect, if we admit Michelson's null result as a fact. This was the first path which led me to the special theory of relativity.” (Einstein 1922, p. 46) “… the Michelson-Morley experiment, even though Einstein later had trouble recalling if he even knew of the experiment prior to his 1905 paper. This one experiment, in isolation, has little force. Its null result happened to be fully compatible with Newton’s own emission theory of light.” (Norton 2003, p. 2) “It became more acute when the Michelson-Morley experiment of 1887, the first second order experiment, detected no ether wind. By 1903, Trouton and Noble had carried out a fully electrodynamic second order experiment, again with a null result. (See Janssen, 1995, Ch. 1.)” (Norton 2003, p. 13) “… in 1913 the Dutch physicist Willem de Sitter suggested that fast-moving binary stars (two stars that orbit one another) could be used to measure the effect of a moving source on the speed of light. Various experiments of this sort over the past eight decades have verified that the speed of light received from a moving star is the same as that from a stationary star—670 million miles per hour—to within the impressive accuracy of ever more refined measuring devices.” (Greene 1999, p. 20) Einstein wrote in his paper (1905): “light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body.” (Norton 2003, p. 26; his italics) “The special theory of relativity owes its origins to Maxwell’s equations of the electromagnetic field.” Albert Einstein, Autobiographical Notes, p. 59 in Norton 2003, p. 36) From the EDWs perspective, it has to be very clear that the light has the constant speed c “independent of the state of motion of the emitting body” just because the electromagnetic field belongs to an EDW (the field-EW) than the macro-EW (where the macro-emitting body is placed). The emitting body does not exist for the light (as an electromagnetic wave), this macro-object corresponds to an electromagnetic field (with speed c).. [↑](#footnote-ref-33)
34. “The observational consequences of special relativity differ significantly from Newtonian theory only in the realm of speeds close to that of light. Newton’s theory was adapted to the fall of apples and the slow orbits of planets. It knew nothing of the realm of high speeds. Nineteenth century electrodynamics was also a theory of light and the first to probe extremely fast motions. The unexpected differences between processes at high speeds and those at ordinary speeds were fully captured by the electrodynamics. But their simple form was obscured by elaborate electrodynamical ornamentations. Einstein’s achievement was to strip them of these ornamentations and to see that the odd behavior of rapidly moving electrodynamical systems was not a peculiarity of electricity and magnetism, but imposed by the nature of space and time on all rapidly moving systems.” (Norton 2003, p. 3) The differences between these two cases would furnish an “unequivocal marker of motion through ether”. (Norton 2013) Without offering details about this topic we quote Einstein’s words: “"In setting up the special theory of relativity, the following ... idea concerning Faraday’s magnet-electric induction [experiment] played a guiding role for me... [magnet conductor thought experiment described]. ...The idea, however, that these were two, in principle different cases was unbearable for me. The difference between the two, I was convinced, could only be a difference in choice of viewpoint and not a real difference. Judged from the [moving] magnet, there was certainly no electric field present. Judged from the [ether state of rest], there certainly was one present. Thus the existence of the electric field was a relative one, according to the state of motion of the coordinate system used, and only the electric and magnetic field together could be ascribed a kind of objective reality, apart from the state of motion of the observer or the coordinate system. The phenomenon of magneto-electric induction compelled me to postulate the (special) principle of relativity. [Footnote] The difficulty to be overcome lay in the constancy of the velocity of light in a vacuum, which I first believed had to be given up. Only after years of [jahrelang] groping did I notice that the difficulty lay in the arbitrariness of basic kinematical concepts." (Einstein in Norton idem) And Norton continues: “In sum Einstein’s lesson was this. Maxwell's theory employed an ether state of rest; but that state of rest could not be revealed by observation. So somehow the principle of relativity needed to be upheld.” (Norton 2003) [↑](#footnote-ref-34)
35. From Gabriel Vacariu’s work 2008, 2010, we recall the “organizational threshold” and respectively the “epistemological-ontological threshold” which grasp the “parts-whole relationship” for the same EW and respectively EDWs. [↑](#footnote-ref-35)
36. “The one true and complete theory of the world cannot be an inconsistent theory; what are now typically taken to be the laws of general relativity and quantum theory cannot all be true.” (Giere 2006, p. 33) Within the unicorn world, indeed these theories cannot be both true. However, even in the EDWs, quantum mechanics is wrong, since it is a mixture of EDWs (the micro-EW and the field-EW). Moreover, as we showed in our previous works, we cannot relate the theory of relativity to quantum mechanics, since there are at least three EDWs involved: the macro-EW, the micro-EW, and the field-EW. [↑](#footnote-ref-36)
37. We are not the firsts who argue for the non-existence of space and time (or spacetime). However, our arguments are totally different than the other arguments furnished by all other predecessors who constructed their arguments within the unicorn world. We have constructed our arguments for rejecting space and time (spacetime) within the EDWs perspective! [↑](#footnote-ref-37)
38. “… if we want the light to have the same speed in any referential system, we have to change the perception of space and time for those two observers. In this way, we are forced to accept that those two observers perceive different time and space.” (Presura 2014, p. 106) “Time, for instance, is perceive different by various observers in motion not only because their clocks they have move slower in their movement, but also because the internal clocks of all atoms from which all observers are formed move slower.” (Presura, p. 111) [↑](#footnote-ref-38)
39. “Einstein is inseparably linked with analyses dense in light signals and the clocks they synchronize. What is notable in the above account is how little they figured in Einstein’s path to special relativity. They were decisive in the final moments, some five to six weeks prior to the completion of the theory, when Einstein probably used them in his last, desperate gambit. But there is no evidence in the long years of investigation preceding that Einstein gave any serious thought to light signals and clocks.” (Norton 2003, p. 38) Or “the abandonment of the ether—following the failure of attempts to measure velocity relative to the ether and, more generally, the apparent independence of all electrodynamical phenomena of motion relative to the ether—did not vindicate the Newtonian inertial frame, but required a dramatically revised conception. Special relativity might be said to have applied the relativity principle of Newtonian mechanics to Maxwell's electrodynamics, by eliminating the privileged status of the rest-frame of the ether and admitting that the velocity of light is independent of the motion of the source. As Einstein expressed it, ‘the same laws of electrodynamics and optics will be valid for all frames of reference for which the equations of mechanics hold good.’ (1905, p. 38.) But as Einstein also pointed out, the invariance of the velocity of light and the principle of relativity, at least in its Galilean form, are incompatible. It simply makes no sense, according to Galilean relativity, that any velocity should appear to be the same in inertial frames that are in relative motion.” (DiSalle 2006) [↑](#footnote-ref-39)
40. Essentially, here it is important not to forget that even if the mirrors run faster, the photon has the same speed, so, the time run slower (“one second”, i.e., the distance followed by the photon is longer between those two mirrors in motion). [↑](#footnote-ref-40)
41. Within the EDWs perspective, there is not the “spatio-temporal framework” which is deformed since “spacetime” does not have any exist, it does not have any ontological background. There are only some features pertaining to all objects/entities (and their relations) in motion that are changed. The special theory of relativity refer, from our viewpoint, to the entities and processes which belong to the EDWs. (See Vacariu 2014, or 2016) We recall here that the microparticles (and their interactions) (the micro-EW) and the macroparticles (and their interactions) (the macro-EW) correspond to the electromagnetic field/waves (always, speed c) (the field-EW)! Because of these correspondences, the electromagnetic waves have always c, while the micro-entities (except photons) and the macro-entities cannot reach this speed. [↑](#footnote-ref-41)
42. We have to be aware that this “empty space” (i.e., “nothing”) always corresponds to the electromagnetic waves (always with speed c). [↑](#footnote-ref-42)
43. A clock or “its” components can exist, but not both, if we want to avoid the ontological contradictions of the whole-parts relationship. When we speak about the arms of that clock and its screen, the clock does not really exist. For these contradictions and the EDWs, see Vacariu 2016. [↑](#footnote-ref-43)
44. If space and time (spacetime) are neither entities nor processes, what do these entities refer to? Frames of references? However, in Einstein’s theory of special relativity, we have different frames of references. Do these frames of references have different ontological status? No, since it is about the EDWs, no more or less! [↑](#footnote-ref-44)
45. We mention that, according to the EDWs perspective, only ED entities/processes have ED ontologies. It is not allowed to consider that other things have ontological status! [↑](#footnote-ref-45)
46. Space and time are exactly like color: color does not exist but it helps us “describe” an object. Exactly the same situation is for space and time. Essentially, if there are no absolute space and absolute time, then there are no space and time at all! [↑](#footnote-ref-46)
47. Einstein indicates that the difference between space and time is wrong and we can talk only about “spacetime”. Einstein unification of space and time made us to reject the notion of “spacetime” itself. Perceptually, we can talk only about perceptual “scenes” (for instance, visual “scenes”) but not about space or time or spacetime. Ontologically, not even an EW really exists, we have only the epistemologically different entities and their epistemologically different interactions/processes, no more or less. [↑](#footnote-ref-47)
48. An object can be “static” only in a particular framework. However, in an “absolute” framework (the greatest cosmological distance), nothing is static, everything has been in motion since the Big Bang. [↑](#footnote-ref-48)
49. The problems of quantum mechanics are not only what we showed in the 2008, 2010, 2016 books, but they also include the introduction of space and time into the equation of quantum mechanics. Without space and time but with EDWs, it is much easier to explain the strange phenomena of “quantum mechanics”. Also, against quantum mechanics, see Gabriel Vacariu’s PhD thesis 2007 or his article 2006, his book 2016, etc. [↑](#footnote-ref-49)
50. Very possibly, this “nothing” corresponds to something that belonged (or still belongs) to an EDW rather than the macro-EW, micro-EW, or field-EW. [↑](#footnote-ref-50)
51. If one second exists, then does “half a second” or “one minute” or “one year” really exist? Then we reach the part-whole ontological contradiction (see Vacariu 2016). Therefore, neither “one second”, nor “one minute” really exists! [↑](#footnote-ref-51)
52. “… two events that seem to happen simultaneously for one observer, will not appear with necessity simultaneously for another observer from a different system of reference.” (Presura 2014, p. 117) [↑](#footnote-ref-52)
53. See Vacariu and Vacariu (2015): “Is cognitive neuroscience a pseudo-science?”, Datagroup [↑](#footnote-ref-53)
54. “Though back (past) and forth (future) time travel is theoretically permitted by the laws of physics, it is riddled with paradoxes. Among the most well-known is the ‘twin paradox,’ in which one twin travels at relativistic speeds (comparable to that of light) through the universe for many years, leaving his twin brother behind on earth. When he returns, he would have aged much less than his sibling. The theory of relativity dictates that in a fast-moving frame of reference, all clocks, and thus aging, would move slowly.” (Mathew 2014, p. 37-38) [↑](#footnote-ref-54)
55. The biological mechanisms “inside the body” are certain macro-entities. These mechanisms are parts of the body. Both the mechanisms and the body belong to the macro-EW and there is an identity relationship between parts and the whole. There is, in this case, just an organizational threshold between parts and whole. The microparticles and the body belong to the EDWs, and, in this case, there is an epistemological-ontological threshold. [↑](#footnote-ref-55)
56. We recall that after Newton elaborated the theory of gravitation and became quite famous, some physicists asked him if he had a definition to the force of “gravity”. Newton answered he had no definition of “gravity” but other people, based on his theory of gravity, would define the force of “gravity”. Einstein rejected the idea that “gravity is a force” since gravity was, for him, just the “curvature of spacetime”. Rejecting “spacetime”, we consider “gravity” (in the macro-EW) as being the curvature of “nothing” which corresponds to the curvature of parts of the electromagnetic field which surround a huge concentration of a part of the same electromagnetic field (this concentration corresponds to the planet). [↑](#footnote-ref-56)
57. In the same way, maybe the physicists would be able to eliminate all the other two forces, the weak and the strong nuclear forces... [↑](#footnote-ref-57)
58. “Motion through space is a concept we learn about early in life. Although we often don't think of things in such terms, we also learn that we, our friends, our belongings, and so forth all move through time, as well. When we look at a clock or a wristwatch, even while we idly sit and watch TV, the reading on the watch is constantly changing, constantly ‘moving forward in time.’ We and everything around us are aging, inevitably passing from one moment in time to the next. In fact, the mathematician Hermann Minkowski, and ultimately Einstein as well, advocated thinking about time as another dimension of the universe—the fourth dimension—in some ways quite similar to the three spatial dimensions in which we find ourselves immersed. Although it sounds abstract, the notion of time as a dimension is actually concrete.” (Greene 1999, p. 27) It was possible Einstein to think “time” as a dimension of “space” just because both space and time do not exist, i.e., they cannot have any ontological status! For us, Einstein’s “relativization of spacetime” was a step toward the rejection of the “Universe” and its replacement with EDWs… [↑](#footnote-ref-58)
59. “We can say that the electromagnetic wave of light (the oscillation of electric field) is, in fact, a wave of probability for photons. There where the amplitude of oscillation of electric field is greater (lighter areas), we will find more photons, while where the wave is smaller (dark areas), less photons. We have to notice that not the values of electric field in one point determines this probability, but the amplitude of oscillation. In other words, the electric field can have null-value, during the oscillation, because it is the size of oscillation (amplitude) which determines the number of photons we find there.” (Presura 2014, p. 226) [↑](#footnote-ref-59)
60. The above statements have the same objective reality as the statements from the EDWs perspective that explain the nonlocality in quantum mechanics! [↑](#footnote-ref-60)
61. We have to recall that the mind-EW has no “spatial” dimensions (i.e., it has no nothing), but only one “temporal” dimension, i.e., mental processes that correspond to the neural processes [↑](#footnote-ref-61)
62. Einstein’s relativization of spacetime reminds us of the optical illusion “Ames’ room”. In fact, there are only entities and their interactions and, in some particular EDWs, “nothing”, which corresponds to at least one EDW. [↑](#footnote-ref-62)
63. However, the relative motion is related to certain optical illusions! [↑](#footnote-ref-63)
64. It has to be clear that the “space” means “nothing” that corresponds to something that belongs to an EDW, and “time” means certain processes that take place. Due to its motion, the “dilation of time” for an object means the extension (dilation) of processes that are inside that entity. For instance, it is not the time that slow down for a body in motion, but the processes inside that body are longer because the internal entities moves on a longer routes. In this way, we can understand why the twin in a plane traveling close to the speed of light would be younger than the twin on Earth: the internal processes of the twin in the plane will take longer to accomplish. [↑](#footnote-ref-64)
65. “… the generalization of straight line in a curved space-time is a geodesic line.” (Presura 2014, p. 153) [↑](#footnote-ref-65)
66. “At the core of Einstein’s belief was the idea that ‘force’ could be explained using pure geometry. For example think of riding on a merry-go-round… we feel a ‘force’ tugging at us as we walk across the platform. Because the outer rim of the merry-go-round must shrink, according to special relativity. However, if the platform of the merry-go-round now has a shrunken rim or circumference, the platform as a whole must be curved. To someone on the platform light no longer travels in a straight line, as through a ‘force’ were pulling it toward the rim…. Thus the ‘force’ we feel while walking between horses on a merry-go-round can be explained as the curving space itself.” (Kaku 1994, p. 90) “To Riemann, the bending or warping of space causes the appearance of a force. Thus forces do not really exist; what is actually happening is that space itself is being bent out of shape.” (idem, p. 91) This idea is related to Einstein’s equation from general relativity: “Matter-energy → Curvature of space-time”. (Kaku 1994, p. 92) “While the ‘marble’ of space-time was clean and elegant, the ‘wood’ of matter-energy was a horrible jumble of confused, seemingly random forms, from subatomic particles, atoms, polymers, and crystals to rocks, trees, planets, an stars.” (Kaku 1994, pp. 98-98) “As Minkowski had done with special relativity, Eddington and Weyl, within a few years of the advent of general relativity, presented both the mathematical formalism and the physical content of the theory, in the first perspicuous and comprehensive texts on the theory (Weyl, 1918; Eddington, 1920)… In this way they revealed general relativity as a theory, not of relativity, but of ‘world-structure’ – the dynamical structure that unified the physics of gravitation with the geometry of space and time.” (DiSalle 2006, p. 138) According to Weyl, the progress from Newton to Einstein reflects “a deepening understanding of world-geometry and its relations with the dynamical properties of matter”. (DiSalle 2006, p. 139) [↑](#footnote-ref-66)
67. “The principle of general covariance, then, acquires its physical significance in conjunction with the equivalence principle. By itself, it says that the geometrical structures of spacetime don't depend on the coordinates in which we express them, or on the set of points that we may think comprises spacetime. This is an important principle, but it doesn't recommend general relativity over other theories, since special relativity and Newtonian mechanics also involve spacetime structures that can be defined in a generally-covariant way, through the same kinds of coordinate-independent mathematical objects that we use in general relativity. Combined with the equivalence principle, however, it implies that a central Newtonian idea—that gravity is a force causing deviations from uniform rectilinear motion—is based on an arbitrary choice of coordinates. For a trajectory that satisfies all empirical criteria for being inertial in a particular frame of reference—e.g. the trajectory of the center of mass in our example—may be freely falling relative to some other trajectory that satisfies the same criteria. By contrast, a freely-falling trajectory is a freely falling trajectory in any coordinate system; it is only the decomposition of it into its inertial and gravitational parts that will be different in different coordinate systems.” (DiSalle 2006) [↑](#footnote-ref-67)
68. “Einstein held that this epistemological insight had a natural mathematical representation in the principle of general covariance, or the principle that the laws of nature are to be invariant under arbitrary coordinate transformations. More precisely, what this means is that coordinate transformations are no longer required (as in the affine spaces of Newtonian mechanics and special relativity) to take straight lines to straight lines, but only to preserve the smoothness of curves (i.e. their differentiability). The general theory of relativity was intended to be a generally covariant account of spacetime, and its general covariance was intended to express the general relativity of motion. And the theory came into being because Einstein perceived a deep connection between this project and that of finding a relativistic theory of gravitation.” (DiSalle 2006) [↑](#footnote-ref-68)
69. Wolfson makes an interesting observation: Einstein elaborated the general theory of relativity not making physical experiments (in laboratory or in nature) but only thinking in his mind. (Wolfson 2000) We think that changing the “Weltanschauung” you do not need too much empirical data. [↑](#footnote-ref-69)
70. Einstein’s grand strategy was to turn wood into marble, i.e., to give a completely geometric origin to matter, that is his total theory of field would explain the particles through a general field. (Kaku 1994, p. 99) [↑](#footnote-ref-70)
71. Pauli, Dirac, Heisenberg, Feynman and others tried to replace the infinitesimal points with “bubbles” or small oscillating particles. However, such theory would contradict at least one of two principles: the conservation of quantum probability (i.e., the physical objects cannot instantaneously disappear) and the impossibility to pass the speed of light. (Greene 1999, p. 176) As we saw above, the notion of probability is just an epistemological tool for us and, more than this, an entity can instantaneously disappeared from one EW; we can find just something from another EW that would correspond to that entity. This idea is related to Smolin’s idea (through introducing discontinuous space-time) and Greene’s perspective within the string theory to stop the regression ad infinitum that produces the infinities. (See below ) [↑](#footnote-ref-71)
72. Einstein hoped that this “embarrassing dualism” can be eliminated by a “total field theory” that would involve the derivation of material points and the equations of the movement of particles from the field equations. (Einstein (5), p. 169) In special theory of relativity, the physical reality is described through a continuous spatial functions and this is the reason that it is difficult to accept the material points within the calculation of fundamental field theory. (p. 180) We have to remember that the special theory of relativity is an extension of the Maxwell’s partial differential equations that reflects the continuity of space. [↑](#footnote-ref-72)
73. “We notice that Einstein’s proposal for the movement of the bodies eliminates completely the notion of force, it is replaced with the notion of curved space-time.” (Presura, p. 155) The movement of the bodies is a direct consequence of the metric of curved space-time. (idem) (“The metric of space-time (its curvature) is generated by the energy-impulse tensor of matter which it is placed inside it.” (Presura 2014, p. 156) Within the EDWs perspective, the metric of “nothing” (its curvature) is given by the energy-impulse tensor of “nothing” which corresponds to something that belongs to an EDW. (If Hilbert believes that “Physics is becoming too difficult for the physicists”, Gabriel Vacariu considers that the “Mathematicians has transformed physics in science-fiction. Nature (i.e., the EDWs) has no idea about mathematics!” [↑](#footnote-ref-73)
74. “In Newton's theory of gravity, one body exerts a gravitational pull on another with a strength determined solely by the mass of the objects involved and the magnitude of their separation. The strength has nothing to do with how long the objects have been in each other's presence. This means that if their mass or their separation should change, the objects will, according to Newton, immediately feel a change in their mutual gravitational attraction. For instance, Newton's theory of gravity claims that if the sun were suddenly to explode, the earth-some 93 million miles away—would instantaneously suffer a departure from its usual elliptical orbit. Even though it would take light from the explosion eight minutes to travel from the sun to the earth, in Newton's theory knowledge that the sun had exploded would be instantaneously transmitted to the earth through the sudden change in the gravitational force governing its motion. This conclusion is in direct conflict with special relativity, since the latter ensures that no information can be transmitted faster than the speed of light—instantaneous transmission violates this precept maximally.” (Greene 1999, p. 30) “Einstein wrote in his Autobiographical Notes (1949, p. 31): ‘Newton, forgive me: you found just about the only way possible in your age for a man of highest reasoning and creative power.’ ” (Norton 2003, footnote 3, p. 43) [↑](#footnote-ref-74)
75. “The crucial link between the relativity of motion and non-Euclidean geometry was supposed to come from Einstein’s thought experiment involving a rotating disc. If a disc rotates, special relativity implies that a measuring stick that rotates with it must be contracted in the dimension parallel to its velocity; since the velocity is greater as one approaches the edge of the disc, the increasing contraction of the stick will cause the lengths it measures to seem greater. As a result, to the observer at rest relative to the disc, the Euclidean relation between the diameter of the disc and its circumference will be disturbed; the co-moving observer must think that the geometry of the disc is non-Euclidean.” (DiSalle 2006, p. 123) [↑](#footnote-ref-75)
76. “Thus on our circular disc, or, to make the case more general, in every gravitational field, a clock will go more quickly or less quickly, according to the position in which the clock is situated (at rest). For this reason it is not possible to obtain a reasonable definition of time with the aid of clocks which are arranged at rest with respect to the body of reference. A similar difficulty presents itself when we attempt to apply our earlier definition of simultaneity in such a case, but I do not wish to go any farther into this question.” (Einstein 2008, p. 44) [↑](#footnote-ref-76)
77. We can re-write Einstein’s principle (written with italic words in his book about the theory of relativity for everybody): “All systems of Gaussian coordinates are in principle equivalent for the formulation of the general laws of nature” (part §28) becomes “All the EDWs are in principle equivalent for the formulation of the general laws of nature”. In the next sentence, Einstein emphasizes that this principle represents a movement from the special theory of relativity to the general theory of relativity. (Einstein 2011) [↑](#footnote-ref-77)
78. We repeat, the planet (the macro-EW) corresponds to an electromagnetic field which is very much concentrated in a particular place. An electron corresponds to a part of an electromagnetic wave which is a little more concentrated in a particular point. [↑](#footnote-ref-78)
79. Born was correct specifying that the main problems of quantum mechanics would be philosophical problems and not scientific ones: “I am now convinced that theoretical physics is actual philosophy.” (Max Born) “As Einstein realized, when the foundations of science become problematic, the man of science becomes a philosopher [Einstein 1936, § 1].” (Weinert 2009, p. 17) [↑](#footnote-ref-79)
80. This is the main reason so many physicists have been published, long time after us, UNBELIEVABLE similar ideas to our ideas! The reader has not to forget that Gabriel Vacariu;s thesis has been posted in 2007 by the staff of UNSW (Sydney, Australia) and he posted his first five books FREE on different webpages. [↑](#footnote-ref-80)
81. We analyse also McEnvoy and Zarate’s book (2013) from our EDWs perspective just because this popular book introduces the main theories and concepts of quantum mechanics. [↑](#footnote-ref-81)
82. Using “probabilities”, we describe “Maxwell distribution” which furnishes us information about billions of molecules: in this diagram, x is the velocity of the molecules, y is the number of molecules. Based on Maxwell’ s work, Boltzmann (the creator of “statistical mechanics”, i.e., “the properties of macroscopic bodies are predicted by the statistical behaviour of their constituents parts”) gives a new interpretation of the Second Law of thermodynamics: “When energy in a system is degraded, (as Clausius said in 1850), the atoms in the system become more disordered and the entropy increases.” (McEnvoy and Zarate 2013, p. 24) The entropy, S = L log W (k = Boltzmann’s constant, W = the probability that a particular arrangement of atoms will occur). (McEnvoy and Zarate 2013, p. 24) [↑](#footnote-ref-82)
83. We emphasize here and in other places that the EDWs are neither “worldviews” (epistemological worlds), nor ontological different worlds (like the multiverse), but a completely new notion, but EDWs! The EDWs are neither epistemological worlds, nor ontological worlds, and they have nothing to do with “property dualism” and any kind of emergentism or reductionism! [↑](#footnote-ref-83)
84. “These radiation curves – one of the central problems of theoretical physics in the late 1890s – were shown to be very similar to those calculated by Maxwell for the velocity (i.e., energy) distribution of heated gas molecules in a closed container.” (p. 29) From our viewpoint, this similarity is given by the correspondences between the phenomena that belong to the field-EW and the micro-EW! “Could this black-body radiation problem be studied in the same way as Maxwell’s ideal gas… electromagnetic waves (instead of gas molecules) bouncing around in equilibrum with the walls of a closed container?” (McEnvoy and Zarate 2013, p. 30) Only from the EDWs perspective... [↑](#footnote-ref-84)
85. An essential footnote: “… the observation that the electron energies do not respond to changes in light intensity… The intensity affects the number of photons and therefore the magnitude of the electron current, but does not affect the cut-off voltage V0 which is determined by frequency.” (p. 56) The “electron energies” means, in this case, the electromagnetic waves/field which does not “interact” with the microparticles (photons) (since there are EDWs). On page 58, about Millikan work’s: “… the energy of an ejected electron is independent of the intensity of light… but depends on the frequency.” (p. 58) Light is both the photons or the electromagnetic waves but in EDWs! [↑](#footnote-ref-85)
86. J. J. Thomson got Nobel prize in 1906 for showing the electrons were particles, his son George Thomson got Noble prize in 1937 for showing the electrons were waves! Obviously, the electrons are both particles and waves but in EDWs, exactly as light is both the photons and the electromagnetic waves but in EDWs. [↑](#footnote-ref-86)
87. Putnam considers that are three alternatives: Bohm’s or Ghirardi-Rimini-Weber’s, which is the correct interpretation, Pitowski’s alternative (Pitowski comments on one of Putnam’s conferences, as Putnam himself remarks), which indicates that we will “fail to find a scientific realist interpretation which is acceptable”. (p. 631) (As we will see below, Bohm’s interpretation is the closest alternative to the EDWs perspective. However, his alternative is also constructed within the unicorn world). From an EDWs perspective, it is indeed impossible to find a “scientific realist interpretation” of quantum mechanics within the unicorn world. Replying to Putnam’s presentation, Pitowski said “You are saying that before we can interpret quantum mechanics we have to change it.” (Putnam 2005, p. 632) Putnam’s answer was that Von Neumann, “[...] already ‘changed’ quantum mechanics, certainly from Bohr’s point of view. All interpretations of quantum mechanics are in a sense ‘changes’ of quantum mechanics, because it is an incomplete theory−one cannot ‘regiment’ it, formalize it in standard logical notation […] unless you add an ‘interpretation’.” (Putnam 2005, p. 632) From the EDWs perspective, any interpretation of quantum mechanics is an “incomplete theory” within the unicorn world, and the search for “hidden variables” (Ptolemaic epicycles) is useless. Using different macro-tools of observation, at different times, a human being can observe the electron and the wave belonging to the EDWs. [↑](#footnote-ref-87)
88. “Initially, I started to construct the EDWs perspective for solving the mind-body problem. In the same time, I keep in my mind the idea of applying my perspective to some problems from cognitive science and physics (quantum mechanics). However, for applying my perspective, for instance, to the problem of wave-corpuscle duality, I follow the strategy of solving this problem from a completely different area and not attacking it directly from within the physics. The majority of physicists and philosophers have attacked directly this problem but their strategy involved the incarceration of their approaches within the framework of the unicorn-world.” (Gabriel Vacariu 2008) [↑](#footnote-ref-88)
89. “The static electric charges generates the electric field, while these charges are in motion, generate both the electric and the magnetic fields. Moreover, the electric and the magnetic fields generate one another. Together, they form the electromagnetic field. They count the configuration of the field knowing the positions and the speeds of the electric charges, using Maxwell equations. They tell us also how the electromagnetic field acts, with forces, on the electric charges changing their state of rest or motion.” (Presura, 2014 p. 322) [↑](#footnote-ref-89)
90. It is about an unknown EW and, based on the EDWs perspective, certain physicists maybe will be able to describe the phenomena which belong to this EW in the future. [↑](#footnote-ref-90)
91. In the chapter about the “quantum field theory”, Presura writes: “Will we see that, one quantified, there will be changes between different points of it or it will changes packets of discrete energy with other fields, packets of energy that we call particles. After these observations, we have to abandon the idea of the universe in which the particles are a kind of minuscule ‘balls’. The particles will become now the energetic manifestations of the entire universe seen as a huge quantum field.” (Presura 2014, p. 329) “Manifestations” is a wrong notion: it would introduce the notion of “causality” between the field and the particle which, in our EDWs perspective, cannot even exist (it would produce strong ontological contradictions). Moreover, a particle does not correspond to a “packet of energy”, but to the entire field since the particle and the field belong to the EDWs. Of course, the enfolded part of the wave is this “packet of energy”, but this packet of energy is not broken (not “totally isolated”) from the rest of the field/wave, it is just a part of the entire electromagnetic field, even if that packet of energy is the most important part of the wave for this correspondence! [↑](#footnote-ref-91)
92. Maxwell’s equations are the same in any inertial system of reference! That is, the electromagnetic laws are the same in all inertial systems of reference. (Presura 2014, p. 95) In this context, recall the postulate of Einstein’s special relativity: light has the same speed, c, in any referential system. [↑](#footnote-ref-92)
93. “… the magnetic field exists only because the speed of light is finite, and it can be seen as a manifestation of electric field in a different system of reference.” (Presura, p. 98) The “manifestation of the electric field in a different system of reference” does not mean an EW since the entire electromagnetic field/wave is an entity that belongs to the field-EW. Our interpretations is better: the magnetic and the electric fields are two faces of the same phenomena that belong to an EDW than the field-EW or the particle-EW. If the magnetic and the electric fields are two faces of the same phenomena, maybe the magnetic field and the electric field belong to the EDWs! Working within the EDWs perspective, the physicists have to furnish the solution to this problem. [↑](#footnote-ref-93)
94. “If there is an electric change which initial position changes, this process would produce a variable electric field which, in its turn, would produce a variable magnetic field.” (Presura 2014, p. 71) These are the electromagnetic waves with the speed c. Maxwell predicted the existence of electromagnetic waves (who predicted the light is an electromagnetic wave), and Hertz came with the first prove. (Presura, p. 73) According to Maxwell, an electromagnetic wave oscillates because the electric and the magnetic fields oscillate. (Presura 2014, p. 75) (These are the “perturbative systems” vs. the non-perturbative systems, see Oriti section 4.8.4) [↑](#footnote-ref-94)
95. If Planck quantified the quantum energy of the “black body radiation”, Einstein quantified the light: the electromagnetic waves of light is formed from discrete packets of energy, the photons. (Presura 2014, p. 217) From our viewpoint, we have only the correspondence between the a part of “enfolded” electromagnetic wave and the microparticle. Interesting, there is necessary at least 10 photons to reach retina of the eye in order this information to be manipulated by the brain. (Presura, p. 219) “The emission or the absorption of light takes place through transitions between the levels of energy of atoms. In these processes, the photons are emitted ...” (Presura, p. 220) What does “light” mean here? It has to be the electromagnetic wave, of course, since the “photons” appear later. Therefore, this sentence is a mixture of the EDWs! Moreover, the “levels of energy of atoms” mean exactly different values in different places of the electromagnetic field. [↑](#footnote-ref-95)
96. If we accept Presura’s reductionism (many physicists work in the same framework), we have to believe that when a human body moves on the street, the motion of the body is not a “continuous” process, but a process which happens in “jumps”! Within the macro-EW, there are no such “jumps”; these jumps are not even in “quantum world” since this notion is incorrect: there are the particle-EW and the field-EW. These jumps are for the motion of the microparticles between the discrete “levels of energy”. However, an electromagnetic field/wave is not constructed from the fields with certain “jumps”! The electromagnetic field is something continuous and not discrete. This directness mirrors the interactions between certain microparticles. [↑](#footnote-ref-96)
97. “Previous experiments on electrons demonstrated that they acted both as a particle and as a wave. This strange duality between particles and waves was finally unraveled by the quantum physicists: the electron, in its dance around the atom, was shown to be a particle, but it was accompanied by a mysterious wave. In 1925, Austrian physicist Erwin Schrödinger proposed an equation (the celebrated Schrödinger wave equation) that accurately described the motion of the wave that accompanies the electron. This wave, represented by the Greek letter psi, gave breathtakingly precise predictions for the behavior of atoms which sparked a revolution in physics.” (Kaku 2055, p. 151) “Finally, in 1928, physicist Max Born proposed the idea that this wave function represented the probability of finding the electron at any given point. In other words, you could never know for sure precisely where an electron was; all you could do was calculate its wave function, which told you the probability of it being there. So, if atomic physics could be reduced to waves of probability of an electron being here or there, and if an electron could seemingly be in two places at the same time, how do we finally determine where the electron really is?” (Kaku 2005, pp. 151-2) [↑](#footnote-ref-97)
98. The characteristics of the electromagnetic wave: intensity, wavelength, and frequency. (Presura, p. 230) From our viewpoint, the photons do not have mass just because these microparticles have particular values of intensity, wavelength and frequency. Other microparticles have mass because they have different values for intensity, wavelength and frequency. [↑](#footnote-ref-98)
99. “… oscillators which are in thermal equilibrium, responsible of light emission in the case of black body radiation, are not given by the internal structure of atoms, as maybe we expected. On the contrary, they are given by the oscillations of atoms surrounding the equilibrium position! In other words, not the internal structure of atoms did reveal the quantum form of energy, but their movement of oscillation.” (Presura 2014, p. 215) Obviously, we have to introduce here the correspondence between the microparticles and the waves. The oscillations of atoms has to be related to their correspondence with the electromagnetic waves! If the quantum energy is “discrete”, from a reductionist viewpoint, the “movement of our body” is not continuous but discrete, that is the microparticles which correspond to our body jump from one level to another! From the viewpoint of the macroscopic entities, there is a continuous movement for them, otherwise, we would be able to explain nothing referring to them. Presura writes that “we have to imagine oscillators are exactly the modes of vibrations of electromagnetic field…”. (Presura, p. 215) Anyway, we have to understand that any microparticle (a discrete entity) corresponds to an electromagnetic field/wave (a continuous entity)! [↑](#footnote-ref-99)
100. “One is the phase velocity – the speed at which a wave crest moves – and the second is a group velocity – the speed of the reinforcement regions formed when many waves are superimposed.” (McEnvoy and Zarate 2013, p. 113) Again, we can detect a particular wave (which corresponds to a particular microparticle), but many particular waves represent the electromagnetic field, i.e., the field-EW. “The group velocity represents the velocity of a particle”. (McEnvoy and Zarate 2013, p. 123) [↑](#footnote-ref-100)
101. “To the electron is attached a pilot wave which wavelength is given by its impulse: λ = h/p. This wave is resonant in atoms, where the perimeter of orbit is an integer number of wavelengths of the wave.” (Presura, p. 224) “We have seen that the electron chooses in atom those classical orbits for which the wave pilot is resonant, i.e., its wavelength is included by an integer number in orbital circumference. Since only certain orbits fulfill this condition, the electron selects in atom only these states and therefore it has discrete states of energy.” (p. 227) We can see here again a perfect image of two EDWs: the microparticle-EW and the field-EW! The equation f=E/h means that “the probability wave of free electron, in rectilinear and uniform movement, vibrates with a temporal frequency given directly by the energy of the electron divided by h. More energetic electron, faster vibration for the probability wave.” (p. 231) This equation mirrors the relationship between the electron and the wave which belong to the EDWs! “The probability of finding an electron is proportional with the intensity of the wave...” (p. 231) In reality, the position of the electron corresponds, proportionally, to the intensity of the wave. For use it is important that Presura emphasizes that the speed of a phase of planar probability wave describing an electron is different than the speed of the electron, a “thing that seems to lead to a contradiction. However, this observation is not a contradiction, on the contrary it indicates very well the probabilistic character of describing the electron”! (p. 231) It is very clear that this sentence (introduced by physicists long time ago) has been constructed within the unicorn world! From our viewpoint, this sentence mirrors exactly the correspondence between two entities (with different properties) that belong to the EDWs! There is no direct, “proportional”, correspondence between these properties, since these entities belong to the EDWs (and one EW does not exist for any EDW). For photon, “the probability wave is given exactly by the classical electromagnetic field of the light wave.” (Presura, p. 233) In fact, it is about the correspondence between the photon and the electromagnetic wave and these entities belong to the EDWs. [↑](#footnote-ref-101)
102. “He loathed the concept of discontinuous quantum jumps within the atom proposed by Bohr.” (McEnvoy and Zarate 2013, p. 139) Working within the wave/field-EW, Schrödinger could not accept the phenomena from the micro-EW. “”Frequencies of brith linespectra can now be visualized as beats between the vibration frequencies of two ther quantum states. How much more appealing is the conception that in quantum transitions energy passes continuously from one vibration pattern to another rather than fro indescribable jumping electrons.” (McEnvoy and Zarate 2013, p. 139) His “classical theory of matter waves” to mechanics is similar to “Maxwell’s theory of electromagnetic waves had to optics”. (p. 139) Amazing, the next section has the title: “Who needs particles anyway?”, the first sentence being: Schrödinger even began to doubt the existence of particles.” followed by this one: “The image point or particle of a mechanical system can be represented by a wave group with small dimensions in every direction.” (McEnvoy and Zarate 2013, p. 140) The “wave packet” (a superposition of thousands of waves as de Broglie described”) represents the particle. Anyway, Henrik Lorentz criticized Schrödinger’s approach (McEnvoy and Zarate 2013, p. 140), and his critics mirror directly the EDWs! At next page, we have a Schrödinger’s “thought” on last week of February 1926: “I am repelled by the Heisenberg formalism because of the difficult algebra involved and the lack of an Anschauslischkeit, a viewpoint or picture. Yet, to my surprise, I showed that the two theories were completely equivalent from a mathematical point of view.” (McEnvoy and Zarate 2013, p. 142) However, at the meeting in July 1926 in Munich, after Schrödinger’s presentation, Heisenberg asked him: “Can you explain quantized processes such as the photoelectric effect and black-body radiation on the basis of your continuum wave model?” Schrödinger had no answer to this question! (McEnvoy and Zarate 2013, p. 143) [↑](#footnote-ref-102)
103. “To resolve the discrepancy between waves of probability and our commonsense notion of existence, Bohr and Heisenberg assumed that after a measurement is made by an outside observer, the wave function magically “collapses,” and the electron falls into a definite state—that is, after looking at the tree, we see that it is truly standing. In other words, the process of observation determines the final state of the electron. Observation is vital to existence. After we look at the electron, its wave function collapses, so the electron is now in a definite state and there is no more need for wave functions.” (Kaku 2005, p. 152) [↑](#footnote-ref-103)
104. The error of this statement sends to Spinoza’s dual aspects, Bohr’s complementarity, Leibniz’s parallelism, and any other kind of “dual property”... [↑](#footnote-ref-104)
105. “The study of electrons become, in this way, a theory of waves, more exactly of probability wave of electrons, and a theory of probabilities. More simple saying, the electron is a wave between the measurements and a corpuscular at measurements.” (Presura, p. 229) This statement is quite wrong: the electron is always a microparticle, and the wave is always an electromagnetic wave, but in EDWs. Maybe we need a theory of probability because of the “uncertainty principle” (we cannot localize exactly the position and the impulse of a microparticle), but the physicists working in quantum mechanics within the unicorn world have made the huge error through ONTOLOGIZING the “probability” (given by our macroscopic tools of measurement on microparticle and electromagnetic wave)! The “nature” (i.e., the ED ontologies of EDWs) has no idea about this “probability” (mathematics, in general, which is just a tool that help us in explaining certain processes of “nature”). [↑](#footnote-ref-105)
106. This statement confirm our principle that in a conscious state, the self is a continuous entity without any quantum jumps. This principle strongly supports the existence of EDWs! [↑](#footnote-ref-106)
107. “In a non-local theory, the events from a very distant galaxy can influence instantaneously the events placed here.” (Presura 2014, p. 287) Presura writes that the theory of relativity imposes a limit of speed influence, c. He emphasizes that Einstein’s approach imposes a limit regarding the speed of the “transmission of information”. Introducing the notion of “information”, Presura wants to avoid the great problem of “causality” (with greater speed than c) between the “nonlocal” events of quantum mechanics: quantum events do not transmit “information”, therefore, “it is possible a nonlocal theory does not violate relativity theory”. (Presura, p. 297) For us, the distinction between “event” and “information” is quite absurd: there is no causality of physical events or causality of “information” (an “empty notion” for us). It is about the EDWs: the node of an electromagnetic wave and the rest of the wave which corresponds to the microparticle, for instance, an electron. Presura indicates that when we measure something, the probability wave collapses, and this change happens in the entire universe. From our viewpoint, the changes happens indeed for the entire electromagnetic field which covers that “nothing” (no ontological status) (or using a wrong notion, the entire “space” - empty notion, anyway!). “However, still the collapse of the probability in the entire Universe is quite disturbing. Why it would be possible the probability wave to collapse in the entire universe at the same time?… The decoherence explains the collapse of the probability wave through a process in which it becomes localized step-by-step, through the interaction with the environment. The decoherence theory will not explain why, because the measurement, the collapse of the probability wave happens instantly in the entire universe. It is a local theory, while the quantum mechanics is no-local.” (Presura, p. 288) However, if we stop measuring the microparticle, the collapse disappears and the wave appears again in the same place! This state of affair cannot be explained within the unicorn world, but only within the EDWs perspective: the wave did not collapse at all. What it did really happens is the fact that, changing the measurement apparatus, we change our observation from one EW to an EDW. There is no “decoherence”, no collapse, no disappearance, but only changing our observation (indirect measurements) from “measuring” a particular entity (which belong to the micro-EW) to “measuring” an ED entity which belongs to an EDW (the wave which belong to the field-EW), no more or less. The microparticle corresponds to the “node” of the electromagnetic wave and the rest of the entire electromagnetic field. The “nonlocality” of two microparticles, for instance, is given by the fact that the electromagnetic field is everywhere and it corresponds to these microparticles. [↑](#footnote-ref-107)
108. We would have to draw the attention that, working within the unicorn world, the physicists have been forced to introduce the “complex numbers” in order to explain the relationships between the wave and the particle! [↑](#footnote-ref-108)
109. “The electron is not seen as a ball, but as a packet of energy associated with the oscillations of its probability wave, exactly as the photon is seen as a packet of energy associate with the oscillations of electromagnetic field.” (Presura 2014, p. 351) Again, if the microparticles do not exist, then the body of human being also does not exist. “The electron will become now the particle associated with the quantified oscillations of its probability wave.” (Presura, p. 352) What does it mean “associated” in this statement? Within the unicorn world, this notion has no correct explanation, and usually it leads to certain strong ontological contradictions! This is the reason, working within the unicorn world, many physicist have been forced to accept the “strong reductionism”, i.e., only the electromagnetic waves really exist. [↑](#footnote-ref-109)
110. Feynman used to say that the whole quantum mechanics could be resumed by analyzing Young's experiment. Evidently, within the unicorn-world, Young’s experiment that mixture the waves and the particles, the micro- and the macro-EDWs (the particle, the wave, the screen and double-slit apparatus) within the unicorn-world resumes indeed the wrong image of quantum mechanics until now! [↑](#footnote-ref-110)
111. Heisenberg has similarly claimed that “the particle trajectory is created by our act of observing it”. (Heisenberg in Zeh 2004, p. 105) Only within the unicorn world, could Heisenberg claimed such statement exactly as other physicists have used “superposition” until we discovered the EDWs… [↑](#footnote-ref-111)
112. At page 76, Oerter mentions again these points specifying that in “In classical physics, the fields were interpreted as real, physically existing entities spread throughout space. The quantum field, in contrast, is only an information wave. It doesn’t tell us where the electron is. Rather, it summarizes everything we know about the electron. Quantum mechanics doesn’t model the physical world, it reflects what we can say about the world.” (Oerter 2006, p. 76) Indeed, quantum theory mirrors what we can say about the “unicorn world”! Oerter continues writing that the “universe, it seems, does not admit of a complete description. The quantum mechanical description is the best we can do, and it gives only probabilities, not certainties.” (idem) Obviously, we cannot have a “complete description” of the unicorn world! [↑](#footnote-ref-112)
113. In his new book, regarding quantum theory, Krauss writes that: “We would need a theory of everything before we could ever have a theory of something.” (his italics, Krauss 2017, p. 115) “Theory of everything” is theory of the “unicorn world”! In our book 2010, we showed that the superstring theory is quite wrong. [↑](#footnote-ref-113)
114. About “quantum enigma” (Bell’s inequalities, etc.), see Rosenblum and Kuttner (2006). This book is investigated in Vacariu 2016a. “In refuting EPR, Bohr claimed that what happened to one object could indeed ‘influence’ the behavior of the other instantaneously, even though no physical force connected them. Einstein derided Bohr’s ‘influences’ as ‘spooky interactions.’” (Rosenblum and Kuttner 2006, p. 141) From our point of view, indeed, no “physical force” connects these microparticles; the wave corresponds to the two microparticles and this correspondence represents the instantaneous “influence”! As we will recall, “correspondence” is not a real phenomenon, i.e., it does not have any ontological status. „EPR’s argument assumed that the behavior of objects could be affected only by physical forces, and any object could otherwise be considered separate from the rest of the world. In particular, two objects could be separated so that the behavior of one could in no way affect the other.” (Rosenblum and Kittner 2006, p. 141) Again, between these two microparticles there is, indeed, no “physical force”; there is only a correspondence between these two microparticles and the wave. However, the microparticles and the wave belong to EDWs. As in cognitive neuroscience, in quantum mechanics it is quite common to talk about “correlations”. After experimenting with “correlations” between two photons (more specifically, their angle of polarization), physicists have reached the conclusion that their “twin photons indeed had identical polarization, identical stick angles. (In quantum theory, where polarization is observer created, the twin-photon correlation must be explained by a mysterious ‘influence’ instantaneously exerted on a photon by the observation of its twin.)” (Rosenblum and Kuttner 2006, p. 145) Actually, physicists believe that in principle, “any two objects that have ever interacted are forever entangled. The behavior of one instantaneously influences the other. An entanglement exists even if the interaction is through each of the objects having interacted with a third object. In principle, our world has a universal connectedness.” (Rosenblum and Kuttner 2006, p. 150) We consider we cannot talk about the “universal connectedness” of some or all objects (particles), but only about the correspondence between objects and waves. Our experiment with the stick and the two corresponding electrons (microparticles) directly mirrors Bell's inequality. Bell's inequality is broken just because those two microparticles (electrons or photons, etc.) correspond to the wave. A real entanglement between two microparticles (a phenomenon that belongs to the EW of those microparticles) does not exist as a real physical phenomenon. Again, there is only a correspondence between the wave and the two microparticles, and, we must repeat, this “correspondence” is not a real physical state which belongs to the microparticles-EW or to the waves-EW! Within the EDWs perspective, it is much easier to understand Rosenblum and Kuttner's inquiry: “Nonphysical” influences: If there’s a mind that’s different from the physical brain, how does it communicate with the brain? This mystery reminds us of the connection between two quantum-entangled objects – of what Einstein called “spooky actions” and Bohr called “influences.” (p. 189) (We will remind you that in cognitive neuroscience the great unsolved problem is the “binding problem”, which is quite similar to this “entanglement problem” from quantum mechanics. In both cases, there are phenomena that belong to the EDWs.) [↑](#footnote-ref-114)
115. Again this paragraph: “We can say that the electromagnetic wave of light (the oscillation of electric field) is, in fact, a wave of probability for photons. There where the amplitude of oscillation of electric field is greater (lighter areas), we will find more photons, while where the wave is smaller (dark areas), less photons. We have to notice that not the values of electric field in one point determines this probability, but the amplitude of oscillation. In other words, the electric field can have null-value, during the oscillation, because it is the size of oscillation (amplitude) which determines the number of photons we find there.” (Presura 2014, p. 226) [↑](#footnote-ref-115)
116. “We need a new conceptual model, something that is neither particle nor wave, something for which our everyday experience provides no analogy. That ‘something’ is what I have been calling the quantum field. It is a field that obeys a wave equation (the Schrödinger equation) that gives us the properties of interference and so on, but it always comes in chunks—in any interaction, only a whole electron (or atom or molecule) is emitted or absorbed or detected.” (Oerter 2006, p. 73) We believe that now it is quite clear that this new conceptual model is the EDWs perspective. [↑](#footnote-ref-116)
117. For more details about photon-wave complementarity, see our previous works. Anyway, we add that the speed of a photon (no mass) corresponds to the speed of the electromagnetic wave. Therefore, Michelson-Morley experiment is valid just because the speed of light c is constant! In this case, “constant” means the correspondence between the particle and the wave, which itself includes (through correspondence) the speed of light! [↑](#footnote-ref-117)
118. Krauss writes: “In fact, light also behaves like both a particle and a wave, depending on the circumstances under which you choose to measure it.” (2017, p. 88) Krauss works within the wrong framework of the “Universe”; inside the “Universe”, if you presuppose the existence of both entities (particles and wave), you reach an ontological contradiction. Only within our perspective, we can accept that both entities exist, but in the EDWs. Later, Krauss wrote: “As I have noted, in quantum mechanics particles have a wavelike character.” (Krauss 2017, p. 97) Indeed, Krauss works within the unicorn world! See also: “As I described in the earlier double-slit experiment example, there is no sense in which the particle has at any time both a specific position and a specific momentum. It possesses a wide range of both, at the same time, until we measure it and thereby fix at least one of them within some small range determined by our measurement apparatus.” (Krauss 2017, p. 101) If our measurement apparatus determines the position and the momentum for a particle, and following Heisenberg, there are ontologically “undetermined” features for the microparticle, than our body (which, within the unicorn world is identical with a huge amalgam of microparticles) has an “undetermined” position or moment! (About Heisenberg’s uncertainty principle, see below) [↑](#footnote-ref-118)
119. “When does the collapse happen? When the photon of the microscope hits the electron, when my brain becomes conscious of the new value of its position? We don’t know yet precisely when the process take places or how does it happen. The physicists describe it as a ‘black box’ and they see it as a result of the measurement process… Does the collapse happen suddenly in the entire universe, even passing the speed of light? Paradoxically, the collapse takes place instantly in the entire universe, even if this process would presupposes, apparently, a speed greater than the speed of light.” (Presura 2014, p. 260) From our viewpoint, the “collapse” does not exist. The observer has just changed the tools of measuring (we cannot measure the particle and the wave with the same instrument) moving from one EW (particle-EW, for instance) to an EDW (field-EW). Nothing it is passing the speed of light, so there is no paradox here! Working within the unicorn world, it is not surprising that Presura writes that it is “paradoxical that, after almost 100 years from the construction of the elements of quantum mechanics, we don’t know yet for instance how the collapse of the probability wave takes place.” (Presura, p. 261) [↑](#footnote-ref-119)
120. Presura indicates the role of abstract “Hilbert spaces”, vectors, and “operators” for describing the relationship between the wave and the particle. Within the unicorn world, the physicists needed, indeed, the “abstract mathematics”… (Presura 2014) [↑](#footnote-ref-120)
121. Within the unicorn world, there have been people (Bohm with his “implicit order” and others) who claimed that all macro-objects in the “Universe” are somehow related. Obviously, we can apply the “nonlocality” not only to the microparticles but also to the macroparticles. Because of the difference regarding their masses, we can “ignore” the “nonlocality” for the macro-objects (given by their correspondences with the electromagnetic waves). That is, there are “different grades of correspondences” for the wave-microparticle relationship and the wave-macroparticle relationship. Anyway, working within the unicorn world, we can claim that all macro-objects are somehow related, i.e., there is a “nonlocality” or “entanglement” between any two objects. From a reductionist viewpoint, the explanation of the behavior of macro-objects become meaningless, therefore, “entanglement” and “nonlocality” are meaningless notions since only the electromagnetic waves exist. [↑](#footnote-ref-121)
122. “The paper, now famous as ‘EPR’ for ‘Einstein, Podolsky, and Rosen,’ did not claim that quantum theory was wrong, just that it was incomplete. Quantum theory supposedly denied a physically real world, and thus required an observer created reality, only because it was not the whole story. EPR would show that you could, in fact, know a property of an object without observing it. That property, they argued, was therefore not observer created. The property was a physical reality that the ‘incomplete’ quantum theory did not include.” (Rosenblum and Kuttner 2006, p. 128) In other words, if “a physical property of an object can be known without its being observed, then that property could not have been created by observation. If it wasn’t created by its observation, it must have existed as a physically reality before its observation. EPR needed to display only one such property to show quantum theory to be incomplete.” (Rosenblum and Kuttner 2006, p. 135) From the EDWs perspective, an entity is “observed”/it interacts with any other entity from the same EW, so it is not necessary for the human observation to “ontologize” the “observed” entity! It has to be clear that these microparticles (and any other entity or phenomenon – except mental states, the I) have existed before the human beings observe them. [↑](#footnote-ref-122)
123. Evidently, the notion of “slit” is used here only from a pragmatic reason. For instance, an electron does not pass through a slit but through an amalgam of microparticles that corresponds to that slit. [↑](#footnote-ref-123)
124. “Observer-participancy in turn gives what we call tangible reality to the universe… Of all strange features of the universe, none are stranger than these: time is transcendent, laws are mutable, and observer-participancy matters.” (Wheeler 1979 in Dyson 2004, p. 73) [↑](#footnote-ref-124)
125. “Wheeler would make all physical law dependent on the participation of observers.” (Dyson 2004, p. 72) Following Bohr, Wheeler is very close to Kant’s paradigm! However, we consider that all physical laws depend on the “participation” (interactions) of epistemologically different entities (in the frameworks furnished by EDWs), not only on the participation of human observers. We are just a class of entities among epistemologically different entities! [↑](#footnote-ref-125)
126. “More precisely, spin-½ means that the angular momentum of the electron from its spin is h/2.”) (Greene 1999, p. 80). [↑](#footnote-ref-126)
127. We recall: graviton cannot even exist. The gravity is not the “curved spacetime” (Einstein’s general relativity) (since spacetime (or both space and time) cannot even exist), but the “nothing” curved which corresponds with something that belongs to an EDW, for instance, there are electromagnetic waves that are “indirectly curved” (“correspondence”) by the “planets”. However, the planets does not exist for the wave/field, the fields does not exist for the planets since both belong to the EDWs. [↑](#footnote-ref-127)
128. “By immersing atoms in magnetic fields and through other experiments, physicists deduced that the electron’s spin can point in one of only two directions: either in the same direction as the magnetic field (called spin-up) or opposite to it (spin-down). It may seem strange that the spin can’t point in any arbitrary direction; after all, there are no restrictions on how we orient the spin axis of a top or a gyroscope. The quantization of spin, like the quantization of the energy levels, is a consequence of quantum mechanics, however. Just as the energy levels of a (quantum) ant rollerblading in a bowl could only take on certain discrete values, the spin direction of the electron has only two possible values.” (Oerter 2006, p. 91) For an electron’s spin, there are only two directions just because the microparticle corresponds to the field that belongs to an EDW. This correspondence imposes (indirectly, since the microparticle does not exist for the field) the two values of the spin’s microparticle! [↑](#footnote-ref-128)
129. “The magnetic moment of the spin of a particle is a manifestation of special relativity, included in Dirac’s model.” (Presura 2014, p. 345) Obviously, the special relativity could be applied to the microparticles (entities which belong to the micro-EW). On the contrary, the general relativity cannot be applied to the quantum mechanics since there would be EW entities which belong to the EDWs (the macro-EW, the micro-EW and the field-EW). [↑](#footnote-ref-129)
130. “But this was another visual metaphor that was quickly found to have no foundation in reality. Today, we interpret electron spin as a purely ‘relativistic’ quantum effect, in which electrons may take up one of two possible ‘orientations’, which we call spin-up and spin-down. These are not orientations along specific directions in conventional, three-dimensional space, but orientations in a ‘spin-space’ which has only two dimensions – up or down. Each orbital in an atom was found to contain two – and only two – electrons. This is Austrian physicist Wolfgang Pauli’s famous exclusion principle, which he developed in 1925 and which states that electrons are forbidden from occupying the same quantum state. The principle derives from the mathematical form of the wave-function for any composite state consisting of two or more electrons. If the composite state were assumed to be created with two electrons which have precisely the same physical characteristics, then the wave-function has zero amplitude – such a state could not exist. For the wave-function to the exist with a non-zero amplitude, then the two electrons must somehow be different. In an atomic orbital, this means that one electron must have a spin-up orientation and one must have a spin-down orientation. In other words, their spins must be paired.” (Baggott 2012, p. 17) The last sentence referred tot the entanglement problem solved, within the EDWs perspective, by the correspondence! Pauli’s principle indicates that a single quantum state can be occupied by one electron, no more. Each orbital contains two electrons, so there are two quantum states. Pauli’s principle mirrors the correspondence between the wave and the particles. “The fact that each orbital contains in reality two states is confirmed also by the spectral of atoms in the magnetic field. Here, the lines of absorption and emission becomes double in the presence of the magnetic field, thing that can happen only if each orbital wold contain, in fact, two quantum different states.” (Presura, p. 252) The new property for the electron would be the representation of these states. Therefore, we need to generalize Schrödinger’s equation for two states not only for one. (Pauli’s equation) The “spin” indicates the number of distinct quantum states for the particle in a spatial position. (Presura, p. 252) (The electron, proton and neutron have two states.) Pauli’s exclusion principle has to be re-considered within the EDWs perspective: the electrons, for instance, do not exist for the waves, the waves do not exist for the electrons, but there is a correspondence between them that has a major role in this relationship. (Pauli’s postulate: “Two fermions cannot occupy the same quantum state, while two (or more) bosons can occupy the same quantum state.” Presura, p. 256) The physicists have to think about the relationship between the fermions/bosons and the electromagnetic waves in order to understand these states of affair. “Pauli’s exclusion principle”: If one quantum state can be occupied only by one (not two) electron, the other has to go on an “empty higher energy state”: “This is what keeps the atom from always collapsing to its lowest or ground state and gives each element its characteristic structure.” (McEnvoy and Zarate 2013, p. 99) “The fact that electrons cannot all get on top of each other makes tables and everything else solid.” (McEnvoy and Zarate 2013, p. 99) Clearly, we have here the correspondences between many microparticles and a macro-object (EDWs), but also between the microparticles and the electromagnetic wave! Pauli’s exclusion principle has to be explained exactly on the correspondence between those two electrons and the corresponding electromagnetic wave! [↑](#footnote-ref-130)
131. Stern and Gerlach’s experiment indicates that the electron has an intrinsic magnetic momentum, i.e., a magnetic field exists even if the electron does not move. Presura emphasizes that the physicists do not know why this field exists. So, we cannot explain the presence of the intrinsic magnetic field around the electron because of its rotational motion around its axes and, in this way, the speed of rotation would surpass the speed of light. (Presura 2014, p. 251) The electron is not a “small ball”, but a point particle, therefore, the motion around its axes is a “new quantum property”, named “spin”. (idem) The spin of the electron would be these two quantum states (and its rotation around its axes). (Presura, p. 253) Some considered that the properties of the electron would be “spatial properties”, that is, the “space is quantified”. (Presura, p. 253) We believe that this magnetic field exist just because the electron corresponds to an electromagnetic wave! However, “space” cannot exist at all. Again, its existence would produce certain strong ontological contradictions... [↑](#footnote-ref-131)
132. “In the EPR argument, Bell, Clauser, and Aspect showed Bohr to be right and Einstein wrong. But Einstein was right that there was something to be troubled about. It was Einstein who brought quantum theory’s full weirdness up front. It was his objections that stimulated Bell’s work and that continue to resonate in today’s attempts to come to terms with the strange worldview quantum mechanics forces on us. Bell believes that in ‘his arguments with Bohr, Einstein was wrong in all the details. Bohr understood the actual manipulation of quantum mechanics much better than Einstein. But still, in his philosophy of physics and his idea of what it is all about and what we are doing and should do, Einstein seems to be absolutely admirable... [T]here is no doubt that he is, for me, the model of how one should think about physics’.” (Rosenblum and Kuttner 2006, p. 151) With the EDWs perspective, we showed that Einstein was in a much better position than Bohr & Co.: Einstein was correct (working within a particular EW, the macro-EW), while physicists probability working in quantum mechanics were wrong (the mixture of EDWs). [↑](#footnote-ref-132)
133. The title of a section of Chapter 13 from Rosenblum and Kuttner (2006) is “Is It Einstein for Whom the Bell Tolls?” (p. 151) Einstein was right regarding the “weirdness” of quantum mechanics. We are sure Einstein would be delighted to read about the EDWs perspective and its application to the “quantum enigma”: In our works (2006, 2007, 2008, 2010, etc), we showed that the “quantum enigma” is a “pseudo-enigma”! [↑](#footnote-ref-133)
134. Quantum electrodynamics deals with the “multiparticle probability wave”. (Presura 2014, p. 255) [↑](#footnote-ref-134)
135. Momentum, p = mv. [↑](#footnote-ref-135)
136. We recall that, embracing a deterministic universe view, Einstein claims that “I can’t believe that God plays dice.” (Tegmark and Wheeler 2001, p. 71) [↑](#footnote-ref-136)
137. “… after measuring the speed, the probability wave becomes a plane wave. Now the electron can be found everywhere, and we don’t know its position anymore, even if we know its speed. After measuring the position, the probability wave becomes localized in the zone where the particles has been measured, and this can be mathematically written as a sum of plane waves, with different wavelengths (which mean with different speeds). Now we know the position of the electron, but we don’t know exactly the speed.” (Presura 2014, p. 260) [↑](#footnote-ref-137)
138. If we try to measure both values (position and speed), we will have uncertainty value for one or the other: ΔxΔp ≥ h/p (Heisenberg’s relationship). The product between the uncertainty of the position and the uncertainty of the speed cannot be less than h/p. The uncertainty cannot be null, therefore we cannot know the position and the speed at the same time! (Presura, p. 247) (Another “uncertainty” relationship is between the “energy” of particle and “time”.) [↑](#footnote-ref-138)
139. “Think, for example, of how the electron is described in the quantum theory. Because of uncertainty, the electron does not exist at any single point, but exists in all possible points around the nucleus. This electron ‘cloud’ surrounding the nucleus represents the electron being many places at the same time.” (Kaku 2005, p. 93) The electron exists at a single point but corresponds to the wave (that is present everywhere) and this correspondence created the illusion that the electron is in many places at the same time, i.e, the “electron cloud”. “Likewise, the universe was once smaller than an electron. When we apply the quantum theory to the universe, we are then forced to admit the possibility that the universe exists simultaneously in many states. In other words, once we open the door to applying quantum fluctuations to the universe, we are almost forced to admit the possibility of parallel universes. It seems we have little choice.” (Kaku 2005, p. 93) According to the EDWs perspective, the “electron cloud”, i.e., the “virtual particles cloud” is nothing more than the corresponding field (which belongs to the field/wave-EW). If we reject the existence of an “electron cloud” and of a single Big Bang and therefore the idea that “universe was once smaller than an electron”, then, inevitably, we reject the idea of a “parallel universe”, another Ptolemaic epicycle created by the human minds within the unicorn world. (Against the idea of “multiverse”, see Vacariu 2008) Within the unicorn world, indeed we have “little choice”! “What keeps two atoms locked in a stable molecule is the fact that electrons can simultaneously be in so many places at the same time that they form an electron ‘cloud’ which binds the atoms together. Thus, the reason why molecules are stable and the universe does not disintegrate is that electrons can be many places at the same time. But if electrons can exist in parallel states hovering between existence and nonexistence, then why can’t the universe? After all, at one point the universe was smaller than an electron. Once we introduce the possibility of applying the quantum principle to the universe, we are forced to consider parallel universes.” (Kaku 2005, pp. 147-148) Are we, human being just an amalgam of microparticles, each such microparticle being situated in “many places at the same time”? Another absurd idea constructed within the unicorn world in which we are indeed “forced to consider parallel universe”. “The multiverse idea is appealing, because all we have to do is assume that spontaneous breaking occurs randomly. No other assumptions have to be made. Each time a universe sprouts off another universe, the physical constants differ from the original, creating new laws of physics. If this is true, then an entirely new reality can emerge within each universe.” (Kaku 2005, p. 96) The “multiverse” can be appealing only within the unicorn world. We replace the “multiverse” with EDWs and we reach exactly the same conclusion. Several important physicists claimed that they believe only waves exist. In that case, human beings do not exist, they are just “appearances”; or, in other words, are just waves! Quite absurd… (Against Everett’s many worlds, see section 4.9.3) [↑](#footnote-ref-139)
140. In his famous book from 1935, von Neumann introduced the projection postulate (the collapse wave-function) that proved that hidden variables are impossible in quantum theory. (Whitaker 1996, p. 199) Thirty years later, Bell showed that von Neumann was wrong (hidden variables could exist) and the non-locality is real. (Whitaker 1996, p. 256) From an EDWs perspective, there is no collapse and the “hidden variables” would correspond, in fact, to the EDWs! (About the non-locality and the EDWs perspective, see Vacariu 2006, 2007 and 2008) [↑](#footnote-ref-140)
141. “As we see, to the macroscopic objects are associated probability waves.” (Presura p. 243) We can “associate” electromagnetic waves even with the macroscopic entities, but we have to take into account, the waves, the microparticles and the macroparticles belong to the EDWs! [↑](#footnote-ref-141)
142. Maybe we will be able to use two measurement apparatus to grasp both characteristics of a particle (its speed and position) at the same time... [↑](#footnote-ref-142)
143. In Bohm’s theory, both the particle (with precise position and momentum) and the wave always exist. (Whitaker 1996, p. 269) With Peter Holland’s words, we want to highlight here the relationship between de Broglie and Bohm: “Bohm’s model is essentially de Broglie’s pilot-wave theory carried to its logical conclusion”. (Whitaker 1996, p. 246) Whitaker emphasize that “(...) while for Bohr complementarity was the wave or the particle, for de Broglie was the wave and the particle.” (p. 246) Nevertheless, both de Broglie and Bohm’s theories were constructed within the unicorn-world. We emphasize again that the relationship between the wave and the particle is the correspondence. Even if Bohm accepted the non-locality, obviously, within the unicorn world, he could not explained it. (About Bohr’s ideas and the EDWs perspective, see Vacariu 2008) [↑](#footnote-ref-143)
144. We change “Bohr’s view that quantum mechanics and classical physics are complementary aspects of nature” (Dyson 20004, p. 76) into the claim that quantum mechanics and classical physics are descriptions of the EDWs just because “nature” does not exist! [↑](#footnote-ref-144)
145. In 1970, Dieter Zeh “noticed that in the real world you cannot separate the cat from the environment. The cat is in constant contact with the molecules of air, the box, and even cosmic rays that pass through the experiment. These interactions, no matter how small, radically affect the wave function: if the wave function is disturbed to the slightest degree, then the wave function suddenly splits into two distinct wave functions of the dead cat or the live cat, which no longer interact. Zeh showed that a collision with a single air molecule was enough to collapse it, forcing the permanent separation of the dead cat and live cat wave functions, which can no longer communicate with each other. ...In the real world, objects interact with the environment, and the slightest interaction with the outside world can disturb the two wave functions, and then they start to ‘decohere’—that is, fall out of synchronization and separate. Once the two wave functions are no longer vibrating in phase with each other, Zeh showed, the two wave functions no longer interact with each other.” (Kaku 2005, pp. 166-7) [↑](#footnote-ref-145)
146. No, the “quantum superposition” is not necessary within the EDWs perspective! It has been necessary within the unicorn world! [↑](#footnote-ref-146)
147. Later, in his book, Presura writes: “If we were seeing the quantum world with our eyes, we would have an image very unfamiliar, in which the particles seems to jump suddenly from one to to another: if we find the electron on the Earth, after few moments we can find it on the Moon (with small probabilities, of course) and after one minute back on Earth. We can not talk at all about continuous movements, the evolution of trajectories, etc. but only about a probability wave which evolves, and we will find the particle in different places, as the probability wave informs us.” (Presura 2014, p. 329) “The electron is, in the same time, in all its places.” (p. 330) If we agreed with Presura (as the majority of physicists until us), we can say that our bodies do not really exist, since the particles do not really exist! Therefore, there is, a very small probability indeed, our bodies to be on Earth (all microparticles that “composed” it) and then after few seconds, our bodies will be on the Moon! Nothing can stop us to believe in such things, working within the unicorn world, in the old paradigm of quantum mechanics! “In its essence, the Universe is in a quantum superposition of all of its possible classical states” (Presura 2014, p. 331), but if we investigate the macroscopic bodies, and the collapse of the probability waves, the lent evolution of the probability wave for the macroscopic objects will determine that the classical states that we observe to be dominant in the probability wave of the Universe. (Presura 2014, p. 331) Again, we have there a mixture of three EDWs: the field-EW, the micro-EW and the macro-EW! [↑](#footnote-ref-147)
148. As we saw above, within Copenhagen interpretation and from other physicists like Wheeler, the role of the observer became essential in explaining the quantum world. The observer creates the “world”. From an EDWs perspective, this “essential role” is rejected. The EDWs are already there, we are just simply indirect observers, no more or less! [↑](#footnote-ref-148)
149. “What was this quantity, the ‘wave function’, that Schrödinger’s equation described? This central puzzle remains a potent and controversial issue to this day... Wave functions could describe combinations of different states, so-called superpositions. For example, an electron could be in a superposition of several different locations.” (Tegmark and Wheeler 2001, p. 71) We saw that this “superposition” of several locations of an electron is created by human imagination based on the superposition of waves that are recorded by the screen in Young’s two-slits experiment. [↑](#footnote-ref-149)
150. In 1927, using Einstein’s special relativity, de Broglie showed that the particles would have the wave-properties, and the wave would have the particle-properties! [↑](#footnote-ref-150)
151. On the same line, Heisenberg claims that “the particle trajectory is created by our act of observing it.” (Heisenberg in Zeh, p. 105) [↑](#footnote-ref-151)
152. “Bell’s theorem has been called ‘the most profound discovery in science in the last half of the twentieth century.’ It rubbed physics’ nose in the weirdness of quantum mechanics. As a result of Bell’s theorem and the experiments it stimulated, a once ‘purely philosophical’ question has now been answered in the laboratory: There is a universal connectedness. Einstein’s ‘spooky interactions’ do in fact exist. Any objects which have ever interacted continue to instantaneously influence each other. Events at the edge of the galaxy influence what happens at the edge of your garden.” (Rosenblum and Kuttner 2006, p. 139) Again, within the EDWs perspective, this sort of “universal connectedness” between two microparticles does not exist! That is, there is no direct, real connection between the two microparticles (by “direct, real connection”, we refer to any physical phenomenon which belongs to the same micro-EW). The wave corresponds to those two microparticles and the nothing (“space”) between them and this correspondence mirrors this sort of “connectedness”! We have to remember that the wave does not exist for the microparticles (electrons, photons, etc.) and the microparticles do not exist for the wave. Moreover, the microparticles do not exist for the table (or for the stick, see below), the table (or the stick) does not exist for the microparticles. [↑](#footnote-ref-152)
153. Also, a microparticle cannot be in many places at the same time! [↑](#footnote-ref-153)
154. [our footnote] “Heisenberg’s cut” means the separation between the observer and the observed entity. [↑](#footnote-ref-154)
155. We emphasize again that this “massiveness” of the macro-objects mirror exactly different “degree of correspondence” for the micro-wave and the macro-wave relationships. [↑](#footnote-ref-155)
156. “How the evolution of the probability wave depends on the size of the classical system? In general, bigger the system (…), slower the evolution of the probability wave. This is one of the reasons the effects of quantum mechanics are not visible for the macroscopic systems.” (Presura 2014, p. 259) It is clear Presura has been working within the unicorn world. In reality, the probability wave is not a real notion for describing the field-EW. That field/wave exists without our measurements and both the particles and the waves do not have a “statistical” ontological status! These ED entities have such statistical status only in relationship with our measurements, therefore, Einstein was right… [↑](#footnote-ref-156)
157. “Cosmic microwave backgroung observations show that space has almost no curvature.” (Tegmark 2004) [↑](#footnote-ref-157)
158. We mention Hanna’s comments on Kant’s paragraphs (A239/B298-9 and A248/B305): “… empty concepts cannot be meaningfully applied by us either to noumenal objects or to objects of our sensory intuition, and in that sense they are ‘impossible’ – that is, impossible to use.” (Hanna 2001, pp. 90–1) We emphasize that even if they are thinkable, it is impossible for us to use these notions just because there are EDWs and not different “worldviews” or “paradigms of thinking”... [↑](#footnote-ref-158)
159. Along the same lines, see Putnam’s example with his friend a “world-famous physicist”. (Putnam 2005, 619) Putnam tried to convince his friend that there is a problem in quantum mechanics. Before several talks with Putnam, the physicist accepted the Copenhagen interpretation. After the talks, the physicist accepted the problem. Fourteen years later, at a conference he said: “There is no Copenhagen interpretation of quantum mechanics. Bohr brainwashed a generation of physicists.” (p. 619) From our viewpoint, Bohr is not more guilty than other physicists. The acceptance by everybody of the unicorn-world paradigm has represented the huge mistake that has “brainwashed” scientists and philosophers for such a long time! [↑](#footnote-ref-159)
160. For philosophical details about the whole-parts relationship, emergence and reductionism, and other approaches of the mind-brain problem, see van Gulick’s article (2001), a very good synthesis/presentation of all these philosophical problems. Gabriel Vacariu investigates these notions in Vacariu (2008). Also, see Bechtel’s works which are essential for many topics from cognitive (neuro)science. [↑](#footnote-ref-160)
161. “De Broglie’s wave–particle ‘duality’ implied that the electron was to be regarded as both wave and particle. But how could this be? Particles are localized bits of stuff, waves are delocalized disturbances in a medium (think of the ripples in a pond caused by the throw of a stone). Particles are ‘here’, waves are ‘there and everywhere’. One of the physical consequences of wave–particle duality is that we cannot measure the simultaneous position and momentum (specifically the speed and direction) of a quantum particle precisely. Think about it. If we can measure the precise position of a wave-particle this must mean that it is localized in space and time. It is ‘here’. For a wave this is only possible if it is formed by combining a large number of wave forms of different frequencies, such that they add up to produce a wave which is large in one location in space and small everywhere else. This gives us the position, but at the cost of complete uncertainty in the wave frequency, because the wave must be composed of many waves with lots of different frequencies.” (Baggott 2012, pp. 29-30) [↑](#footnote-ref-161)
162. “De Broglie was inspired by Einstein’s suggestion that light might have particle-like properties, even though the interference effects ‘proved’ it was a wave. If a wave could act at times like a particle, de Broglie reasoned, why couldn’t a particle, the electron for instance, act like a wave? According to de Broglie, every particle has a wavelength associated with it that depends on the mass and the velocity of the particle. The faster the particle moves, the shorter its wavelength. Just as for photons, a smaller wavelength means more energy.” (Oerter 2006, pp. 61-62) In order to avoid any ontological contradiction, “association” requires the existence/being of EDWs. Some physicists have always constructed these “associations” within the unicorn world, and therefore they have been working surrounded by some strong ontological contradictions. [↑](#footnote-ref-162)
163. This influence is similar to the “downward causation” introduced by Primas (later by Atmanspacher). About their approach, see last chapter. [↑](#footnote-ref-163)
164. “A thing seems to be accepted by most of researchers (either neurologists or psychologists): consciousness is not localized in a point in the brain, but it seems distributed in all the brain.” (Presura 2014, p. 265) No: the mind (consciousness included) is not localizable somewhere in the brain, it is an EDW which corresponds to the brain, body and the external world… (Vacariu 2002, 2003, 2005, 2007, etc.) [↑](#footnote-ref-164)
165. “… the laser produces a macroscopic electromagnetic field, while the electric bulb not.” (Presura 2014, p. 276) [↑](#footnote-ref-165)
166. The same thing we can say about the polarization of light. Explaining this phenomena, Presura introduces both electromagnetic wave and the photon into discussion. “The electric field can be linearly decompose as a sum of two electric fields, corresponding to some horizontal and vertical polarized waves. The same thing we can say about the probability waves of the photon (which are here exactly the electric field). Therefore, we will consider the photon |45º> as being in a quantum superposition classical states |0º> and |90º>.” (Presura 2014, p. 277) That is, the photon polarized at 45º is in a quantum superposition of two classical states: the photon has the polarization 0º and 90º. These paragraphs mirror exactly the framework of unicorn world in which the image was constructed. There is no superposition there! Moreover, we have to take into account that the field is everywhere but the field belongs to the wave/field-EW, while the photon belongs to the microparticle-EW! Later, describing a “separator” of polarized fascicles (which splits the “light” (that is the electromagnetic wave) in two parts having opponent polarizations (one vertical, the other horizontal), Presura writes: “The initial state of the photon (that in which it is polarized at 30º) is in a quantum superposition of those two polarized states which get out of the box of fascicles separator (polarization at 0º and 90º).” If we try to detect the photon with a special apparatus, we will see it on one polarized wave not on both since the “photon is indivisible”. (Presura, p. 278) There is here a mixture of the EDWs, the particle-EW and the field/wave-EW: the photon corresponds to the electromagnetic field (two polarized waves), no more or less. [↑](#footnote-ref-166)
167. We can talk about the naturalization of “God”, but not about a “Supreme Being”: “God” hyperis an EW, no more or less, which even it is does not exist for us… How then, the EW0 can be a new “God”? No, it is just an EW... [↑](#footnote-ref-167)
168. The “nonlocality” is compared with“voodoo” interactions of Haitian-African folklore! (McEnvoy and Zarate 2013, p. 170) Within the unicorn world, such comparisons are unavoidable! [↑](#footnote-ref-168)
169. We have to recall that a human body corresponds to an amalgam of microparticles. According to this idea from the quantum mechanics, the body would not exist until it is measured. This error would be another very serious argument against any interpretation of quantum mechanics, but in favor of the EDWs perspective! [↑](#footnote-ref-169)
170. “Bell liked to replace the word complementarity by contradictoriness.” (Whitaker 1996, p. 179) Bell is correct because, within the unicorn-world, we have to eliminate the existence of either the wave or the particle! Searching for the fundamental “level” of reality (the unicorn-world), many physicists accept the existence of wave and reject the existence of particles. (Among them, see Penrose 2004) In 1970’s, realizing certain experiments, Closer and later Aspect (early 1980’s) “proved” the “entanglement” between quantum particles, i.e,. they supported quantum nonlocality (“spooky action at a distance”) and rejected the “local hidden variable theory” proposed by Einstein-Podolsky-Rosen. This position reminds us the elimination of mental states by the eliminative materialists (Patricia Churchland and Paul Churchland) in the philosophy of mind. (Against this approach, see Vacariu 2008) Obviously, from an EDWs perspective, we prefer to replace complementarity by correspondence! Bell called Borh’s complementarity one of the three romantic world views in the field of quantum theory. The other two romantic views are Wigner’s approach (Whitaker, p. 201) and deWitt’s “many worlds” interpretation. (Whitaker 1996, p. 282) See also Everett’s many worlds below… [↑](#footnote-ref-170)
171. The wave is “attached” to the electron as “pilot-wave” which “guides” the movement of the classical electron. (Presura 2014, p. 284) From our viewpoint, what does it mean “attached”? Obviously, it mean that the electron and the pilot wave are both in the “same world”, the unicorn world! From our viewpoint, the electron corresponds to the wave since both belong to the EDWs. [↑](#footnote-ref-171)
172. “Thus, in Newtonian mechanics, the whole is the sum of its parts. In quantum mechanics, however, (the multiparticle probabilistic wave) is before its part, meaning that the parts (particles) appear as particular manifestations of the whole. This thing will become more clear for the theories of quantum field…” (Presura 2014, p. 287) The part (the microparticle) and the whole (the electromagnetic field) belong to the EDWs! Even the microparticles (the “parts”) and the planet (the “whole”) belong to the EDWs, since an essential property of the macro-entity (the planet), the “gravity” (i.e., that “nothing curved”) cannot be reduced to the properties of the parts (the microparticles). Obviously, the mind and the brain/body have totally different properties just because the mind is an EW, while the brain/body is an entity which belongs to the macro-EW. [↑](#footnote-ref-172)
173. Weatherall (2019) indicates that the “equivalence theories” that refer to the “dualities” in Physics do not preserve the same “empirical content”: “Dualities are not (generally) theoretical equivalences.3 The reason is that dualities do not preserve empirical content.” (p. 2) As an example, Weatherall investigates the electromagnetic duality which “do not preserve empirical content”. (3) His last paragraph: “They are not (in general) empirically equivalent in the sense usually required for theoretical equivalence: they do not necessarily preserve ‘prior’ empirical content. They are empirically equivalent in a weaker sense, where we permit re-interpretations that force the equivalence. In other words, a theory is, in general, equivalent to its dual theory only with a compensating ‘anti-dual’ empirical interpretation. How well-motivated this re-interpretation is will depend on context.” (p. 13) Obviously, Weatherall’s view needs the ontology furnished by the EDWs perspective! In some cases, these “different empirical contents” means nothing else than ED entities/processes that belong to the EDWs. Only if the dualities refer to content that belong to the EDWs, we can consider that these dualities “do not preserve the empirical content”! Such claims are quite impossible to be constructed within the unicorn world; they would lead to strong ontological contradictions. The same verdict is available for other dualities in Physics like microparticles-macroparticles or microparticles-electromagnetic waves: there are EDWs, no more or less! (More details about the electromagnetism and the EDWs, see our book 2017, for instance) Such “empirical equivalences” have been possible to be constructed only within the unicorn world. In reality, a planet is not even equivalent with a huge amalgam of microparticles. There is no identity between a planet and a huge amalgam of microparticles within the unicorn world, since there are two EDWs! [↑](#footnote-ref-173)
174. “Although we have described the merging of possible histories in the context of only a couple of specific examples, this way of thinking about quantum mechanics is general.” (Greene, p. 181) [↑](#footnote-ref-174)
175. Presura recalled that, at the beginning of quantum mechanics, there were the approaches of Heisenberg’s matrix, Schrödinger’s probability wave, and Dirac’s operators which describe all mathematically the same physical processes. (p. 364) Feynman introduced a new mathematical interpretation’s of the same physical processes. (Presura 2014, p. 364) The “standard model of elementary particles” has two quantum theories of fundamental fields: the “quantum chromodynamics” (the quantum field associated with quarks that compose the protons and neutrons) and the “electroweak theory” (disintegration of nucleus, quantum electrodynamics, electromagnetism). We should pay attention that even the great Feynman worked within the “unicorn world”. This is the reason he was able to create quite implausible “states of affair” even for quantum mechanics... [↑](#footnote-ref-175)
176. (Our footnote) In Feynman’s approach, there is the problem created by these “infinities”! To “save the phenomena” the physicists introduced “quantum renormalization”. From our viewpoint, there is no such correspondence between an “infinite” number of microparticles and the probability wave. There is only the correspondence between a particle and, indeed, the entire wave! Moreover, the “infinity” is a mathematical notion without any ontological status. (see Vacariu and Vacariu 2019) [↑](#footnote-ref-176)
177. The two fundamental elements of Feynman’s method are the notion of virtual trajectory (any trajectory can the followed by the particle) and that of probability amplitude… that is the trajectory’s contribution to the final result. Some physicists interpret this process saying that the particle becomes virtual traveling on these virtual trajectories at the same time.” (Presura 2014, p. 391) The particle is in all spatial points in a superposition state because it travels virtual on all virtual states. (Presura, p. 393) Wrong! In reality, the particle is in one place but it corresponds to the entire field/wave; the particle and the field belong to EDWs! [↑](#footnote-ref-177)
178. “In this radically new interpretation, the cat is both dead and alive because the universe has split into two. In one universe, the cat is dead; in another universe, the cat is alive. In fact, at each quantum juncture, the universe splits in half, in a never-ending sequence of splitting universes. All universes are possible in this scenario, each as real as the other. … The great advantage of the many worlds theory is that it is simpler than the Copenhagen interpretation: it requires no collapse of the wave function. The price we pay is that now we have universes that continually split into millions of branches.” (Kaku 2005, p. 168) [↑](#footnote-ref-178)
179. “One great advantage to finding the hidden symmetries of nature is that we can show that phenomena that are seemingly distinct are actually manifestations of the same thing, linked together by a symmetry. For example, we can show that electricity and magnetism are actually two aspects of the same object, because there is a symmetry that can interchange them within Maxwell’s equations. Similarly, Einstein showed that relativity can turn space into time and vice versa, because they are part of the same object, the fabric of space-time.” (Kaku 2005, p. 97) “Symmetries then encode the hidden beauty of nature. But in reality, today these symmetries are horribly broken. The four great forces of the universe do not resemble each other at all. In fact, the universe is full of irregularities and defects; surrounding us are the fragments and shards of the original, primordial symmetry shattered by the big bang. Thus, the key to understanding possible parallel universes is to understand ‘symmetry breaking’—that is, how these symmetries might have broken after the big bang. As physicist David Gross has said, ‘The secret of nature is symmetry, but much of the texture of the world is due to mechanisms of symmetry breaking’.” (Kaku 2005, p. 97) [↑](#footnote-ref-179)
180. “If the big bang were perfectly symmetrical (or if it came from nothing), then we should expect equal amounts of matter and antimatter to be formed. So why do we exist? The solution proposed by Russian physicist Andrei Sakharov is that the original big bang was not perfectly symmetrical at all. There was a tiny amount of symmetry breaking between matter and antimatter at the instant of creation, so that matter dominated over antimatter, which made possible the universe we see around us. (The symmetry that was broken at the big bang is called CP symmetry, the symmetry that reverses charges and the parity of matter and antimatter particles.) If the universe came from ‘nothing,’ then perhaps nothing was not perfectly empty but had a slight amount of symmetry breaking, which allows for the slight dominance of matter over antimatter today. The origin of this symmetry breaking is still not understood.” (Kaku 2005, p. 96) [↑](#footnote-ref-180)
181. The same observation is available for the following paragraph: “From this point of view, the realization of the mechanism of spontaneous symmetry breaking represented a real breakthrough in the development of theoretical physics, because i) one does not have to identify a small asymmetric term in the Hamiltonian and one may use a fully symmetric Hamiltonian, ii) the symmetry breaking is accounted for by the instability of the physical world or phase chosen to describe the states of the system. This mechanism also shows up in the classical case, where symmetric equations of motion may nevertheless lead to an asymmetric physical description, due to the existence of disjoint physical worlds or phases in which the symmetry is broken (see Part I).” (Strocchi 2005, p. 118) [↑](#footnote-ref-181)
182. The same idea is in the next paragraph:“At the same time, just as when the number of atoms of matter is very large and their temperature is low, they condense to a liquid (or some other condensed) phase and the field theory picture in terms of elementary quanta gives way to an effective hydrodynamic continuum description of the system, the emergence of a continuum space(time) should be understood as the condensation of a large number of interacting quantum atoms of space to a new condensed phase, in which an hydrodynamic effective description is more appropriate, but that can be deduced (at least in part) from the underlying microscopic field theory.” (Oriti 2007, p. 7) [↑](#footnote-ref-182)
183. “GFTs are quantum field theories of spacetime (as opposed to QFTs on spacetime), that describe the dynamics of both its topology and geometry in local, simplicial, covariant, algebraic terms, and that encompass ideas and insights from most of the other approaches to non-perturbative Quantum Gravity.” (Oriti 2009, p. 310) [↑](#footnote-ref-183)
184. In this article, Oriti makes an analogy between discrete/continuous nature of space and condensed matter system. (p. 5): “This set of results suggests that space itself can be understood as a kind of Aether (a medium-substance) that is, however, relativistic (at least up to Planckian scales), whose structure has to be described in background independent manner, and is fundamentally quantum in nature. The physical question, then, becomes what constitutes it, what it looks like at microscopic scales. The novelty is now that this idea has the possibility of being realized rigorously, within a fastly developing quantum gravity approach: group field theory.” (Oriti 2011, p. 5) Again, we have here the empty notion of spacetime… [↑](#footnote-ref-184)
185. “The idea I am arguing for is that of quantum space as a kind of condensate [26], made of ‘fundamental’ building blocks that cannot be understood, in themselves, in terms of the ordinary notions of space or time. Moreover, I am arguing that, from this perspective, the question whether quantum space is discrete or continuous makes no absolute sense, i.e. it has to be answered differently in different physical contexts, as for any other condensed matter system. This last point, as shown, rests on the fact that even the microscopic building blocks of a condensed matter system are best described in the context of quantum field theory. In fact, we do have a candidate QFT formalism for the microscopic structure of quantum space: group field theory (GFT) [25]” (2011, p. 8) Obviously, Oriti relatives the “framework of thinking”, that is, he introduces relative, phenomenal entities that are not absolute “real”! This framework is quite old in philosophy and physics! [↑](#footnote-ref-185)
186. “But what if even these turn out to be largely universal, thus independent of the details that distinguish, say, one microscopic model from another? how do we compare different microscopic models, then? and is then of any use to have them at all, if only very general properties of them are falsifiable? However, one can see the same issue more optimistically. We have, at present, not a single complete candidate for the microscopic theory of quantum space, in particular not single one for which we are able to show how it gives rise to a continuum space at macroscopic scales.” (p. 13) Talking about different “levels of description”, the question remains: what does really exist? Oriti cannot answer to this question. [↑](#footnote-ref-186)
187. [23] G. Horowitz, J. Polchinski, in [2], gr-qc/0602037; J. De Boer, Les Houches Lect.Notes 97 (2015) 163-183] [↑](#footnote-ref-187)
188. “The notion of emergence is itself subtle to define, even in ordinary physical theories [13–15]. We will base our analysis on a very general characterization of it, provided by Butterfield and collaborators [16–18]. Emergence is understood to be the appearance, in a certain description of a physical system, of properties that are novel with respect to a different (more ‘fundamental’) description of the same system, and robust thus stable enough to represent a characterization of the new description and to form part of new predictions stemming from it. Emergence, in this understanding, usually requires the use of some limiting procedure and of a number of (possibly drastic) approximations, to allow the novel properties to become visible in the new description.” (p. 2) [↑](#footnote-ref-188)
189. Oriti mentions Strocchi 2015, but he makes a mistake, it is about 2005! [↑](#footnote-ref-189)
190. “It is wrong to think that the task of physics is to find out how Nature is. Physics concerns what we say about Nature.” (Niels Bohr) [↑](#footnote-ref-190)
191. We recall here Tesla’s famous words: “If you want to find the secrets of the universe, think in terms of energy, frequency and vibration.” Obviously, Tesla’s reductionism was thought within the “Universe”, i.e., the unicorn world... [↑](#footnote-ref-191)
192. This the idea of the first statement of their article and in their footnote, the authors mention Anderson’s article “more is different”! We mention here that we could not understand essential notions from this article, but we tried to grasp the main idea of their research… Gabriel Vacariu investigated Anderson’s article within the EDWs perspective in his PhD thesis and his first book (2008)! [↑](#footnote-ref-192)
193. And broken symmetry. (Bayha et all. 2020) [↑](#footnote-ref-193)
194. “In the thermodynamic limit, a closed-shell system undergoes a quantum phase transition from a normal to a superfluid phase with increasing attraction7,27. As a generic feature of quantum phase transitions2, this gives rise to a collective mode that goes soft, that is, the excitation gap closes at the transition point. In the case at hand, the lowest collective mode corresponds to the coherent excitations of time-reversed pairs across the gap.” (Bayha et al. 2020, p. 585) [↑](#footnote-ref-194)
195. For more details: “With the atoms inside, the researchers tuned the trap, from zero attraction to such a strong attraction that the atoms came together in bound pairs. This is a requirement for forming a fermionic superfluid – the fermionic particles have to become bound together as Cooper Pairs that act like bosons, a heavier particle that forms a superfluid phase at higher temperatures than fermions do.” (Starr 2020) [↑](#footnote-ref-195)
196. Obviously, the physicists have to take our EDWs perspective, but they have to mention the source, not to plagiarize it! [↑](#footnote-ref-196)
197. Einstein: “God does not play dice with the universe”. Bohr’s replay: “Stop telling God what to do!” (McEnvoy and Zarate 2013, p. 172) Both great thinkers were wrong (anyway God cannot even exist), but Einstein was closer to the EDWs than Bohr! [↑](#footnote-ref-197)
198. It is quite impossible, nobody discovered the EDWs until Gabriel Vacariu did it, but after he published many of his works, many people have published UNBLIEVABLE similar ideas to his ideas! The reader has be aware about the possibilities of communications furnished by Internet in our days – the speed of light! [↑](#footnote-ref-198)
199. “Physicists sometimes view philosophers with a certain disdain, quoting from the Roman Cicero, who once said, ‘There is nothing so absurd that it has not been said by philosophers’. … However, philosophers may yet get the last laugh. The quantum theory is incomplete and rests on shaky philosophical grounds.” (Kaku 2005, pp. 156-7) [↑](#footnote-ref-199)
200. Against the string theory, see Vacariu and Vacariu (2010, last chapter). About this “unacceptable” relationship, see Vacariu 2008, 2014, 2016, and Vacariu and Vacariu 2010. [↑](#footnote-ref-200)
201. Maudlin (1996) examines in detail why the theory of everything (the grand unified theory-electroweak force unified with strong nuclear force- unified with gravity) is a myth. “The electroweak force is to be unified with the strong nuclear force by a grand unified theory (GUT), and then, in the final step, the GUT will somehow be unified with gravity in a theory of everything (TOE). This image of the future course of physical theory has become so pervasive as to rank almost as dogma.” (p. 129) Without presenting any of his arguments, we insert here Maudlin’s conclusion: “At this point, there is little hard evidence for the kind of structure postulated by the GUTs and even less for the TOEs.” (p. 143) [↑](#footnote-ref-201)
202. “I think that a particle must have a separate reality independent of the measurements. That is, an electron has spin, location and so forth even when it is not being measured. I like to think the moon is there even if I am not looking at it.” (Einstein in Rosenblum and Kuttner 2006, p. 125) „At the 1927 Solvay conference, Einstein, by then the world’s most respected scientist, turned thumbs down on the newly minted Copenhagen interpretation. He insisted that even little things have reality, whether or not anyone is looking. And if quantum theory said otherwise, it had to be wrong. Niels Bohr, the Copenhagen interpretation’s principal architect, rose to its defense.” (Rosenblum and Kuttner 2006, p. 125) Within the EDWs, a particle has a “separate reality independent of measurement”. That particle exists because of its interactions with other microparticles from the same EW. [↑](#footnote-ref-202)
203. We recall that in Vacariu and Vacariu (2017) we re-wrote Einstein both relativities, replacing “spacetime” with “motion”. For us, the most amazing thing has been that even if Einstein relativized “spacetime”, very few people have thought that exactly this “spacetime” did not exist. (see the last chapter with Carlo Rovelli) The main reason for such error has been the framework in which everybody has been working: the unicorn world! [↑](#footnote-ref-203)
204. We mention again that it have been not a huge surprise when we discover so many people (from Philosophy, Physics, and Cognitive Science) publishing UNBELIEVABLE similar ideas to our ideas, many years after Gabriel Vacariu published his first works! [↑](#footnote-ref-204)
205. “Two types of black holes have been identified. The first is the stellar black hole, in which gravity crushes a dying star until it implodes. The second, however, is more easily detected. These are galactic black holes, which lurk at the very centers of huge galaxies and quasars and weigh millions to billions of solar masses.” (Kaku 2005, pp. 123-4) [↑](#footnote-ref-205)
206. “In 1967, a stunning breakthrough was made by physicists Steven Weinberg and Abdus Salam, who showed that it was possible to unify the weak and electromagnetic forces. They created a new theory whereby electrons and neutrinos (which are called leptons) interacted with each other by exchanging new particles called the W- and Z-bosons as well as photons. By treating the W- and Z-bosons and photons on the very same footing, they created a theory which unified the two forces.” (Kaku 2005, p. 82) “In the 1970s, physicists analyzed the data coming from the particle accelerator at the Stanford Linear Accelerator Center (SLAC), which fired intense beams of electrons at a target in order to probe deep into the interior of the proton. They found that the strong nuclear force that held the quarks together inside the proton could be explained by introducing new particles called gluons, which are the quanta of the strong nuclear force. The binding force holding the proton together could be explained by the exchange of gluons between the constituent quarks. This led to a new theory of the strong nuclear force called Quantum Chromodynamics. So by the mid 1970s, it was possible to splice three of the four forces together (excluding gravity) to get what is called the Standard Model, a theory of quarks, electrons, and neutrinos, which interact by exchanging gluons, W- and Z-bosons, and photons.” (Kaku 2005, p. 82) [↑](#footnote-ref-206)
207. Talking about the “quantum theory of gravity” is like talking about the mental states within the brain. For instance, Kosslyn tried to prove the existence of “mental images” in the brain – an incredible blunder accepted by many people working in cognitive neuroscience, a pseudo-science (about cognitive neuroscience as a pseudo-science, see Vacariu and Vacariu 2015). In all these cases, it is about the mixture of EDWs! [↑](#footnote-ref-207)
208. “Because the Standard Model, notwithstanding its stunning experimental successes, seems so contrived, physicists tried to develop yet another theory, or the grand unified theory (GUT), which put the quarks and leptons on the same footing. It also treated the gluon, the W- and Z-boson, and the photon on the same level. (It could not be the ‘final theory,’ however, because gravity was still conspicuously left out; it was considered too difficult to merge with the other forces, as we shall see.) This program of unification, in turn, introduced a new paradigm to cosmology. The idea was simple and elegant: at the instant of the big bang, all four fundamental forces were unified into a single, coherent force, a mysterious ‘superforce.’ All four forces had the same strength and were part of a larger, coherent whole. The universe started out in a state of perfection. However, as the universe began to expand and cool rapidly, the original superforce began to ‘crack,’ with different forces breaking off one after the other.” (Kaku 2005, p. 84) “Although the universe started in a state of perfect unity, today it has gone through many phase transitions, or changes of state, with the forces of the universe breaking free of the others one by one as it cooled.” (Kaku 2005, p. 84) [↑](#footnote-ref-208)
209. Somebody can claim that a GUT or TOE has to be about the Hypernothing. However, this theory would have nothing to do with quantum mechanics, Einstein’s general theory of relativity, superstring theory or any other theory at all! There has to be a theory about the EW0 but not referring to quantum mechanics and Einstein’s general relativity. There would be a kind of correspondence without any ontological status, no more or less. [↑](#footnote-ref-209)
210. “The first force is gravity, which holds the Sun together and guides planets in their celestial orbits in the solar system… The second great force is electromagnetism, the force that lights up our cities, fills our world with TV, cell phones, radio, laser beams, and the Internet… The third force is the weak nuclear force, which is responsible for radioactive decay. Because the weak force is not strong enough to hold the nucleus of the atom together, it allows the nucleus to break up or decay… The weak force, in turn, is based on the interactions of electrons and neutrinos (ghost-like particles that are nearly massless and can pass through trillions of miles of solid lead without interacting with anything). These electrons and neutrinos interact by exchanging other particles, called W- and Z-bosons… The strong nuclear force holds the nuclei of the atoms together. Without the nuclear force, the nuclei would all disintegrate, atoms would fall apart, and reality as we know it would dissolve.” (Kakku 2005, pp. 79-80) [↑](#footnote-ref-210)
211. “I am now convinced that theoretical physics is actual philosophy.” (Max Born) Obviously, for Born, in that period, “theoretical physics” was represented by quantum mechanics. [↑](#footnote-ref-211)
212. Again, the waves are not the “underlying reality of the universe” just because the “universe” does not exist and, moreover, the waves correspond, at least, to the Hypernothing! [↑](#footnote-ref-212)
213. “Nothing” is a notion that can describe the non-existing “parts” of any EW (except the Hypernothing-EW and the mind-EW). As we have emphasized many times, “nothing” associated with “empty space” from an EW cannot have any ontological status, but in generally, it corresponds to something which belongs to an EDW. [↑](#footnote-ref-213)
214. We strongly emphasize that the notion of “inflation” is quite similar with the notion of “nonlocality” in quantum mechanics. Since we have explained the nonlocality with the EDWs perspective, in the same way, we reject the notion of “inflation” as describing real phenomena! Exactly as the “nonlocality” of two particles (the micro-EW) are explained through their “correspondence” with a electromagnetic wave (field-EW), in the same way, the inflation is explained with certain phenomena which belong to the pre-Big-Bang-EW. [↑](#footnote-ref-214)
215. “Eventually, Linde proposed a new version of inflation that seemed to eliminate some of the defects of the early versions. He envisioned a universe in which, at random points in space and time, spontaneous breaking occurs. At each point where breaking occurs, a universe is created which inflates a little. Most of the time, the amount of inflation is minor. But because this process is random, eventually there will be a bubble where the inflation lasts long enough to create our universe. Taken to its logical conclusion, this means that inflation is continuous and eternal, with big bangs happening all the time, with universes sprouting from other universes. In this picture, universes can ‘bud’ off into other universes, creating a ‘multiverse’.” (Kaku 2005, p. 92) Obviously, the notion of “multiverse” is totally different than the EDWs. “At first, one might object to the notion of a multiverse, because it seems to violate known laws, such as the conservation of matter and energy. However, the total matter/energy content of a universe may actually be very small. The matter content of the universe, including all the stars, planets, and galaxies, is huge and positive. However, the energy stored within gravity may be negative. If you add the positive energy due to matter to the negative energy due to gravity, the sum may be close to zero! In some sense, such universes are free. They can spring out of the vacuum almost effortlessly. (If the universe is closed, then the total energy content of the universe must be precisely zero.)” (Kaku 2005, p. 93-4) [↑](#footnote-ref-215)
216. Against multiverse and superstring theory, see Vacariu (2008), and mainly Vacariu and Vacariu (2010) [↑](#footnote-ref-216)
217. Ontologically speaking, the notion of “infinity” has been the greatest disease of theoretical physics especially in the last 200 years! [↑](#footnote-ref-217)
218. We believe that the EDWs perspective can be applied to all aspects of dark matter, but it is quite impossible for us to do this job in a chapter... [↑](#footnote-ref-218)
219. “The search to understand the nature of dark matter and dark energy is perhaps the grandest adventure we have ever undertaken.” (Lawrence Krauss, p. vii in Hooper 2006) A very good recent history of dark matter in Bertone and Hooper’s article (2016). [↑](#footnote-ref-219)
220. “Now it is possible to estimate how much mass should be inside the Milky Way stars whose velocities we know (including the Sun) to explain their rates of rotation about the centre of the galaxy. The surprising result of such calculations is that the observed mass of the Milky Way, as judged by the light emitted by the stars within it, accounts for only 10% of the mass required to explain the rotation. This result is confirmed when we look at the motions of galaxies within clusters of galaxies; there seems to be insufficient mass in the galaxies to prevent the clusters from flying apart. Again the observed mass is only about 10% of that required. This has led to the idea of missing mass. Nine tenths of the mass in the Universe seems to be in a form that we cannot detect.” (Woolfson 2013, pp. 48-49) “The dark matter story grew out of the recognition in the 1930s that the mass in stars in clusters of galaxies is too small for gravity to hold clusters together. If standard gravity physics is a good approximation on these large scales then most of the mass of a cluster would seem to be dark1,2. By the 1970s, evidence for dark matter included relative motions of galaxies on smaller scales3, motions of stars and galaxies close to us4, and measurements of velocities of stars and gas in other galaxies5–7. The measured stellar velocities indicated that more mass than is seen in stars is needed to hold galaxies together. This deduction checked with the demonstration that if most of the mass in a spiral galaxy were in a disk supported by circular motion, the disk would be unstable to collapse, to chaotic streaming. This instability is avoided if the mass in the disk is subdominant to the mass in a more nearly spherical dark halo8.” (Peebles 2017, p. 1) Also, we add information about “cold dark matter”: “… how to reconcile the clumpy distribution of galaxies with the smooth sea of 3 K thermal radiation. This cosmic microwave background (CMB) is a fossil from the early hot stages of expansion of the Universe, the ‘Hot Big Bang’. (The demonstration that the CMB has the thermal spectrum expected of a fossil was completed a decade later, but the Hot Big Bang interpretation was widely accepted in 1980.) By the early 1980s, the bound on the anisotropy of the CMB had improved to δT/T ~ <1×10−4 (ref. 10), where T is the radiation temperature. The root mean square fluctuation in galaxy counts in randomly placed spheres of radius 10 Mpc was measured to be about 100% of the mean3. How could the growing clumping of matter have so little disturbed the CMB? The answer I proposed in 1982 was that baryonic matter may be subdominant to a gas of nonbaryonic, initially slowly moving particles11. This sCDM cosmology (for cold dark matter; the ‘s’ distinguishes the original from later modifications) predicted CMB anisotropy an order of magni-tude below the measurements.” (idem) [↑](#footnote-ref-220)
221. “Estimates of the total mass for galaxies (and clusters of galaxies), inferred from observed motions in conjunction with gravitational theory, differ dramatically from mass estimates based on observed luminous matter. To take the most famous example, the orbital velocities of stars and gas in spiral galaxies would be expected to drop with the radius as r outside the bright central region; observations indicate instead that the velocities asymptotically approach a constant value as the radius increases.” (Smeenk 2013, p. 8) “To save Einstein’s and Newton’s theories, many physicists and astronomers have postulated that there must exist a large amount of ‘dark matter’ in galaxies and also clusters of galaxies that could strengthen the pull of gravity and lead to an agreement of the theories with the data. The clusters and superclusters of galaxies are the largest observed objects in the universe. Most physicists believe that without dark matter, the clusters of galaxies could not be stable objects, for the gravitational force determined by Einstein’s and Newton’s theories is not strong enough to hold the galaxies together in the cluster.” (Moffat 2008, p. vi) We can see here again the strong temptation of introducing certain Ptolemaic epicycles for solving certain problems. Within the EDWs perspective, it is not necessary to save “Einstein’s theory” since it cannot be applied to the entire “universe” which it does not exist! This theory is available for some but not all EDWs. [↑](#footnote-ref-221)
222. “Empirical evidence for the existence of dark matter comes purely from its gravitational effect: despite significant efforts, experimental searches for dark matter particles in accelerators (e.g. for a review in LHC searches see [7]), and dedicated detectors on Earth (e.g. [8,9]) and in space (e.g. [10,11]) so far remain unsuccessful. Until the particles are discovered, dark matter will remain a hypothesis, albeit one with strong empirical support.” (Zavala and Frenk 2019, p. 1) Using gravitational lensing method, Gilman et al. (December 2019) detected the “existence” of cold dark matter. Their results are in concordance with the “predictions of cold dark matter”. We emphasize that the results refer to “sub-galatic scales”. These sub-galatic scales refer, in fact, to the mega-entities that exist in the mega-EW! Codl dark matter “in the form of some unknown species of elementary particle had become the leading paradigm. In addition to massive neutrinos (sterile or otherwise), supersymmetric particles (neutralinos, gravitinos, sneutrinos, axinos) and axions were each widely discussed as prospective dark matter candidates. And as the evidence in favor of non-baryonic dark matter became increasingly compelling, an ever greater number of particle physicists began to openly speculate about the nature of this invisible substance. The result of this was a long and diverse list of exotic possibilities, ranging from topological defects produced through spontaneous symmetry breaking in the early Universe (monopoles, cosmic strings) [177], to macroscopic configurations of quark matter (centimeter-scale ‘nuggets’, with nuclear-scale densities) [339], and even ‘pyrgons’ (Kaluza-Klein excitations) that could appear within the context of models with extra spatial dimensions [185].” (Bertone and Hooper 2016, pp. 42-3) "At present, there's no direct evidence in the lab that dark matter particles exist," Birrer said. "Particle physicists would not even talk about dark matter if the cosmologists didn’t say it's there, based on observations of its effects. When we cosmologists talk about dark matter, we're asking 'how does it govern the appearance of the universe, and on what scales?'" (Hubble’s team 2020) Obviously, there are no “dark particles”, and the scale is the mega-scale, that is the mega-EW! “‘Dark matter is colder than we knew at smaller scales,’ said Anna Nierenberg of NASA's Jet Propulsion Laboratory in Pasadena, California, leader of the Hubble survey. ‘Astronomers have carried out other observational tests of dark matter theories before, but ours provides the strongest evidence yet for the presence of small clumps of cold dark matter. By combining the latest theoretical predictions, statistical tools and new Hubble observations, we now have a much more robust result than was previously possible’." (idem) [↑](#footnote-ref-222)
223. “We can determine the amount of dark matter in a galaxy by comparing the galaxy’s mass to its luminosity. More formally, astronomers calculate the galaxy’s mass-to-light ratio (see Cosmic Calculations 16.1). First, we use the galaxy’s luminosity to estimate the amount of mass that the galaxy contains in the form of stars. Next, we determine the galaxy’s total mass by applying the law of gravity to observations of the orbital velocities of stars and gas clouds. If this total mass is larger than the mass that we can attribute to stars, then we infer that the excess mass must be dark matter.” (Bennet et al. 2010) “There was clearly a discrepancy between the luminous mass observed with telescopes and the mass inferred from dynamical measurements (…).” (Bertone 2013, p. 25) [↑](#footnote-ref-223)
224. As many other physicists, Krauss (2012) tries to show that the “Universe” appeared from “nothing” (even space and time). As we showed with the EDWs perspective, the universe/world does not exist but EDWs. Moreover, as we will see in this book, even space and time do not exist. [↑](#footnote-ref-224)
225. For the history of a longer period of cosmology, see Sheehan and Conselice (2015). [↑](#footnote-ref-225)
226. “Hubble was able to use his measurement of Cepheids and Leavitt’s period-luminosity relation to prove definitively that the Cepheids in Andromeda and several other nebulae were much too distant to be inside the Milky Way.” (Krauss 2012, p. 31) “When he performed the same experiment on other spiral nebulae, Hubble found that they too were well outside the Milky Way galaxy. In other words, it was clear to him that these spiral nebulae were entire island universes in their own right—that the Milky Way galaxy was just one galaxy in a firmament of galaxies. In one stroke, the size of the universe became vastly larger. From a single galaxy, the universe was suddenly populated with millions, perhaps billions, of sister galaxies. From a universe just 100,000 light-years across, the universe suddenly was perhaps billions of light-years across.” (Kaku 2005, p. 48) [↑](#footnote-ref-226)
227. “By analyzing twenty-four galaxies, he found that the farther the galaxy was, the faster it was moving away from Earth, just as Einstein’s equations had predicted. The ratio between the two (speed divided by distance) was roughly a constant. It quickly became known as Hubble’s constant, or H. It is perhaps the single most important constant in all of cosmology, because Hubble’s constant tells you the rate at which the universe is expanding. If the universe is expanding, scientists pondered, then perhaps it had a beginning, as well. The inverse of the Hubble constant, in fact, gives a rough calculation of the age of the universe.” (Kaku 2005, p. 50) [↑](#footnote-ref-227)
228. “The stars that appeared to be the most luminous really were the most luminous, and what’s more, for the Cepheids, their luminosities were keyed to their periods. She first published this result in a 1908 paper… In another paper published four years later, she added a plot showing the magnitudes vs. the logarithm of the periods for a somewhat larger sample of Cepheids in the Small Magellanic Cloud. The plot was exactly linear… This meant that the Period-Luminosity relationship for Cepheids was not just a correlation, it was a law of nature.” (Sheehan and Conselice 2015, p. 224) Cepheids are the “standard candle” for measuring distances because “we can determine a Cepheid’s luminosity from the period between its peaks of brightness”. (Bennett et al. 2010, p. 445) [↑](#footnote-ref-228)
229. “In 1912, astronomer Vesto Slipher had found that the galaxies were moving away from Earth at great velocity. Not only was the universe much larger than previously expected, it was also expanding and at great speed. Outside of small fluctuations, he found that the galaxies exhibited a redshift, caused by galaxies moving away from us, rather than a blue one. Slipher’s discovery showed that the universe was indeed dynamic and not static, as Newton and Einstein had assumed.” (Kaku 2005, p. 49) [↑](#footnote-ref-229)
230. “The story of dark matter is perhaps one of the strangest chapters in cosmology. Back in the 1930s, maverick Swiss astronomer Fritz Zwicky of Cal Tech noticed that the galaxies in the Coma cluster of galaxies were not moving correctly under Newtonian gravity. These galaxies, he found, moved so fast that they should fly apart and the cluster should dissolve, according to Newton’s laws of motion. The only way, he thought, that the Coma cluster can be kept together, rather than flying apart, was if the cluster had hundreds of times more matter than could be seen by telescope. Either Newton’s laws were somehow incorrect at galactic distances or else there was a huge amount of missing, invisible matter in the Coma cluster that was holding it together.” (Kaku 2005, p. 70-1) [↑](#footnote-ref-230)
231. We recall here the analogy with different whole-parts relationships: forest-trees, planet-microparticles, wave-microarticles! The forest does not have any ontology, while the planet and the wave have their ED ontologies. The trees, the microparticles have their ED ontologies. [↑](#footnote-ref-231)
232. Until we have written an article in 2020, we used the notion the “macro-macro-EW”, but at prof. Ilie Parvu’s suggestion, we replaced this notion with the “mega-EW”. [↑](#footnote-ref-232)
233. “With this, researchers seemed to finally have incontrovertible evidence that the Universe was not just composed of visible matter. The discovery prompted a gradual change in how ‘dark matter’ was conceived. No longer just cold stars and solid bodies, dark matter came to be viewed as the material that made up the majority of the Universe. And with that change came a new player on the scene: particle physics.” Massive Compact Halo Objects (MACHO) or WIMPs (Weakly Interacting Massive Particle) were introduced as alternative for dark matter. We strongely emphasize that this direction is completely wrong! Only working within the unicorn world, the physicists could have checked for the microparticles that form the dark matter. It has to be very clear that the microparticles or the macroparticles do not exist for the entities that belong to the mega-EW! “A stream of observations in the 1980s supported the presence of dark matter, including gravitational lensing of background objects by [galaxy clusters](https://en.wikipedia.org/wiki/Galaxy_cluster), [44] the temperature distribution of hot gas in galaxies and clusters, and the pattern of anisotropies in the [cosmic microwave background](https://en.wikipedia.org/wiki/Cosmic_microwave_background). According to consensus among cosmologists, dark matter is composed primarily of a not yet characterized type of [subatomic particle](https://en.wikipedia.org/wiki/Subatomic_particle).[13][14] The search for this particle, by a variety of means, is one of the major efforts in [particle physics](https://en.wikipedia.org/wiki/Particle_physics).[14]” (Wikipedia, “Dark matter”) Anyway, “Elena Aprile, a professor of physics at Columbia University and the woman who leads the XENON dark matter experiment, told Ars that it is “getting harder and harder experimentally” to find dark matter. Even though the XENON experiment has seen a few iterations—and the team has another, XENONnT, planned in 2019—there’s still no sought-after WIMP particle. ‘Clearly most of us have this feeling that the story is coming to a conclusion, and at the same time we are pushing to the limits of what we know how to do,’ Aprile told Ars.” (Bucklin 2017) Aprile has to change her framework of thinking (the unicorn world) with our EDWs perspective! The same advise is for those scientists checking for “axions” (CERN Axion Solar Telescope and Axion Dark Matter eXperiment (ADMX) at the University of Washington (Bucklin 2017), for instance. [↑](#footnote-ref-233)
234. “They begin with galactic rotation curves, citing the papers of Roberts and Rots [260] and Rogstad and Shostak [262] as evidence for their atness in the outer parts of galaxies. The authors then went on to build a case for the existence of large amounts of dark matter in the outer parts of galaxies, based on mass estimates from galaxy pairs, the dynamics of dwarf galaxies, and the so-called timing argument for the Local Group. And although the observations presented in this paper were not new, and were subject to large uncertainties, the authors appear to have been contended in their conclusions, stating that the trend of increasing mass with increasing radius is ‘almost certainly real’, and arguing that this trend was in line with the ‘viral discrepancy’ that had been observed in clusters and groups of galaxies [124, 264, 265]. The first sentences of this paper's body summarizes well the sentiment of the authors: ‘There are reasons, increasing in number and quality, to believe that the masses of ordinary galaxies may have been underestimated by a factor of 10 or more. Since the mean density of the Universe is computed by multiplying the observed number density of galaxies by the typical mass per galaxy, the mean density of the Universe would have been underestimated by the same factor’.” (Bertone and Hooper 2016, p. 56) “Peebles helped usher in the ‘dark sector’ to our model of the universe, becoming a pioneer of (what is now called) the standard cosmological model. In this model, the universe is dominated by mysterious forms of matter and energy that we are yet to fully understand, but whose existence is supported by observational evidence.” (The Conversation) [↑](#footnote-ref-234)
235. “Take it [dark matter] away from a galaxy like our own Milky Way, and all its stars and planets would fly away like bullets in intergalactic space!” (Bertone 2013, p. vii) One of the great reasons that support the existence of dark matter is that the “orbital speeds” in the Milky Way are very high even these stars are very far from the center of galaxy. (Bennett et al 2010) In contrast, because the gravitational field of the Sun decreases with distance from it in our solar system, the orbital speeds decrease with this distance! [↑](#footnote-ref-235)
236. The “Russian physicist Aleksandr Friedmann, who found the most general and realistic solutions of Einstein’s equations… his solutions depend on just three parameters: 1. H, which determines the rate of expansion of the universe. (Today, this is called Hubble’s constant, named after the astronomer who actually measured the expansion of the universe.) 2. Omega, which measures the average density of matter in the universe. 3. Lambda, the energy associated with empty space, or dark energy… The subtle interplay between these three constants determines the future evolution of the entire universe. For example, since gravity attracts, the density of the universe Omega acts as a kind of brake, to slow the expansion of the universe, reversing some of the effects of the big bang’s rate of expansion.” (Kaku 2005, pp. 40-1) “If Omega is less than 1, scientists conclude that there is not enough matter in the universe to reverse the original expansion from the big bang… If Omega is greater than 1, then there is sufficient matter and gravity in the universe to ultimately reverse the cosmic expansion. As a result, the expansion of the universe will come to a halt, and the universe will begin to contract… A third possibility is that Omega is perched precisely at 1; in other words, the density of the universe equals the critical density, in which case the universe hovers between the two extremes but will still expand forever… And last, there is the possibility that the universe, in the aftermath of a big crunch, can reemerge into a new big bang. ” (Kaku 2005, pp. 41-3) [↑](#footnote-ref-236)
237. Aczel indicated a well-known problem: the cosmological constant (“lambda”) introduced by Einstein in his general theory of relativity to save the image of “static universe”. Based on his observations, Hubble pointed that the universe would expand. However, with the supposition of “dark energy”, the “lambda returns”. (Aczel 2014) It is not “dark energy” but an EDW! “The cosmological constant (acting differently from how it was designed, as a force stopping the expansion) is the best explanation we have for the mysterious ‘dark energy’ seen to permeate space and push the universe ever outward at an accelerating rate. To most physicists today, lambda, cosmological constant, and dark energy are closely synonymous.” (Aczel 2014) “And so Einstein proposed a revision of his model, still with a cosmological constant, but now the constant was responsible for the creation of new matter as the universe expanded (because Einstein believed that in an expanding universe, the overall density of matter had to still stay constant): ‘In what follows, I would like to draw attention to a solution to equation (1) that can account for Hubbel’s facts, and in which the density is constant over time.’ And: ‘If one considers a physically bounded volume, particles of matter will be continually leaving it. For the density to remain constant, new particles of matter must be continually formed in the volume from space.’ Einstein achieves this property by the use of his old cosmological constant, λ: ‘The conservation law is preserved in that by setting the λ-term, space itself is not empty of energy; as is well-known its validity is guaranteed by equations (1).’ (Quoted in O’Raifeartaigh, et al., 2014, p. 7.) So Einstein keeps on using his discarded lambda—despite the fact that he invented it for a non-expanding universe. If the universe expands as Hubble showed, Einstein seems to be saying, then I still need my lambda—now to keep the universe from becoming less dense as it expands in volume.” (Aczel, 2014) “As for why Einstein was so intent on maintaining the use of his discarded lambda, the constant represents the energy of empty space—a powerful notion—and Einstein in this paper wanted to use this energy to create new particles as time goes on. Today we view the same energy of the vacuum as the reason for the acceleration of the universe’s expansion. Einstein presciently understood that the energy of the vacuum, unleashed by his cosmological constant, was too important to let die.” (Aczel, 2014) From all these statements, we can conclude that is is not about the “energy of empty space”, but about an EDW, no more or less. The “cosmological constant” refers to the correspondences between an EDW and the macro-EW (where are the planets that form the galaxies). This EW is not the micro-EW or the wave/field-EW, but just an EDW than all these three EDWs. [↑](#footnote-ref-237)
238. Somebody can believe that the dark matter is in fact the Hypernothing. We believe that the dark matter belongs to the pre-Big Bang-EW, but not to the EW0. This is just an opinion... [↑](#footnote-ref-238)
239. Obviously, there is a strong analogy of dark matter/energy with entanglement and nonlocality of quantum mechanics! All these processes require the explanation of EDWs perspective. [↑](#footnote-ref-239)
240. “Physicists have proposed literally tens of possible dark matter candidates, including neutralinos, gravitinos, sneutrinos, sterile neutrinos, axions, fuzzy dark matter, WIMPs, WIMPzillas, superWIMPs, self-interacting dark matter, cryptons, Kaluza–Klein dark matter, D-matter, branons, Q-balls, and mirror matter, to name a few.” (Bertone 2013, p. 61) [↑](#footnote-ref-240)
241. “Remove all bodies but one and its mass will give a gravitational field that spreads throughout space. This means that we could contemplate a region of space devoid of all material bodies but it would not be empty if there were even just one more body elsewhere in the universe: the gravitational field from that remote body would fill all of the otherwise ‘empty’ region.” (Close 2009, p. 38) Therefore, we cannot talk about “empty space”! [↑](#footnote-ref-241)
242. We have to be aware that “galaxies” and “clusters of galaxies” do not exist one set for the other set: here it is about parts-whole and both belong to the same macro-EW. Obviously, for the parts and the whole, there are some properties that are quite different. [↑](#footnote-ref-242)
243. “In 2006, scientists at Harvard University saw something spectacular through the Chandra Telescope: two galaxy clusters colliding. The collision left clumps of visible and invisible matter to be analyzed… Using gravitational lensing, scientists were able to determine that most of the matter was near the galaxy clusters and not in the red haze of gas clouds where most visible matter was. The galaxy collision therefore separated dark and visible matter—and by doing so, allowed scientists to find evidence of the former.” (Bucklin 2017) Again, dark matter can be explained only within the EDWs perspective: the dark matter does not exist in the macro-EW, but only within the mega-EW (that corresponds to the galaxies)! “If dark matter does not exist, then the next most likely explanation must be general relativity – the prevailing theory of gravity – is incorrect and should be modified. The Bullet Cluster, the result of a recent collision of two galaxy clusters, provides a challenge for modified gravity theories because its apparent center of mass is far displaced from the baryonic center of mass.[67] Standard dark matter models can easily explain this observation, but modified gravity has a much harder time, [68][69] especially since the observational evidence is model-independent.[70]” (Bucklin 2017) Obviously, Since “spacetime” has no ontology (Vacariu and Vacariu 2016), in our book 2017, we re-wrote Einstein’s general theory of relativity without “spacetime”. Obviously, we do not need to modified this theory since it is available only for entities that belong to the macro-EW. [↑](#footnote-ref-243)
244. In this footnote, we emphasize an important idea: the mega-EW does not mean, with necessity, that the “entities” that belong to this EW are “greater” or “larger” than the entities that belong to the macro-EW. It is about an EDW than the macro-EW... [↑](#footnote-ref-244)
245. Not surprisingly (from our viewpoint), recent experiments for searching the dark matter particles furnished negative results: Large Underground Xenon (LUX) in Dakota, XENON1T-XENON10-XENON100 (Italy), PandaX-II (China), LHC (Geneva) found no evidence for dark matter particles! (Hossenfelder and McGauch 2018, p. 40) Some researchers introduced the notion of “unseen particles”/forces (“hidden sector”). (idem) Wihtin the EDWs perspective, the so-called “unseen particles” is a totally wrong notion! Quite interestingly, in 2016, McGauch et al., measuring the gravitational pull” from “normal matter” of 150 galaxies with gravitational pull from dark matter, discovered a strong “correlation between dark matter and normal matter!! (Hossenfelder and McGauch 2018,, p. 41) In fact, it is about the correlations between ED entities that belong to two EDWs: the macro-EW (galaxies) and the mega-EW (the mega-entities). The correlation refers to two kinds of “gravity: the gravity of “galaxies” and the gravity of mega-entities [↑](#footnote-ref-245)
246. “Though the specific identity of the dark-matter particle remains unknown, the best candidates were, until recently, the theoretical particles known as WIMPs (an acronym for weakly interacting massive particles). Unfortunately, WIMPS are extremely difficult to detect in the laboratory, because they rarely interact with ordinary matter, and in their search for them physicists have built giant underground experiments, in which detectors are shielded by soil and rock from other particles.” (Sheehan and Conselice 2015, p. 335-336) “WIMPs are not the only type of cold dark matter candidate. Another contender, called the axion, arose from an attempt to cleanse the standard model of particle physics and remove a marked inequity.” (Halpern 2012, p. 86) “Unless the mass that we cannot see — dark matter — really exists then we can explain neither the rotation rates of galaxies nor the stability of galactic clusters. The two main candidates being considered for dark matter are: WIMPs (Weakly Interacting Massive Particles). These are elementary particles, abundantly produced by the Big Bang, of which a sufficient number have survived to account for the missing mass. They interact with matter so feebly that, as yet, no means of detecting them has been found. If they exist, then the only indication of their presence is their gravitational effect. MACHOs (Massive Compact Halo Objects). These objects consist of ordinary matter that emit either no radiation or, perhaps, too little radiation to be detected. Among the candidates that have been suggested for these objects are black holes, black dwarfs (faded white dwarfs), brown dwarfs (bodies intermediate in mass between a planet and a star) and smaller, planetary-size bodies. (Woolfson 2013, p. 109) (The “Schwarzschild radius” or “event horizon” (his solution to Einstein’s theory): “a sufficiently dense object acts as if it has a spherical shell through which no matter or light can ever escape…” (Hooper 2006, p. 31) However, compact objects “at least within the mass range probed by microlensing surveys, do not appear to dominate the missing mass in the Milky Way's halo.” (Bertone and Hooper 2016, p. 46) “Neutralinos, axions, sterile neutrinos, mirror particles, Kaluza–Klein photons, gravitinos, sneutrinos: the new theories proposed over the last three decades to extend the Standard Model provide an endless list of dark matter candidates, each with its own properties and detection strategies. Most likely only one of them, if any, will turn out to explain the dark matter puzzle.” (Bertone 2013, p. 9) There are no such “dark-matter” particles exactly as there are no “gravitons”! This is the reason there are so many pseudo-particles. If we ask an electron “Why your trajectory follows a curved, geodesic line near a huge amalgam of microparticles?” (that is a planet in an EDW), the electron has “no idea” about any planet since it does not perceive/interact with any macro-entity; the electron interacts only with other microparticles (that we know - protons, electrons, neutrons - or not). However, we have not to forget about the part-whole relationship within the same EW. (See Vacariu 2015) The fundamental microparticles are considered the fermions: quarks (6 versions) and leptons (electrons, muon, tau, etc.) and the bosons (particles of forces): four forces with photon, Z and W bosons, and gluons (8 types). “Neutrinos are an example of a dark matter candidate we call a weakly interacting massive particle, or a WIMP.” (Hooper 2006, p. 75) “The Standard Model of particle physics contains only one plausible candidate for dark matter: the neutrino. Our observations, along with computer simulations, now tell us that this one candidate is not as plausible as was once thought. Although neutrinos do have the attractive feature of being known to exist, they are no longer thought of as a possible candidate for dark matter.” (idem, p. 78) “In the simplest variety of supersymmetric models, there are seven superpartners that are potentially interesting candidates for dark matter. Three of these are sneutrinos, the supersymmetric partners of the Standard Model neutrinos. The other four are the superpartners of the photon, the Z boson, and two Higgs bosons.4 Those particles, respectively, are the photino, the zino, and two Higgsinos. These four are collectively known as neutralinos. In many supersymmetric models, the lightest of the four neutralinos is the lightest of the superpartners.” (Hooper 2006, p. 98) “A particle that reacted with nothing could never be detected. It would be fiction. The neutrino is just barely a fact.” (Leon Lederman in Hooper 2006, p. 63) This motto of Chapter 4 in Hooper’s book mirrors exactly the EDWs perspective: ED interactions constitute ED entities. Without interactions, an entity could not exist. The Universe/world does not exist since it does not interact with something else. Because of their interactions, there are macro-entities (for instance), but not the Universe (which is just a “slogan”, a label, but not something that really exists). “As it became accepted that standard model neutrinos could not make up most of the Universe's dark matter8, it also became clear that there must exist at least one currently unknown particle species that makes up the missing mass.” (Bertone and Hooper 2016, p. 35) From our viewpoint, the same conclusion is available for any kind of known and unknown microparticle! [↑](#footnote-ref-246)
247. Moreover, there are other EDWs: for instance, Krauss informs us that “the largest gravitationally bound objects in the universe are called superclusters of galaxies. Such objects can contain thousands of individual galaxies or more and can stretch across tens of millions of light-years. Most galaxies exist in such superclusters, and indeed our own galaxy is located within the Virgo supercluster of galaxies, whose center is almost 60 million light-years away from us.” (Krauss 2012, p. 48) These superclusters of galaxies (which do not have any ontological status in the macro-EW) correspond to certain ED entities which belong to an EDW, the mega-EW. [↑](#footnote-ref-247)
248. In general, there are two alternatives for the existence of dark matter: either “dark matter microparticles” or “changing the gravity equations” (initiated by Mordehai Milgrom in 1983 who modified Newton’s laws, creating MOND-“modified Newtonian dynamics”). Recent observations of gravitation in galaxies favors modified gravity theories over dark matter.” (Hossenfelder Sabine and McGaugh 2018, p. 38) The astronomers consider that all that exist are the galaxies, and reject the existence of dark matter. They have worked within the unicorn world: the mega-entities really exist in the mega-EW. In reality, Einstein’s general theory of relativity is available only for planets (the macro-EW), but not for the mega-entities (the mega-EW)! So, we don’t need to modify this theory, we have to discover a new laws governing these mega-entities! “In 2006, a group of astronomers including Douglas Clowe transformed the debate between dark matter and MOND with the publication of an article entitled, ‘A direct empirical proof of the existence of dark matter’. In this paper, the authors described the observations of a pair of merging clusters collectively known as the ‘bullet cluster’ (and also known as 1E0657-558) [81]. As a result of the clusters' recent collision, the distribution of stars and galaxies is spatially separated from the hot X-ray emitting gas (which constitutes the majority of the baryonic mass in this system). A comparison of the weak leansing and X-ray maps of the bullet cluster clearly reveals that the mass in this system does not trace the distribution of baryons (see Fig. 7). Another source of gravitational potential, such as that provided by dark matter, must instead dominate the mass of this system.” (Bertone and Hooper 2016, pp. 53-4) We have to understand that the “bullet clusters” correspond to the mega-entities which belong to the mega-EW, therefore, searching for the “dark matter” inside the macro-EW (where the clusters of galaxies formed by the ontological planets are) is quite meaningless! [↑](#footnote-ref-248)
249. Another strong argument for the existence of “dark matter” is the observation of X-ray emissions from clusters because the temperature of the gas in clusters is directly related to the total mass of cluster. (Krauss 2012, p. 55) “… the total mass in and around galaxies and clusters was determined to be only about 30 percent of the total amount of mass needed to result in a flat universe today.” (Krauss 2012, pp. 55-56) “Temperature measurements of hot gas also tell us the amount of dark matter in clusters, and give results that agree with those we infer from galaxy velocities.” (Bennett 2010, p…) “Thanks to WMAP results that have further supported the accelerating universe picture, astronomers have begun to include a cosmological constant, along with regular matter and cold (slow-moving) dark matter, as part of what they call the Lambda-CDM (Lambda Cold Dark Matter) “concordance model.” The idea is that the universe has passed through stages in which different factors played important roles—a theory based on a concordance of measurements using various techniques and instruments. Although, as WMAP has shown, dark energy is at present almost three quarters of the universe’s composition, it has played a seminal role only in the past six billion years. In the first eight billion years or so of cosmic history, the universe was compact enough that the density of matter (mostly in the dark form) played a larger part, which fortunately permitted vast structures to form.” (Halpern 2012, p. 40) “Einstein made subtle adjustments to Newton's theory of gravity. And in his 1916 theory of general relativity, he presented calculations on paper that matched the motions in the heavens slightly more accurately than Newton's. Yet he, too, had to account for a universe that, as was evident in ‘the small velocities of the stars,’ wasn't collapsing of its own weight. In his 1917 paper ‘Cosmological Considerations on the General Theory of Relativity,’ he inserted a fudge factor in his equation—the Greek symbol lambda, ‘at present unknown’—to represent whatever it was that was keeping the universe from collapsing. Like Newton, he feigned no hypotheses as to what that something might be. It was just... lambda. But then, little more than a decade later, came Hubble's universe, and with it an elegant and unforeseen solution to the lack-of-collapse conundrum: The reason the universe wasn't collapsing of its own weight was that it was expanding.” (Panek 2011, p. 56) “In 1917, in considering the implications of general relativity, Einstein saw that the universe was inherently unstable. Just as Newton had invoked God to keep his version of the universe from collapsing, so Einstein added a symbol to his equations—arbitrarily, the Greek letter lambda, A. Whatever lambda was, it was counteracting gravity, because, in Einstein's idea of a stable universe, something had to be. It was the reason that a universe full of matter attracting other matter through gravity wasn't collapsing. After Hubble's discovery of evidence for the expansion, the universe didn't need lambda, and Einstein abandoned it.” (Panek 2011, p. 119) “The amount of matter in the universe wasn't enough to halt the expansion, but the amount of matter and energy in the universe was. According to Einstein, matter and energy are equivalent, so while the mass, whether in the form of dark matter or regular matter, might well fall short of the critical density, the energy causing the acceleration—lambda—could make up the difference. A mass density of 40 percent or so plus an energy density of 60 percent or so added up to 100 percent of the critical density, or an omega of 1. The universe did have a low matter density. The universe was flat.” (Panek 2011, p. 139) [↑](#footnote-ref-249)
250. “Spectacular 3D maps of the universe have revealed one of the biggest cosmic structures ever found — an almost-inconceivable wall stretching 1.4 billion light-years across that contains hundreds of thousands of galaxies… Astronomers have long noticed that galaxies are not scattered randomly throughout the universe but rather clump together in what's known as the cosmic web, enormous strands of hydrogen gas in which galaxies are strung like pearls on a necklace that surround gigantic and largely empty voids” (Mann 2020b) Pommarede and his colleagues used a different method to detect the hidden mass “that is gravitationally influencing how galaxies move and therefore uncover dark matter, that invisible stuff that emits no light but exerts a gravitational tug on anything near enough. (Dark matter also makes up the bulk of the matter in the universe.)” (Mann 2020b) Obviously, such superclusters (and clusters) of galaxies corresponds to certain mega-entities which belong to the mega-EW! [↑](#footnote-ref-250)
251. “In 1962, the curious problem with galactic motion [Zwicky’s discovery] was rediscovered by astronomer Vera Rubin. She studied the rotation of the Milky Way galaxy and found the same problem; she, too, received a cold shoulder from the astronomy community. Normally, the farther a planet is from the Sun, the slower it travels. The closer it is, the faster it moves. That’s why Mercury is named after the god of speed, because it is so close to the Sun, and why Pluto’s velocity is ten times slower than Mercury’s, because it is the farthest from the Sun. However, when Vera Rubin analyzed the blue stars in our galaxy, she found that the stars rotated around the galaxy at the same rate, independent of their distance from the galactic center (which is called a flat rotation curve), thereby violating the precepts of Newtonian mechanics. In fact, she found that the Milky Way galaxy was rotating so fast that, by rights, it should fly apart. But the galaxy has been quite stable for about 10 billion years; it was a mystery why the rotation curve was flat. To keep the galaxy from disintegrating, it had to be ten times heavier than scientists currently imagined. Apparently, 90 percent of the mass of the Milky Way galaxy was missing!” (Kaku 2005, p. 72) [↑](#footnote-ref-251)
252. “By knowing the number of galaxies, cosmologists then estimate the amount of dark matter in the universe.” (Moffat 2008, p. 120) “Dark matter and light elements like hydrogen and helium were produced in the first few minutes after the Big Bang. Dark matter halos then slowly grew from seed structures and merged into ever-larger systems, until gas fell under their gravitational pull and sunk to their centers.” (Bertone 2013, p. 28) “The component of the galaxy that is not seen, because it is too diffuse, is the galactic halo, a spherical region of diameter so large that it encompasses the whole of the visible part of the galaxy. The stars within the halo are solely older Population II stars and many of these are within globular clusters. The most important component of the halo is what we cannot see — dark matter.” (Woolfson 2013, pp. 115-116) “The studies found that dark matter surrounds most galaxies in roughly spherical clouds, called halos. Dark matter halos are significantly larger than the visible part of most galaxies, and often extend well into intergalactic space.” (Hooper 2006, p. 19) “Encompassing the Milky Way galaxy is a halo of dark matter. The particles making up this enormous dark matter cloud travel through every corner of our galaxy, oblivious of the planets, stars, dust, and other forms of ordinary matter around them. To a particle of dark matter, the world is a lonely and quiet place.” (Hooper 2006, p. 106) Indeed, to a “particle”/entity of dark matter, from what we know that exist, nothing exists! Therefore, there is only the mega-EW and no other EDW exist for this “world”. The “halo” is similar to the “ether” in the end of 19th Century! [↑](#footnote-ref-252)
253. “Looking towards the constellation Sagittarius, you’ll be looking at the Galactic center, which is at the same time the center of the disk of stars and gas of our galaxy, which constitutes essentially everything you can see in the sky with the naked eye, and the center of a spheroid of dark matter, the halo, about ten times larger, and ten times more massive than the disk.” (Bertone 2013, p. 5) The “halo” is similar to the “mental causation” in philosophy of mind or “graviton” in physics. In fact, the “haloes” are “nothings” in the macro-EW but correspond to certain entities/processes which belong to the mega-EW (for instance). [↑](#footnote-ref-253)
254. “Dark matter and light elements like hydrogen and helium were produced in the first few minutes after the Big Bang. Dark matter halos then slowly grew from seed structures and merged into ever-larger systems, until gas fell under their gravitational pull and sunk to their centers.” (Bertone 2013, p. 28) [↑](#footnote-ref-254)
255. “… Jim Peebles had pointed out that the absence of fluctuations in the cosmic microwave background at a level of ~10˄-4 was incompatible with a Universe that was composed of only baryonic matter, and argued that this problem would be relieved if the Universe was instead dominated by massive, weakly interacting particles, whose density fluctuations could begin to grow prior to decoupling [239] (see also, Ref. [79]).” (Bertone and Hooper 2016, p. 58) [↑](#footnote-ref-255)
256. In the same article, Peebles believes that because “the value of Einstein’s Λ in the standard Big Bang cosmology seems so unlikely within quantum physics, it is natural and important to consider whether the evidence for detection of Λ results from systematic error in the application of the relativistic cosmology.” (Peebles 2014, p. 3) Obviously, there are EDWs, the micro-EW, the macro-EW and the mega-EW! [↑](#footnote-ref-256)
257. For instance, Peebles writes that “How could the progenitor fragments of pure disk galaxies have “known” not to have participated in this generally high global star formation rate? One piece of the matter tumbling together according to the ΛCDM picture of the formation of the pure disk galaxy in Figure 3 ‘knew’ it was going to host the growing disk, and start growing it at redshift well above unity if the age of the disk of the Milky Way [18] was typical of pure disk galaxies, while the rest of the fragments ‘knew’ they had to hold off star formation until they had reached the growing disk. It is a curious situation.” (Peebles 2014, p. 8) It is a “curious situation” within the unicorn world (the Universe); however, within the EDWs perspective, that problematic notion, “knew”, has a meaning: the growing disk corresponds to a mega-entity (the mega-EW)! [↑](#footnote-ref-257)
258. “I will argue that we are about to witness a revolution in this field of research in the next five to ten years, for either we will find dark matter particles, therefore opening up an entirely new branch of science, or we will inevitably witness the decline of the leading theories, forcing us to revisit our description of the universe.” (Bertone 2013, p. 5) “We are therefore forced to accept that there is something else in the universe besides ordinary gas and stars. We have strong evidence that dark matter cannot be made of ordinary matter; therefore new particles must exist, unless we are being completely misled by a wide array of astrophysical and cosmological observations. This is where the dark matter problem transcends the boundaries of astrophysics and cosmology, disciplines that deal with the largest structures of the universe, and becomes a bigger, deeper mystery that challenges our understanding of particle physics, the discipline that studies the fundamental constituents of matter and their interactions.” (Bertone 2013, p. 8) “Either dark matter exists or our current understanding of gravity is incorrect.” (Bennett et al. 2010) “The structure we see in today’s universe probably mirrors the distribution of dark matter when the universe was very young.” (Bennett et al. 2010) Obviously, through the EDWs perspective, we know that reality has no such “dark matter particles” and indeed we need to revise our “descriptions of the universe”! Indeed, exactly as for the mind-body problem, the problems from quantum mechanics and many other problems from various particular sciences, only a philosopher could solve them. How? Changing the scientists’ “paradigm of thinking”! [↑](#footnote-ref-258)
259. “Modern physics is founded on two spectacularly successful theories: Einstein’s general theory of relativity and the theory of quantum physics. Neither of these theories has ever been found to disagree with any observation or measurement. They have each been entirely successful in every test that we have applied to them. Nevertheless, at least one of them is not quite right, because the two theories as we currently understand them are ultimately in- compatible. The theory of quantum physics describes brilliantly the behavior of our world at the smallest scales—the world of particles, atoms, and molecules. The general theory of relativity describes equally well the behavior of our world in the presence of great quantities of mass and energy—the curvature of space- time generated by stars, galaxies, and the Universe itself. These two theories are each very powerful, but each addresses very different physical situations. Perhaps the greatest challenge in physics today is to understand how these two aspects of nature fi t together into a single unified theory—a Theory of Everything.” (Hooper 2006, pp. 130-131) In our works, we have showed that the general theory of relativity and quantum mechanics refer to EDWs: theory of relativity refers to many macro-EDWs, while quantum mechanics refers to the wave-EW and to the particle-EW. However, quantum theory is a wrong theory which mixes two EDW: the wave-EW and the particle-EW. However, the state of affair is much more complicated. (See Vacariu 2014 or 2015) In Vacariu and Vacariu 2010, we showed that the “theory of everything” is a completed wrong paradigm of working. “If we could compress a large enough amount of energy into a small enough space, perhaps we would witness the effects of quantum physics and general relativity at the same time, and thereby discover how they fit together into a single theory.” (Hooper 2006, p. 119) This sentence is without meaning: “large energy”/matter (i.e. microparticles) and “small enough space” belong to the EDWs. Because quantum physics and general relativity refer to the EDWs, it is meaningless to believe the possibility of being witness of “the effects of quantum physics and general relativity at the same time, and thereby discover how they fit together into a single theory”. Hooper continues with this sentence: “A particle accelerator would appear to be the likeliest tool to use in such an experiment. Even our most powerful accelerators, however, collide particles with a million billion times less energy than what we expect would be required to see the effects of both quantum physics and general relativity. Present technology does not permit us to study nature under such extreme conditions.” (Hooper 2006, 119-120) Colliding particles with much higher energy will produce entities which belong to the EDWs that would not exist for the EDWs explained by the theory of relativity or quantum theory. Moreover, Hooper continues with another wrong sentence: “But even if we cannot directly test the laws of physics at such a high level of energy, theoretical physicists still attempt to construct theories that combine the quantum and general relativistic aspects of our world. In such a theory of quantum gravity, we expect the force of gravity to operate in a way similar to the electromagnetic, strong, and weak forces—specifically, gravity would be mediated by a boson, which has been named the graviton.” (p. 120) Graviton does not exist, since gravity is not a force but, according to Einstein’s theory of general relativity, just the curved “spatio-temporal” framework. Hooper introduces the probability calculus of quantum gravity that leads to “infinities”: “In this way, the force of gravity is fundamentally different from, and more perplexing than, the other known forces of nature.” (Hooper 2006, p. 120) No, there is no other different form of force of nature but just curved “spatiotemporal” framework at large scale. “Efforts to unify the force of gravity, as it is described by Einstein’s relativity, with the theory of quantum physics have been plagued by these kinds of difficulties.” (pp. 120-121) After publishing his paper about the general theory of relativity, Einstein tried to unify those two forces (gravity and electromagnetic forces) that were known in that period. “At certain points in spacetime his equations developed singularities; that is, the solutions of the equations became infinitely large. (Moffat 2008, p. vii) Within the EDWs perspective, it is quite impossible to combine Einstein’s general relativity with quantum physics since these two theories describe entities/processes that belong to EDWs (at least, the macro-EW, the micro-EW and the field-EW). [↑](#footnote-ref-259)
260. “Spiral arms are waves of star formation that spread through our galaxy’s disk.” (Bennett et al. 2010) [↑](#footnote-ref-260)
261. Krauss writes that “it was known that ten times as much matter exists in the universe as could be accounted for by protons and neutrons, even that massive amount of dark matter, comprising 30 percent of what was required to produce a flat universe, was nowhere near sufficient to account for all the energy in the universe. The direct measurement of the geometry of the universe and the consequent discovery that the universe is indeed flat meant that 70 percent of the energy of the universe was still missing, neither in nor around galaxies or even clusters of galaxies! (Krauss 2012, p. 71) Within the EDWs framework, if “space” does not exist (i.e., it does not have any ontological status – see our book 2016 on this topic), then this argument for the existence of dark energy does not hold at all! [↑](#footnote-ref-261)
262. “In standard terminology, cosmologists use the omega factor to describe the relative density of matter and energy in the universe compared to a critical amount. Only for omega precisely equal to 1 is the universe flat. If omega is even an iota higher than 1, the universe is closed, and if it is slightly lower, the universe is open.” (Halpern 2012, pp. 43-44) “Omega is the ratio of the density of matter in the universe over a critical value that can readily be calculated. Omega can be less than, greater than, or equal to 1. The open case, with omega less than 1, corresponds to an under dense cosmos—one with insufficient matter ever to reverse course and contract down again. The closed situation, with omega greater than 1, matches up with an overdense cosmos. Under the weight of its own gravity, it would eventually cease expansion and start to collapse, leading to the crushing endgame that has come to be known as the “Big Crunch.” Finally, the flat possibility, with omega equal to 1, would expand forever, albeit eternally approaching the brink of collapse—like an increasingly exhausted runner who still manages to soldier on. In today’s evocative language, the open and flat final-stage scenarios have been deemed the ‘Big Whimper’.” (Halpern 2012, p. 21-22) “Depending on whether the omega parameter (density divided by a certain critical value) is greater than 1, less than 1, or equal to 1, the universe is closed, open, or flat, respectively.” (Halpern 2012, p. 35) There is a relationship between density and temperature during the cosmological age. “At one million years after the Big Bang the density was 10−19 kilograms per cubic metre and the temperature about 1,000 K. This gives a Jeans critical mass of 6 × 1035 kg, equivalent to 300,000 times the mass of the Sun — a substantial mass but less than one hundred-thousandth of the mass of an average galaxy. With the further passage of time, the Jeans critical mass decreased somewhat, the net result of falling density, which increases the Jeans critical mass, and falling temperature, which reduces it.” (Woolfson 2013, p. 87) “Our studies of the cosmic microwave background have demonstrated that the Universe is roughly flat, with a total density approximately equal to the critical density. However, in contrast, when we measure the density of matter in our Universe by observing clusters of galaxies, we find that the density is much smaller: about one-third of the critical density. Thus, even if we completely disregard the observations of distant supernovae, other cosmological measurements lead us to the conclusion that our Universe must contain much more than just matter. Dark energy, it seems, has left its fingerprints in more than one place.” (Hooper 2006, pp. 214-215) The last quoted paragraph clearly reflects the existence of EDWs! [↑](#footnote-ref-262)
263. According to “Friedman-Lemaître-Robertson-Walker (FLRW) models” “the spacetime geometry is both homogeneous and isotropic; this is also called imposing the ‘cosmological principle.’ Roughly speaking, homogeneity requires that at a given moment of cosmic time every spatial point ‘looks the same,’ and isotropy holds if there are no geometrically preferred spatial directions.” (Smeenk 2013, p. 3) “Isotropic means that the universe looks the same to us when we look in every direction, while homogeneous means that it looks the same to every observer, anywhere in the universe.” (Moffat 2008, p. 64) Isotropy means that the temperature of the CMB radiation is uniform in all directions. (Moffat 2008, p. 91) [↑](#footnote-ref-263)
264. It remains us about the pseudo-notion of “mental causation” (philosophy of mind). (See Vacariu 2008) [↑](#footnote-ref-264)
265. “The density of this halo is relatively high. For every square centimeter of the page you are reading, there are about 30 thousand dark matter particles passing through that surface every second, at a speed of about 100 kilometers per second.3 The reason why we don’t perceive these particles, even if we are constantly bombarded by them, is that they interact very weakly with ordinary matter, which is also the reason why dark matter is so difficult to measure.” (Bertone 2013, p. 5) [↑](#footnote-ref-265)
266. Similar ideas have been invented for the explanations of the “entanglement” in quantum mechanics or the “mental causation” in philosophy of mind. (For these pseudo-notions, see our previous works) “As I have mentioned above, dark matter particles are all around us-in the room in which I am typing, as well as ‘out there’ in space. Hence we can perform experiments to look for dark matter and for the new type of elementary particle or particles of which it is comprised.” (Krauss 2012, p. 54) For us, Krauss’ idea mirrors the “correspondences” between entities, phenomena, and forces that belong to EDWs. [↑](#footnote-ref-266)
267. “There is a ‘dark object’ blasting massive holes in our galaxy. We can not see it, and it may not be made of ordinary matter. In fact, it could be something that astronomers have never before identified until now. And despite the fact that we cannot see the monstrous object, its effects have just been detected by astronomers, even though we haven’t directly seen what it is. Astronomer Ana Bonaca, a researcher at the Harvard-Smithsonian Center for Astrophysics, has called the mysterious object “a dense bullet of something.” (<https://curiosmos.com/an-object-of-astronomical-proportions-is-punching-holes-in-our-galaxy/?fbclid=IwAR2c8eCNazT7d9oj9TywZuX1kPmUFi_2ezSgoJLxSLN51FyKHHpkEkXYZo8> ) Obviously, this dark object belongs to the mega-EW, it does not exist for the planets (galaxies), and this is the reason it appears as an empty void in the macro-EW! [↑](#footnote-ref-267)
268. “Dark energy is the name given to the unseen influence that may be causing the expansion of the universe to accelerate with time.” (Bennett et al. 2010, p. 447) “Some scientists believe that, like Einstein’s cosmological constant, dark energy is a property of space itself and that as space expands, more dark energy is created, accelerating the expansion further. Other experts think that dark energy might make up a changing energy field known as quintessence and other still believe that our current understanding of gravity itself might be wrong.” (Complete History of the Universe Vol. 1, 2015, p. 90) Important in this paragraph is that “dark energy is a property of space itself” means, within the EDWs perspective, that dark energy does not exist in the macro-EW, but only the correspondence, i.e., “nothing” in the macro-EW, exist. There is neither field as “quintessence”, nor dark matter particles, but only “nothing” which belongs to the macro-EW that corresponds to “something” which belongs to the mega-EW! Between the macro-macro-disks, there is a force that we call “dark energy”. Exactly as we cannot observe the macro-macro-disks, we also cannot observe this “dark energy” that is a force between the macro-macro-disks. [↑](#footnote-ref-268)
269. In 1998, two teams (Perlmutter’s SCP team and Schmidt and Riess’ Z-team) furnished empirical data that shows the expansion of galaxies is accelerating. The only candidate for this acceleration is the dark energy. “It was Turner, Perlmutter and Martin White who coined the term “dark energy” in 1998 [20], and so when Perlmutter’s SCP team and Schmidt and Riess’s High-Z team both discovered that the Universe’s expansion was accelerating, this seemed to confirm what a few theoreticians had been arguing for several years.” (Evan 2015, p. 160) [↑](#footnote-ref-269)
270. A microparticle cannot “observe” the gravity that “acts” indirectly on it. In fact, gravity (produced by the macro-entities that belong to the macro-EW) does not exist for the micro-entities which belong to the micro-EW. [↑](#footnote-ref-270)
271. We recall that “correspondence” is an abstract notion, i.e., it only theoretically relates, for instance, two ED entities that belong to two EDWs. [↑](#footnote-ref-271)
272. In his PhD thesis (2007) and his first book, Gabriel Vacariu indicates that “gravity” does not exist as a force (Newton) or as a “curved spacetime” (Einstein), but as “nothing” in the macro-EW (no ontological status!) which corresponds to the curved electromagnetic fields (which belong to the field-EW). In other words, it is the electromagnetic field that is INDIRECTLY “curved”, and the “curvature” is not produced by the planet (which does not exist for any electromagnetic field), but by a huge amalgam of electromagnetic waves (field-EW) which corresponds to an huge amalgam of microparticles (the micro-EW) which corresponds to the planet (the macro-EW). In our book 2016, we indicated that “spacetime” cannot have any ontological status - it would produces strong ontological contradictions; in 2017, we re-wrote Einstein both special and general theories of relativity using not “spacetime” (which has no ontological status) but the motions of ED entities which belong to the EDWs! [↑](#footnote-ref-272)
273. “It is possible that dark matter may have its own rich phenomenology hidden from the ordinary matter. This hidden dark matter sector might possess new forces and particles, some of which could be viable dark matter particles that are strongly self-interacting2.” (Zavala and Frenk 2019, p. 3) In reality, dark matter belongs to the mega-EW which does not exist for the macro-EW, therefore, it is not about a “hidden” dark matter, but an EDW! [↑](#footnote-ref-273)
274. In order to explain the existence of dark matter, some researchers try “to explain the nature of the galaxy”, and for this, “they’re trying to redefine gravity… We need dark matter in order to grasp how galaxies work.” (Filser 2019, p. 1) “Martin Kunz, an astrophysicist at the University of Geneva, explains that the structures of the Universe just could not function on a huge cosmological scale without dark matter. The current best cosmological model also depends on it: the so-called Lambda-CDM model, also known as the Standard Model. Using just a few parameters, it describes the development of the Universe since the Big Bang. It can explain important observations, such as the Universe’s accelerating expansion rate, the cosmic microwave background, or the honeycomb-like distribution of galaxies with enhanced clusters of galaxies linked by thin, thread-like structures with vast empty spaces between them – the so-called voids.” (idem) In fact, the galaxies and the “so-called voids” do not have any ontological background, but they correspond to the mega-entity that belong to the mega-EW! Oliver Muller (Strasbourg) “found dwarf galaxies in the constellation of Centaurus moving on a plane, all in the same direction around the central galaxy Centaurus A. They weren’t distributed randomly either, as is predicted by the large cosmological simulations using the Standard Model. Müller’s subsequent article, published last year in the specialist journal ‘Science’, caused quite a stir. The distribution of galaxies such as those of Centaurus is still allowed in the Lambda-CDM model, but it predicts that only one out of a thousand galaxies could have such a structure. The problem is that the same phenomenon can be seen in our own local group of galaxies, both in the Milky Way and in the Andromeda Galaxy. ‘If the three closest galaxies have to be regarded as outliers, then something can’t be right about the basic assumptions found in the Standard Model’, says Müller. However, he does not simply assume that the whole Standard Model is wrong, because it offers too many observations of the Universe that are correct. Müller is simply pointing out certain discrepancies between his observations and the simulations of dark matter. ‘Perhaps we are missing something additional in the simulations”, he says. “It’s also possible that our galactic neighbors are just very special’. This is because the Milky Way, the Andromeda Galaxy and Centaurus A all lie on the edge of a huge void, and have the Virgo cluster of galaxies in direct proximity. Their mass distribution could thus lead to unusual phenomena.” (Filser 2019) The standard model maybe is available for the macro-entities, but not for the mega-entities! In reality, the galaxies and the cluster of galaxies correspond to certain mega-entities that belong to the mega-EW. [↑](#footnote-ref-274)
275. A team from MIT realized certain experiments to detect the axions (that would form the dark matter): “The team reports that in the first month of observations, the experiment detected no sign of axions within the mass range of 0.31 to 8.3 nanoelectronvolts. This means that axions within this mass range either don't exist or they have an even smaller effect on electricity and magnetism than previously thought.” (Chu 2019) Within the EDWs perspective, such experiments are meaningless: the dark matter does not exist for electricity or magnetism at all. “While they are thought to be everywhere, axions are predicted to be virtually ghost-like, having only tiny interactions with anything else in the universe.” (Chu 2019) Quite wrong: dark matter is not composed of microparticles like axions, and moreover, there are not “only tiny interactions with anything else in the universe”. On the contrary, dark matter does not exist for anything else in the EDWs! However, in the same article, there is an essential paragraph: “‘As dark matter, they shouldn't affect your everyday life,’ Winslow says. ‘But they're thought to affect things on a cosmological level, like the expansion of the universe and the formation of galaxies we see in the night sky’.” (Chu 2019) Winslow (the principal investigator of the experiment) is quite correct, but she is missing the EDWs perspective! (In 2018, the researchers from MIT, using a magnetar, tried to detect the axions (the ABRACADABRA experiment). “The team proposed a design for a small, donut-shaped magnet kept in a refrigerator at temperatures just above absolute zero. Without axions, there should be no magnetic field in the center of the donut, or, as Winslow puts it, "where the munchkin should be." However, if axions exist, a detector should ‘see’ a magnetic field in the middle of the donut.” (Chu 2019) Obviously, the results were negative. [↑](#footnote-ref-275)
276. In 2008, the astronomers from University of Colorado Boulder indicated that they found the missing normal matter (baryons) in the spaces between galaxies. “‘We think we are seeing the strands of a web-like structure that forms the backbone of the universe," said CU-Boulder Professor Mike Shull. ‘What we are confirming in detail is that intergalactic space, which intuitively might seem to be empty, is in fact the reservoir for most of the normal, baryonic matter in the universe’.. The team also found that about 20 percent of the baryons reside in the voids between the web-like filaments. Within these voids could be dwarf galaxies or wisps of matter that could turn into stars and galaxies in billions of years, said the CU-Boulder researchers.” (University of Colorado Boulder) [↑](#footnote-ref-276)
277. “Likewise, in 1989 Margaret Geller and John Huchra, analyzing redraft survey data, discovered the immense ‘Great Wall,’ a ‘sheet’ formed from galaxies many light years apart. That first large-scale structure is 500 million light-years long, 200 million light years wide, and with a thickness of 15 million light years.” (Berman 2019) [↑](#footnote-ref-277)
278. In November 2019, Berman writes a short article with the title: “Is the universe controlled by the gigantic structures?”: “Recent observations indicate that galaxies far, far apart are somehow synchronously moving. Something appears to be binding large-scale structures, many light years apart, together after all… The existence and mechanics of large-scale structures are a tantalizing puzzle with obviously major implications for our understanding of the universe… According to the study's lead author, astronomer Damien Hutsemékers of the University of Liège in Belgium, Galaxy spin axes are known to align with large-scale structures such as cosmic filaments but this occurs on smaller scales. However, there is currently no explanation why the axes of quasars are aligned with the axis of the large group in which they are embedded.’… The first word of the research paper's title, ‘[Spooky Alignment of Quasars Across Billions of Light-years](https://www.eso.org/public/usa/news/eso1438/),’ invokes cosmic-scale quantum entanglement as a possible explanation...) (Berman 2019) The “Universe” is not controlled by the gigantic structures, there are just “correspondences” between the entities that belong to the macro-EW and the mega-EW! Therefore, it is not something “binding the large structures”, but there are mega-entities which belong to the mega-EW. “The secret of these synchronized galaxies may pose a threat to the cosmological principle, one of the basic assumptions about the universe. This principle states that the universe is basically uniform and homogeneous at extremely large scales. But the ‘existence of correlations in quasar axes over such extreme scales would constitute a serious anomaly for the cosmological principle,’ as Hutsemékers and his colleagues note in their study. However, Hutsemékers' cautioned that more of these structures would need to be spotted and studied to prove that this is a serious wrinkle in the cosmological principle. ‘Other similar structures are needed to confirm a real anomaly,’ he said… Quasar alignments are not the only hurdles that oddly synchronized galaxies have presented to established models of the universe. In fact, one of the most contentious debates in cosmology these days is centered around the unexpected way in which dwarf galaxies appear to become neatly aligned around larger host galaxies such as the Milky Way.” (Fereeira 2019b, his bold) It seems that not only the a galaxy corresponds to a mega-entity, but there are some mega-laws that involve these mega-entitites. Obviously, since the “universe” does not exist, the old “cosmological principle” fails: the EDWs are not “uniform and homogeneous” since one ED does not exist for any EDW! Here, it is about the structure of the mega-EW, not of the macro-EW (where large groups of planets represent, for us – the observers - the “galaxies”). [↑](#footnote-ref-278)
279. “This ‘cold dark matter’ (CDM) is assumed to behave as a fluid throughout most of the Universe’s history, except at very early times when this assumption breaks down in different ways depending on the specific mechanism of dark matter production. The most common hypothesis is that the dark matter particles are thermal relics from the Big Bang (e.g. [12]). In this case, dark matter was symmetric1 and in thermal equilibrium with the photon-baryon plasma through interactions with standard model particles. As the Universe cools down, dark matter decouples from the standard model particles, its creation and annihilation stops and its co-moving density freezes out.” (Zavala and Frenk 2019, p. 2) [↑](#footnote-ref-279)
280. “Now, an international team of astronomers led by Reinhard Genzel at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany have used the KMOS and SINFONI instruments at ESO's Very Large Telescope in Chile to measure the rotation of six massive, star-forming galaxies in the distant Universe, at the peak of galaxy formation 10 billion years ago. What they found was intriguing: unlike spiral galaxies in the modern Universe, the outer regions of these distant galaxies seem to be rotating more slowly than regions closer to the core -- suggesting there is less dark matter present than expected.” (ESO) One causes would be that the early massive galaxies are dominated by normal matter, dark matter playing a smaller role. (idem) “This suggests that 3 to 4 billion years after the Big Bang, the gas in galaxies had already efficiently condensed into flat, rotating discs, while the dark matter halos surrounding them were much larger and more spread out. Apparently it took billions of years longer for dark matter to condense as well, so its dominating effect is only seen on the rotation velocities of galaxy discs today.” (ESO) (for more technical details about this idea, see Zavala and Frenk 2019) It would seem that the mega-entities appeared billion years after the Big Bangs! Importantly, it is well known that the dark matter has effects only on the massive astronomical entities or group of entities (galaxies or cluster of galaxies), but the physicists are searching for microparticles like WIMPs or axions. The microparticles do not exist for the mega-entities, and therefore, the axions or WIMPs cannot not interact/affect the mega-entities! [↑](#footnote-ref-280)
281. “The discovery, which was published in the journal Astronomy & Astrophysics, is an indicator that large-scale structures influenced the dynamics of galaxies across vast distances in the early universe. ‘Galaxy spin axes are known to align with large-scale structures such as cosmic filaments but this occurs on smaller scales,’ Hutsemékers said in an email, noting that theoretical studies have proposed some tentative explanations of this process. ‘However, there is currently no explanation why the axes of quasars are aligned with the axis of the large group in which they are embedded,’ he noted. The secret of these synchronized galaxies may pose a threat to the cosmological principle, one of the basic assumptions about the universe. This principle states that the universe is basically uniform and homogeneous at extremely large scales.” (Ferreira, 2019) The “large-scale structures” which influence the movement of galaxies across vast distances indicate the existence of the mega-EW. Moreover, the uniformity and homogeneity of these large scales strongly support the existence of the mega-entities and processes that belong to the mega-EW! We recall that, according to the main principle of the EDWs, the mega-EW does not exist for the macro-EW (where the galaxies, planets are placed). Even if as human beings, we indirectly observe the entities which belong to the macro-EW, we do not have necessary tools for seeing the mega-entities/processes! [↑](#footnote-ref-281)
282. “Astronomer Joon Hyeop Lee of the Korea Astronomy and Space Institute is the lead author of ‘Mysterious Coherence in Several-megaparsec Scales between Galaxy Rotation and Neighbor Motion,’ published in October of this year in [Astrophysical Journal](https://iopscience.iop.org/article/10.3847/1538-4357/ab3fa3). Comparing data from two catalogs of redshift survey data — the Calar Alto Legacy Integral Field Area (CALIFA) and NASA-Sloan Atlas (NSA) catalogs — the researchers' analysis of 445 galaxies revealed, surprisingly, that galaxies six meparsecs, or 20 million light years, apart were moving in the same way. Those observed, for example, a galaxy moving toward the Earth was mirrored by other distant galaxies moving in the same direction. ‘This discovery is quite new and unexpected,’ according to Lee, ‘I have never seen any previous report of observations or any prediction from numerical simulations, exactly related to this phenomenon.’ Since the galaxies are too distant for their gravitational fields to be influencing each other, Lee poses another explanation: That the linked galaxies are both embedded within the same, large-scale structure.” (Berman 2019) Obviously, it is about dark matter which does not exist for the planets which “form”, for us, the galaxies. However, the galaxies have no ontological status within the macro-EW, but only the planets... [↑](#footnote-ref-282)
283. This influence is “indirect” just because the mega-EW does not exist for the macro-EW, that is, the dark matter and dark energy do not exist for the planets/galaxies. The same rule is available for the “indirect influence” of the electromagnetic wave on the microparticles... [↑](#footnote-ref-283)
284. There area several groups of researchers which investigations have led to the conclusion that dark matter and dark energy do not exist at all! For instance, in “November, astronomers at the Chinese Academy of Sciences in Beijing published a paper identifying 19 galaxies which might violate the most fundamental theory of how the universe first formed. They had been searching the sky for yet-undiscovered galaxies which seem to be lacking the usual dark matter component, aiming to add more evidence to a baffling phenomenon scientists had begun observing last year. And they claimed to have found a whole group of them.” (Minsky 2020) Van Dokkum and his team identified several galaxies without dark matter at all! (Minsky 2020) Also, Go Ogiya (Observatoire de la Côte d'Azur in France) “suggests a process by which galaxies might form without ever containing dark matter. So-called ‘tidal dwarf galaxies’ could form when dark matter and baryonic matter is ‘ejected’ from an existing galaxy due to tidal forces, but the dark matter component evaporates due to its higher velocity, leaving only stars and gas to form a new galaxy.” (Minsky 2020) “It may be that we do not yet fully understand how matter and energy evolved over time, particularly at early times,” says his colleague Sherry Suyu, from the Max Planck Institute for Astrophysics, in Germany.” (Lovett 2020) “Nicolas Martin, a researcher at the Observatory Astronomical De Strasbourg in France, believes that the observations needed to drive research forward are just beyond the limits of what is possible with the best apparatus around at the moment. Emailing while on location at one such cutting-edge telescope, he said that the research community would likely have to wait for two next-generation telescopes, currently planned or under construction in Chile and Hawaii, before they could generate even more precise measurements of the velocity of stars in the dwarf galaxies.” (Minsky 2020) Obviously, we will need more investigations regarding the existence of dark matter and dark energy, but we furnish this very recent information about dark matter and dark energy just to indicate that the framework necessary for explaining these processes is our EDWs perspective: if dark matter really exists, it belongs to an EDW (the mega-EW) than the EDWs that we already know. If the dark matter does not exist, it is very possible other mega-matter/processes will be discover in the future, and this matter/process would belong to the mega-EW but not to the macro-EW! Indeed, being constructed under the wrong framework (the “Universe”/world), Cosmology of our days (Physics, in general) has been in a crisis exactly as quantum mechanics has been in the last 100 years (with its great problems constructed within the wrong framework - the “Universe”, as we called the “unicorn-world”). We have solved all great problems of Physics of the last century replacing the wrong framework, the “Universe”/“world”, with a much better framework, the EDWs perspective! [↑](#footnote-ref-284)
285. “The standard ΛCDM cosmology assumes the general theory of relativity. This is an extrapolation of some 14 orders of magnitude in length scale from the precision tests on the scales of the Solar System and smaller. It assumes that 95% of the present mass of the universe is in two hypothetical forms, dark matter and dark energy.” (Peebles 2014, p. 1) “Observations over the past decades | obtained by combining a variety of astrophysical data, such as type-Ia supernovae, cosmic microwave background (CMB), baryon oscillations and weak lensing data | indicate that most of our Universe energy budget consists of unknown entities: 27% is dark matter and 68% is dark energy, 1 a form of ground-state energy.” (Mitsou 2019, p. 1) [↑](#footnote-ref-285)
286. “Although the existence of dark matter is generally accepted by the scientific community, some astrophysicists,[15] intrigued by certain observations which do not fit the dark matter theory, [16] argue for various modifications of the standard laws of general relativity, such as as modified Newtonian dynamics, tensor-vector-scalar gravity, or entropic gravity. These models attempt to account for all observations without invoking supplemental non-baryonic matter.[17]” (Wikipedia, “Dark matter”) The idea of modifying the “standard laws of general relativity is totally wrong! In reality, in order to explain the dark matter, the physicists have to change their framework of thinking (the macro-EW) with the mega-EW! [↑](#footnote-ref-286)
287. “Theoretical models, such as supersymmetry13 or theories with extra-dimensions14 provide a natural DM candidate, hence searches targeting these models implicitly cover dark matter, too.” (Mitsou 2019, p. 3) (“Supersymmetry requires that for every fermion, a boson must exist with the same quantum numbers, and vice-verse. Supersymmetry, therefore, predicts the existence of several new electrically neutral and non-strongly interacting particles, including the superpartners of the neutrinos, photon, Z boson, Higgs boson, and graviton. If any of these superpartners were stable, they could be cosmologically abundant, and may have played an important role in the history and evolution of our Universe.” Bertone and Hooper 2016, p. 36) False! Supersymmetry or theories with extra-dimensions are wrong ideas constructed within the unicorn world! “Dark matter might be an entirely new fundamental field, not just an additional component of gravity. It might be a kind of cosmic superfluid. Hell, it might possibly be a manifestation of matter in another universe, which creates an otherworldly gravitational pull that is able to cross higher dimensions. What matters about dark matter is that the phenomena describing it are real, just as the results from the Michelson-Morley experiment were real. The failure of many brilliant scientists to isolate the cause of the phenomena is a strong indication that the answer, whatever it is, will be truly new—which is to say, surprising—which is to say, revelatory.” (Powell 2019) Until Gabriel Vacariu, everybody has been working within the wrong framework, the unicorn world (Universe). Within this wrong framework, nobody could furnish the right view about dark matter. With the EDWs perspective, we furnished the ontology of quantum mechanics and the ontologies of Einstein’s special and general theories of relativity. It has to be very clear that only the EDWs perspective can furnish the missing ontology of dark matter! [↑](#footnote-ref-287)
288. The “Universe” (the “unicorn-world”) does not exist, only the EDWs are. Therefore, our verdict regarding the search for the dark matter within the “Universe” is given by Confucius’s words: “It is difficult to search for a black cat in a dark room, especially when there is no cat.” The same verdict is available for searching the dark energy within the “Universe”: In the last time, there have been some results that have contradicted the expansion of the “Universe”, but, obviously, we have to await for more results. Even if the expansion of the “Universe” is not a real process, nothing stop us to presuppose the being of the mega-EW. We have not to forget that the mega-EW does not exist for the macro-EW! “New observations and analysis made by a team of astronomers at Yonsei University (Seoul, South Korea), together with their collaborators at Lyon University and KASI, show, however, that this key assumption is most likely in error.” “Commenting on the result, Prof. Young-Wook Lee (Yonsei Univ., Seoul), who led the project said, ‘Quoting Carl Sagan, extraordinary claims require extraordinary evidence, but I am not sure we have such extraordinary evidence for dark energy. Our result illustrates that dark energy from SN cosmology, which led to the 2011 Nobel Prize in Physics, might be an artifact of a fragile and false assumption’.” “Other cosmological probes, such as the cosmic microwave background (CMB) and baryonic acoustic oscillations (BAO), are also known to provide some indirect and ‘circumstantial’ evidence for dark energy, but it was recently suggested that CMB from Planck mission no longer supports the concordance cosmological model which may require new physics (Di Valentino, Melchiorri, & Silk 2019). Some investigators have also shown that BAO and other low-redshift cosmological probes can be consistent with a non-accelerating universe without dark energy (see, for example, Tutusaus et al. 2017). In this respect, the present result showing the luminosity evolution mimicking dark energy in SN cosmology is crucial and very timely.” (Yonsei University, 2020) However, “A crisis in cosmology: New data suggests the universe expanding more rapidly than believed” ( W. M. Keck Observatory): “A group of astronomers led by University of California, Davis has obtained new data that suggest the universe is expanding more rapidly than predicted.” (Mann 2020a) "The measurements are consistent with indicating a crisis in cosmology," Geoff Chih-Fan Chen, a cosmologist at the University of California, Davis, said here during a news briefing on Wednesday (Jan. 8) at the 235th meeting of the American Astronomical Society in Honolulu. At issue is a number known as the Hubble constant.” (Mann 2020) There are different results regarding the Hubble constant. “The problem, says Geoff Chih-Fan Chen, a cosmologist at the University of California, Davis, is that different methods of measuring the rate at which the Universe is expanding have produced conflicting results.” (Lovett 2020) There are two ways of measuring the rate at which the galaxies are flying away from each other as a result of Big Bang (Hubble constant): (1) studying the background radiation leftover from the early days after Big Bang (the result is around 67,400 kilometers per second); (2) measuring this constant from supernovae explosions (“standard candles”) in galaxies close enough to the Earth (the result is around 74,000 km per seconds). (Lovett 2020) “A growing number of physicists are acknowledging this, he added, because the independent measurements continue to disagree. Researchers might have to come up with new physics explain what's going on.” (Mann 2020a) For more details regarding the dark energy and the EDWs perspective, see our book 2016. In order to solve the actual crisis of Cosmology, the physicists need to replace their wrong framework (the Universe/world) with the new framework, the EDWs perspective, which has generates a completely “new Philosophiae Naturalis ” – see our previous books! [↑](#footnote-ref-288)
289. If you reject the existence of mega-entities (the mega-EW), than you reject also the existence of the macro-entities (the macro-EW). It means your brain (a macro-entity) does not exist, than neither your mind (an EW which corresponds to your brain/body) exists! So, your “rejection” (a statement that is a thought, a mental state, anyway) would be meaningless... [↑](#footnote-ref-289)
290. We mention that the galaxy-planets relationship is similar to famous example of “whole-parts” in philosophy: forest-trees relationship. [↑](#footnote-ref-290)
291. Obviously, these correspondences have the same status as the nonlocalities or entanglements have in quantum mechanics! [↑](#footnote-ref-291)
292. Gabriel, Vacariu is convinced that, immediately after this manuscript is published, some authors will published UNBELIEVABLE similar ideas to the new ideas that are in this book… [↑](#footnote-ref-292)
293. The title of this documentary is “The END of the UNIVERSE BIG Crunch, BIG Chill or BIG Rip” (2014) realized by BBC. [↑](#footnote-ref-293)
294. “The accelerated expansion of the universe motivates a wide class of scalar field theories that modify general relativity (GR) on large scales. Such theories require a screening mechanism to suppress the new force in regions where the weak field limit of GR has been experimentally tested. We have used atom interferometry to measure the acceleration of an atom toward a macroscopic test mass inside a high vacuum chamber, where new forces can be unscreened. Our measurement shows no evidence of new forces, a result that places stringent bounds on chameleon and symmetron theories of modified gravity.” (Sabulsky et al. 2019, August) No comment... [↑](#footnote-ref-294)
295. In our previous works ([9] or [11]), we indicated that the macro-macro-EW could be the ED world in which the dark matter is placed. [↑](#footnote-ref-295)
296. Some ideas from this article are in our works [9] and [11] and other works. However, in this chapter, we try to develop the relationship between thermodynamics, quantum mechanics and dark energy within the EDWs perspective. [↑](#footnote-ref-296)
297. Boltzmann indicated that entropy is proportional with disorder: if one increases, the other also increases. "A solid, with its neatly packed rows of molecules, is more ordered than a liquid, with its closely packed but reasonably mobile molecules, and a solid has a lower entropy than the liquid into which it melts. A gas, with its freely flying molecules, is more disordered than a liquid, and a gas has a higher entropy than the liquid from which it evaporates." [13, p. 121] [↑](#footnote-ref-297)
298. We have to know that, according to Einstein’s general theory of relativity, all forms of energy produce gravitational fields. ([15], p. 38) From the EDWs perspective, since "spacetime" has no ontology, this idea means that the electromagnetic field represents somehow the gravitational field. [↑](#footnote-ref-298)
299. According to the EDWs perspective, all properties of an object (entity) are that entity. [↑](#footnote-ref-299)
300. We emphasize again that these correspondences do not have any ontological status and do not involve any "cause-effect" relationship since one EW does not exist for any EDW. [↑](#footnote-ref-300)
301. The error of this statement sends to Spinoza’s dual aspects, Bohr’s complementarity, Leibniz’s parallelism, and any other kind of "dual property"... [↑](#footnote-ref-301)
302. "The study of electrons become, in this way, a theory of waves, more exactly of probability wave of electrons, and a theory of probabilities. More simple saying, the electron is a wave between the measurements and a corpuscular at measurements." ([17], p. 229) This statement is quite wrong: the electron is always a microparticle, and the wave is always an electromagnetic wave, but in EDWs. Maybe we need a theory of probability because of the "uncertainty principle" (we cannot localize exactly the position and the impulse of a microparticle), but the physicists working in quantum mechanics within the unicorn world have made the huge error through ONTOLOGIZING the "probability" (given by our macroscopic tools of measurement on microparticle and electromagnetic wave). The "nature" (i.e., the ED ontologies of EDWs) has no idea about this "probability" (mathematics, in general, which is just a tool that help us in explaining certain processes of "nature"). [↑](#footnote-ref-302)
303. "Guggenheim has suggested that entropy is to be thought of as 'spread'; for example, high entropy means that the elements of an assembly are spread over a wide range of energy levels." ([19], p. 101) So, the process of "spreading" is available for many physical process among them being any electromagnetic field/wave and the entropy. [↑](#footnote-ref-303)
304. "What is nowadays referred to as quantum gravity is, strictly speaking, not yet a theory even though many independent (but only mathematical) tests have successfully been done. The final demonstration of complete consistency is missing, and so far not a single supporting observation is available (though no observations clearly contradicting such theories exist either). Even so, these edified thoughts are more than just hypotheses, and for simplicity’s sake they are often called theories—or sometimes, a little less boldly, called *frameworks*: The frame is clear, but much of the interior remains to be filled in. All the work done so far in quantum gravity, including what is discussed in this book, is, as a scientific formulation, situated between a hypothesis and a full-edged theory; the field must still be considered speculative. Only observations, possibly of a kind described later, will be able to change this status." ([18], p. 89) In some cases, it is not about "frameworks", but about the EDWs. [↑](#footnote-ref-304)
305. In fact, this reductionism indicates a kind of "identity" between any macro-entity and an amalgam of micro-entities. In physics, everybody accept the identity between a macro-object and an amalgam of microparticles, but nobody accepted the identity between a microparticle and an electromagnetic wave/field. In reality, there have been only *correspondences* (no ontologies) between the ED entities which belong to the EDWs... [↑](#footnote-ref-305)
306. We have to notice that any kind of real "observer" needs a kind of "organism" "composed" of microparticles, i.e. that corresponds to an amalgam of microparticles that belongs to an EDW, the micro-EW. [↑](#footnote-ref-306)
307. Is any "energy" an immaterial stuff, as Atkins just wrote in a paragraph above? Then his entire book is dealing with fake things or processes. This would be the unicorn world, the old framework that has been dominating the human thinking since Ancient times until our days when the laws of the EDWs perspective were discovered by Gabriel Vacariu. [↑](#footnote-ref-307)
308. Essentially, "there is no such *thing* as heat, and there is no such *thing* as work!... Heat is a way of *transferring* energy from one location to another. Work is one way of transferring energy; heat is another. There is no such thing as "work" stored in an engine and being let out as we drive along a road or lift a load. In exactly the same way, (…) there is also no such thing as "heat" stored in an object even if we may thing that object as being hot. Heat is a way of *transferring* energy: it is energy in transit, not energy possessed by anything." ([13], p. 102, his italics) [↑](#footnote-ref-308)
309. From a stronger reductionist viewpoint, we can reduce the microparticles to the electromagnetic waves, no more or less. We cannot talk about the microparticles and, therefore, we can conclude that the writer of this book and its reader are just electromagnetic fields… In this case, it would be quite difficult to identify a human body which has to be associated with an electromagnetic field. [↑](#footnote-ref-309)
310. "Heat flows; we heat. In thermodynamics heat is not an entity or even a form of energy: *heat is a mode of transfer of energy*. It is not a form of energy, or a fluid of some kind, or anything of any kind. Heat is the transfer of energy by virtue of a temperature difference. Heat is the name of a process, not the name of an entity." ([14], p. 22) We have to apply this definition of "heat" to all kinds of energy: the electromagnetic "energy" is not an "entity", but a "transfer of energy" since that field is in a continuous motion with speed c, that is, it is a "spread" of that electromagnetic field with speed c, a "spread" similar to the "spread of the heat" (but not with speed c, because there are molecules with certain masses which cannot reach c and only photons and electromagnetic waves can have c). From this viewpoint, even a microparticle is not an "entity" but a "transfer of energy" (the motion of an electromagnetic wave) [↑](#footnote-ref-310)
311. "Once inside, the energy is stored as the kinetic energy (the energy due to motion) and the potential energy (the energy due to position) of the constituent atoms, and that energy can be withdrawn either as heat or as work. The distinction between work and heat is made in the surroundings: the system has no memory of the mode of transfer nor is it concerned about how its store of energy will be used." ([14], p. 25) The transfer of energy as heat is not reversible. ([14], p. 27) (Reversible process in thermodynamics: one that is reversed by an *infinitesimal* modification of the conditions in the surroundings". [14], p. 27) The irreversible processes (heat, dark matter, the speed of photons) have to be related with the phenomena which correspond to the EDWs. Because the electromagnetic waves naturally move with speed c in certain directions, the corresponding motions of the photons or other microparticles are irreversible processes. Because to the correspondence between the electromagnetic fields, on one side, heat and dark energy, on the other side, heat and dark energy are "irreversible" processes. However, because the other microparticles and the macro-objects have certain masses, the processes in which are involved are, in general, not "irreversible" processes like the movement of the electromagnetic waves. [↑](#footnote-ref-311)
312. Investigating the notion of time, we have seen many researchers emphasizing the relationship between thermodynamics and time. This was the main reason we started working on thermodynamics. In [9], we showed that time does not exist, i.e., it has no ontological status. Otherwise, the existence of space and time (spacetime) would produce strong ontological contradictions. [↑](#footnote-ref-312)
313. Atkins mentions that the foundations of classical thermodynamics include these notions: T, U and S. ([14], p. 38) These notions explain the entities and their interactions that belong to the macro-EW. If we "reduce" the temperature to certain molecular motions, then we have to believe that the human body has no temperature. In this case, we have to reject even the existence of human body: we have to replace it with certain molecular motions, nothing more and nothing less. According to the EDWs perspective, this idea is completely false! [↑](#footnote-ref-313)
314. However, we have to be aware that "order" is a notion invented by the human beings. [↑](#footnote-ref-314)
315. "Guggenheim has suggested that entropy is to be thought of as 'spread'; for example, high entropy means that the elements of an assembly are spread over a wide range of energy levels." ([19], p. 101) [↑](#footnote-ref-315)
316. "Corresponding to any description of the gas in terms of its ‘macroscopic’ observable properties – temperature, pressure, and so on – there are many possible ‘microstates’ – many possible configurations of molecules that all give the same macrostate. Boltzmann’s insight is that for nonequilibrium macrostates, the vast majority of these microstates are ones such that entropy increases in the future." ([21], p. 221) [↑](#footnote-ref-316)
317. These processes are related to the idea of "irreversible processes": "If the entropy can only increase during a thermodynamical process, then obviously, a reversal of this process is not possible. Many authors believe this is a crucial feature, if not the very essence of the Second Law. Planck, for example, claimed that, were it not for the existence of irreversible processes, 'the entire edifice of the second law would crumble […] and theoretical work would have to start from the beginning.' (Planck 1897, §113), and viewed entropy increase as a 'universal measure of irreversibility' (ibid. §134)." ([20], p. 2) We are convinced that the inevitability of these "irreversible processes" have to correspond to certain entities and their processes that belong to one EW (or more), most probably, the macro-macro-EW. [↑](#footnote-ref-317)
318. "The key word here is *universe*: it means, as always in thermodynamics, the system together with its surroundings. There is no prohibition of the system or the surroundings *individually* undergoing a decrease in entropy provided that there is a compensating change elsewhere." ([14], p. 49) However, we have to replace "universe" either with the macro-EW, or with the micro-EW. In Clausius' framework: "In any spontaneous process, occurring in an isolated system, the entropy never decreases." ([22], p. 5) [↑](#footnote-ref-318)
319. "Clausius himself summarized the thermodynamics condition of the world in his famous pair of statements that jointly summarize the First and Second Laws: *Die Energie der Welt ist konstant; die Entropie der Welt strebt einem Maximum zu.* That is, the energy of the world is constant; the entropy strives towards a maximum." ([13], p. 119) (S = Q/T) [↑](#footnote-ref-319)
320. Spontaneous processes can happen only if there is stored energy somewhere. Otherwise, spontaneous processes cannot take place. Anyway, this spontaneous energy has to correspond to certain ED phenomena which belongs to the EDWs. [↑](#footnote-ref-320)
321. Against the existence of dark matter and dark energy, space and time, and other pseudo-notions in cosmology, see [9]; about dark matter, see [12]. [↑](#footnote-ref-321)
322. In 1998, two teams (Perlmutter’s SCP team and Schmidt and Riess’ Z-team) furnished empirical data that shows the expansion of galaxies is accelerating. The only candidate for this acceleration is the dark energy. "It was Turner, Perlmutter and Martin White who coined the term 'dark energy' in 1998 [20], and so when Perlmutter’s SCP team and Schmidt and Riess’s High-Z team both discovered that the Universe’s expansion was accelerating, this seemed to confirm what a few theoreticians had been arguing for several years." ([25], p. 160) [↑](#footnote-ref-322)
323. We mention that the galaxy-planets relationship is similar to famous example of "whole-parts" in philosophy: the "forest-trees" relationship. [↑](#footnote-ref-323)
324. However, there can be other features involved into this equation. The physicists, not a philosopher, have to discover these particular features. [↑](#footnote-ref-324)
325. "Along with 'Antimatter' and 'Dark Matter' we’ve recently discovered the existence of "Doesn’t Matter" which appear to have no effects on the universe whatsoever." <https://www.facebook.com/365042037273526/photos/a.365271337250596/1154367585007630/> [↑](#footnote-ref-325)
326. Initially, the string theory was referring to bosons. Later, this theory was extended to fermions. This is the reason its name was transformed in the “superstring theory”, that is a super-symmetric theory, each particles having a super-symmetric partner. (Presura, pp. 555-6) We don’t believe in any super-symmetric partners at all! In general, the notion of “super-symmetry” is an empty concept... [↑](#footnote-ref-326)
327. “String theory and M-theory are based on the simple and elegant idea that the bewildering variety of subatomic particles making up the universe are similar to the notes that one can play on a violin string, or on a membrane such as a drum head. (These are no ordinary strings and membranes; they exist in ten- and elevendimensional hyperspace.)” (Kaku 2005, p. 17) [↑](#footnote-ref-327)
328. “This tiny string, in turn, vibrates at different frequencies and resonances. If we were to pluck this vibrating string, it would change mode and become another subatomic particle, such as a quark. Pluck it again, and it turns into a neutrino. In this way, we can explain the blizzard of subatomic particles as nothing but different musical notes of the string. We can now replace the hundreds of subatomic particles seen in the laboratory with a single object, the string. “ (Kaku 2005, p. 18) [↑](#footnote-ref-328)
329. “Graviton is a quanta of gravitational waves, therefore of curvature of space itself. If we want to reconstruct the curvature of space, we have to add gravitons one by one, in all orders of perturbation. However, this procedure can lead to, as we have seen in the framework of quantum electrodynamic, infinities and finally the theory can be proved as nenormabil.” (Presura 2014, p. 581) Space has on ontology, therefore “infinities” are just “empty words” created by the mathematical physicists! [↑](#footnote-ref-329)
330. “The rest mass of a relativistic string is null, and the rest mass that we associate to the string is due only to the energy stored inside it. Attention, however, this energy can be energy of tension (because I extended the string), and energy of vibration (because the string vibrates).” (Presura 2014, p. 567) [↑](#footnote-ref-330)
331. For instance, a superstring “is characterized by the sum of bosonic vibrations and fermionic oscillations.” (Presura 2014, p. 575) Maybe we can suppose that the superstring theory refers to the entities and processes that belong to the pre-Big-Bang-EW. However, if we have this presupposition, we have to eliminate the dimensions of “spacetime” (does not matter how many) from the equation! We believe only a philosopher will be able to explain the correspondences between the pre-Big-Bang-EW and the EDWs after many Big-Bangs! (In reality, there were not Big Bangs, but only suddenly appearances from “nothing” (that corresponded with the pre-Big-Bang-EW) of certain entities/processes that belonged to the first after-Big-Bang-EW. [↑](#footnote-ref-331)
332. “The rest masses of the particles predicted by the relativistic string theory are firstly much greater for reproducing the masses experimentally observed. Thus, the mass of the relativistic string is the order of the Planck masses, billions and billions greater than the mass of the electron.” (Presura 2014, p. 571) The physicists extended the spacetime dimensions from 10-to 11 and then to 26! In the universe with 26 dimensions, all known elementary particles are described exactly by this level of null energy, therefore they have null rest masses, at the first instance.” (Presura, p. 576) Since the “spacetime” has no ontology, in explaining real different physical processes, we have to use EDWs perspective and not (super)string theory... [↑](#footnote-ref-332)
333. In one alternative, even the dimensions of space and time moves from 11 to 26! Another alternative would be, for instance, “D-branes”. This alternative is related to the “parallel universes”. (Presura, p. 590) Anyway, we believe that it would be useless to deal with the (super)string theory in details in this book since this theory is based mainly on human mind imagination and has nothing to do with the EDWs. We repeat: there is, of course, a huge difference between the “parallel universes” and the EDWs: all parallel universes are separated “universes” within the macro-EW, while one EW does not exist for any EDW! [↑](#footnote-ref-333)
334. Exactly after writing the previous ideas, Presura emphasizes that from “this law and this parameter the Creator has to made the entire Universe.” (p. 565) As we indicated in our book (2019), God cannot even exist. Moreover, we do not believe the superstring theory is a correct description of the EW0, just because it is too much “mathematics” there, and, more than this, the theory has been constructed putting together quantum mechanics and the general relativity (a wrong method, anyway). The reader has not to forget: nature (the EDWs) has (have) no idea about mathematics! [↑](#footnote-ref-334)
335. “M stands for “membrane” but can also mean “mystery,” “magic,” even “mother.” Although string theory and M-theory are essentially identical, M-theory is a more mysterious and more sophisticated framework which unifies various string theories.” (Kaku 2005, p. 17) [↑](#footnote-ref-335)
336. The main reason this theory has dominated the academic environment of Physics in explaining the “reality” is that superstring theory involves a lot of mathematics. In Physics of our days, Mathematics is essential, BUT these physicists has pushed too much accent on Mathematics! Feynman was not a “lover” of “abstract mathematics”: “Physics is to math what sex is to masturbation.” “If all of mathematics disappeared today, physics would be set back exactly one week.” (Richard Feynman) [↑](#footnote-ref-336)
337. Even if Einstein was very surprised by Kaluza’s approach of proposing the Riemann metric in five dimensions for unifying the theory of gravity with light (Maxwell’s equations), but later, he rejected Kaluza-Klein’s approach considering that contains more arbitrary elements than the original theory. (Einstein (3), p. 118) and (Kaku 1994, pp. 99-105) [↑](#footnote-ref-337)
338. “I believe that we have found the unique mathematical structure that consistently combines quantum mechanics and general relativity. So it must almost certainly be correct.” (Schwarz 1998, p. 2 in Heindrich 2006, p. 8) Against the string theory, see Woit 2004 and 2007 or a book written by Smolin in 2006. (We had no access to the last book.) [↑](#footnote-ref-338)
339. “(…) we need to use general relativity because the large mass creates a substantial gravitational field, and we also need to use quantum mechanics because all the mass is squeezed to a tiny size. But in combination, the equations break down, so no one has been able to determine what happens right at the center of a black hole.” (Greene 2004, p. 337) [↑](#footnote-ref-339)
340. Even if the physicists have been aware that these theories are available only for different entities and distances, nobody has thought about the existence of EDWs so many decades and centuries! We have to be aware that the microparticles cannot interact with/observe massive entities or cannot “observe” great distances and the planets cannot interact with/observe small entities or “observe” microscopic distances. Nevertheless, both kinds of entities and their interactions exist in the same “spatio-temporal” framework (i.e, nothing with no ontological background)! [↑](#footnote-ref-340)
341. Greene wrote something like this: the string theory re-write the laws of geometry for short distances so that what seemed to be a cosmic collapse in the past can be seen now as a cosmic jump! (1999, p. 259) From our view point, it is about our “observational jump” from one EW to another. [↑](#footnote-ref-341)
342. Kaku wrote about a discussion that took place in Romania in 1953 between Peter Freund (born in Romania) and his professor, George Vranceanu, regarding more dimensions as an answer to the question “Why should light and gravity be so disparate?”. (Kaku 1994, pp. 104-5) As Riemann, Freund was convinced that the laws of nature are simpler in higher dimensions. [↑](#footnote-ref-342)
343. The title of Chapter 2 from Kaku’s book is “Mathematicians and Myth”! [↑](#footnote-ref-343)
344. “Superstring theories are supersymmetric string theories. Supersymmetry is a symmetry relation between bosons (interaction quanta) and fermions (matter particles). It encompasses the Poincaré invariance of spacetime as well as the gauge symmetries of quantum field theory. With supersymmetry, string theory postulates hitherto unobserved supersymmetric partners to the particles (and quanta) of the standard model of particle physics.” (Heindrich 2006, p. 5) “Without supersymmetry, mathematical anomalies and non-renormalizable divergences are unavoidable!” (Heindrich, p. 17) The unicorn-world imposes to the human thinking such mathematical supersymmetry! [↑](#footnote-ref-344)
345. “An alternative idea consists in treating all dimensions as macroscopically extended and assuming that open strings, whose oscillation modes represent in this picture matter particles (and ourselves), are connected to Dirichlet-branes. Our observable universe would be a three-dimensional D-brane developing in time within a ten-dimensional spacetime.” (Heindrich 2006, p. 6) For more “popular” details about “braneworlds”, see Chapter 13 in Greene (2004). [↑](#footnote-ref-345)
346. “(…) the fundamental physical and geometrical principles that lie at the foundation of superstring theory are still unknown.” (Kaku 1999, pp. vii in Heindrich 2006, p. 7) [↑](#footnote-ref-346)
347. “We have to recall Kant’s chirality and perception: human beings have always presupposed that space really exists just because of their perception of ‘external environment’, perception strong related with the position of body within an external environment. However, following Kant, we have showed that the external world, i.e. the perception of external world is not perception of myself, but this perception is the self. That is, the external environment is brought within the self, i.e., the perception of the external environment is the self. (Waxman 1995)” (Vacariu and Vacariu 2016, p. 50??) [↑](#footnote-ref-347)
348. We recall here Carnap’s “linguistic frameworks” which are the same with these “different descriptions”, “ontic interpretations” or “frames of references”. [↑](#footnote-ref-348)
349. “The evolution of an exosystem, on the ot her hand, can (probably in general) be formulated in a reve rsible manner, since those terms indicating irreversible endosystem (216) evolution may be ‘reversibilized’ by taking interactions with the environment into account. This view would require an integral combination of endosystem and exosystem approach, which goes beyond the dual formulations given by (18) and (19). Here we are already in the realm of speculations (hopefully controlled speculations), so it is perhaps worthwhile to add a final idea on the relation of the geometrical structure discussed at string theory. String theory represents a branch of theoretical physics on which many hopes for a unified view of the physical world are based. A string (or superstring, if the theory is to include supersymmetry) is a one-dimensional structure ascribed to internal degrees of freedom of particles. Using this model it is possible to remove those infinities and anomalies occurring if particles are considered as point-like entities in quantum field theory. The lowest-dimensional superstring models which are considered to be relevant at present need 10 dimensions, four for ordinary spacetime, and six further dimensions usually interpreted to be ‘curled up’ into distance scales not empirically accessible. The one-dimensional string lives within these ‘hidden’ dimensions.” (pp. 216-7) Obviously, these sentences, as all sentences, mirror the unicorn world framework! [↑](#footnote-ref-349)
350. “The crucial point is that the referents and the aims of endophysics and of exophysics are different. Endophysics refers to a subject-independent reality while exophysics refers to the empirical reality. Endophysics aims at metaphysical universal laws, while exophysics aims to give us empirically adequate descriptions. Endo-entities belong to the subjective dependent reality, they may be related to hypothetical “things-in-themselves” or to Platonian ideas. They are hidden from us and certainly not directly observable. Observations and experiments do not reveal us directly this endo-reality. In contradistinction, exophysics refers also to tangible objects we can directly see, feel, and touch. The relations between independent reality and appearance, that is, the interface between endo- and exotheoretical descriptions is, strange to say, one of the most neglected topics of scientific discourse.” (Primas 1994, p. 6) “The structure of endophysics cannot be dealt with without considering the symbolic construction of scientific theories1.” (p. 7) “Endo-concepts are linked to the universality and simplicity of primordial patterns, while exo-concepts relate to the variety and richness of the concrete and particular. Accordingly, endo-concepts are just categorically different from exo-concepts.” (pp. 7-8) [↑](#footnote-ref-350)
351. “From an endophysical viewpoint, the Platonic ideas are standards of truth. That is, we hold that the assertions of an endophysical theory are true or false, and what make them true or false is not our mind or our experiments. Of course, we do not know, but we may hope that quantum endophysics gives a true description of the basic structure of the material world. In order that such an endotheory can be helpful for experimental science, it has to be supplemented by a relevant exophysical context which at best is appropriate. Certainly contextual exophysical propositions do not deserve the attribute «true». In modern experimental science, the generally accepted exophysical correctness criterion is Vico’s verum factum principle: we can know for certain only that which we ourselves have made1.” (Primas 1994, p. 9) It is clear a Kantian viewpoint here, no more or less! [↑](#footnote-ref-351)
352. “An endophysical universe is Platonic, it has no manifest appearance, it cannot be observed directly by our five senses. In contrast to this unbroken wholeness, the world we experience is full of broken symmetries. The fundamental symmetries of the endo-world are not manifest in our everyday experience. It is necessary to break fundamental symmetries, as clearly recognized by Pierre Curie [6]: “C’est la dissymétrie qui crée le phénomène”. Observable patterns of the world do not exist in the Platonic universe, they come into being through symmetry breakings. All symmetry breakings are contextual, all apparent violations of basic natural laws come from contextual symmetry breakings. The relation between quantum endophysics and quantum exophysics corresponds to that of Plato’s transcendent universals and the shadows on the wall of Plato’s cave. The existence of such universals can only be inferred intuitively and expressed mathematically. The problem of linking endophysical ideas to exophysical empirical concepts is the task of a theory of measurement. The notorious measurement problem in quantum mechanics is an example of such an interface problem: the derivation of a statistical interpretation of quantum exophysics from ontologically phrased quantum endophysics1.” (p. 11) Again, we see here the role of the human observer and we understand why Primas’ alternative was not taken into account by the majority of physicists: his approach is just a more developed “Bohr’s complementarity” (both being under “Kant’s umbrella”). For Primas, all these phenomenological entities and laws are just abstract notions, descriptions of human being aquired using particular tools of measurements. Primas did not have any idea about the EDWs since the role of the human observer is essential in his approach! He uses “non-Boolean logical structure” which involves a “projection onto a Boolean context. Non-Boolean scientific theories (like quantum mechanics) intrinsically lead to the logical concept of complementarity. Context independent Boolean descriptions of a non-Boolean world do not exist. ” (p 12) It is very clear Primas worked within the unicorn world! For us, “context independent Boolean description of a non-Boolean world” really exist, it is a particular EW which does not exist (for instance, the field-EW) for the other context independent Boolean description (the micro-EW). So, if Primas worked within the unicorn world, we have worked with the EDWs! “Quantum endophysics describes material reality in terms of a non-fuzzy orthomodular, nonBoolean logical structure. Every exophysical description of this non-Boolean quantum reality involves a projection onto a Boolean context. Non-Boolean scientific theories (like quantum mechanics) intrinsically lead to the logical concept of complementarity. Contextindependent Boolean descriptions of a non-Boolean world do not exist.” (Primas 1994, p. 12) [↑](#footnote-ref-352)
353. “The possibility to count degrees of freedom is the result of a quite arbitrary normal-mode analysis. Exophysically speaking, a non-arbitrary criterion is whether the phase space for the description of the environment is locally compact or not. Since every material object system is coupled to the gravitational and to the electromagnetic field these fields cannot be neglected in the description of the environment of a contextual object.” (Primas 1994, p. 19) [↑](#footnote-ref-353)
354. “Quantum systems which are not objects are entangled with their environments, they have no individuality and allow only an incomplete description in terms of statistical states. From the mathematical formalism of algebraic quantum mechanics it follows that the observing system necessarily must be a classical quantum system (in the sense of Boolean logical structure). In retrospect, this situation justifies Bohr’s requirement that “the functioning of the measuring instrument must be described within the framework of classical physical ideas” [3]. This requirement is also in agreement with the fact that, without exception, every experimental arrangement of present-day physical science, and all experimental results in physics, chemistry and molecular biology can be described in engineering terms, using only concepts from classical physics and the engineering sciences.” (Primas 1994, p. 21) These “phenomenal objects” and phenomenal laws (p. 24, for instance) “exist” just because of the human measurements! In other words, using certain measurement macro-apparatus, the human being creates a “phenomenological world” (not an EDW which exists without any human measurement!). Therefore, Primas’s approach is Bohr’s complementarity within an epistemological framework! [↑](#footnote-ref-354)
355. “Quantum theory describes the material world in a basically holistic way. Generalizing this result beyond the material world, we may ponder upon a holistic conception concerning mind and matter. Pauli (1994, p. 260) suggested that the mental and the material domain are governed by common ordering principles, and should be understood as ‘complementary aspects of the same reality’: ‘The general problem of the relation between psyche and physis, between the inner and the outer, can, however, hardly be said to have been solved by the concept of ‘psychophysical parallelism’ which was advanced in the last century. Yet modern science may have brought us closer to a more satisfying conception of this relationship by setting up, within the field of physics, the concept of complementarity. It would be most satisfactory of all if physis and psyche could be seen as complementary aspects of the same reality’.” (Primas 2003, p. 90) Rejecting Leibniz’s “parallelism”, Primas prefers Bohr’s complementarity but under an epistemological framework (in order to avoid strong ontological contradictions). [↑](#footnote-ref-355)
356. “According to Leibniz, such a pre-established harmony of the soul and the body is the key to understanding the relationship of mind and body. While Leibniz’s idea that psychic and physical aspects are perfectly synchronized without any causal interconnections is radically at variance with classical physics, it fits well into the theoretical framework of quantum theory. Leibniz considered neither space nor time as a fundamental feature of reality. Temporal relations are taken to provide a convenient short-hand for keeping track of the relations among the timeless properties of the world. According to Leibniz the mind and the body are of radically distinct nature, without any direct causal effect on each other: “The soul follows its own peculiar laws and the body also follows its own laws and they agree in virtue of the pre-established harmony between all substances, since they are all representations of one and the same universe.” (Primas 2003, p. 82) [↑](#footnote-ref-356)
357. “Pauli understood that physics necessarily gives an incomplete view of nature, and he was looking for an extended scientific framework.” (Atmanspacher and Primas 2006, p. 2) [↑](#footnote-ref-357)
358. “In 1927 Bohr introduced in his ‘Como Lecture’ (Bohr 1928, p. 566) the concept of complementarity in quantum mechanics as a ‘rational generalization’ of the framework of classical physics. A few years later, he wrote (Bohr 1934, p. 10) that the notion of quantum phenomena ‘forces us to adopt a new mode of description designated as complementary in the sense that any given application of classical concepts precludes the simultaneous use of other classical concepts which in a different connection are equally necessary for the elucidation of the phenomena.’ No formal definition of complementarity can be found in Bohr’s papers which are often cryptic and contain obscure passages. Moreover, Bohr himself used the term with different meanings, which generated much dispute concerning its precise unerstanding.” (Atmanspacher and Primas 2006, p. 14) “Although there are no serious problems to understand and apply the mathematical formalism of quantum physics, it forced us to drastically revise our traditional ideas about the nature of matter. Pauli commented this situation as follows (Pauli 1948, p. 307): ‘every gain of knowledge of atomic objects by observations has to be paid for by a loss of other knowledge. . . . Which knowledge is obtained and which other knowledge is irrevocably lost is left to the free choice of the experimentor, who may choose between mutually exclusive experimental arrangements. It is this situation which Bohr called ‘complementarity’ and which has changed so radically the principles underlying our description of phenomena by laws of nature and even our ideas of physical reality.’ The concept of complementarity is neither exclusively related to the wave–particle duality (from which Bohr’s ideas originated) nor to canonically conjugated quantities in quantum theory, nor even to physics in general. Complementarity refers to the existence of mutually exclusive, incompatible aspects which cannot be combined in a single description based on a Boolean, two-valued logic.” (Atmanspacher and Primas 2006, pp. 14-5, their italics) (The authors mention James, Bergson and Bernays who introduced this idea of complementarity long time before Bohr. Anyway, the idea of this complementarity sends directly to Spinoza’s dual aspect approach (discussed later in this article) and all these approaches were constructed within the unicorn world!) “Pauli speculated that a science of the future will refer to such a basic reality as neither psychic nor physical but somehow both of them and somehow neither of them. He suggested that the mental and the material domains of the basic reality should be understood as complementary aspects under which this reality can appear:...” (p. 17) Few pages later, the authors writes that “Treating mind and matter as two domains of description with equal importance, arising from the broken symmetry of an underlying, more basic reality, leads to an epistemically dualistic approach. It says that mind and matter are to be distinguished for the purpose of our modes of knowledge acquisition; they are not considered to be distinct a priori.” (p. 18) Again, it is quite clear that Atmanspacher and Primas approach uses only epistemological terms in their complementarity (obviously, for avoiding any kind of ontological contradiction within the unicorn world!). [↑](#footnote-ref-358)
359. “A significant topic in the Bohr-Einstein discussions concerned Einstein’s worries about the failure of separability in quantum theory. Yet, according to quantum theory the material world is basically a whole which does not consist of parts. The fact that modern quantum theory can successfully describe many aspects of the behavior of matter in terms of elementary systems and its interactions does not imply that matter is composed of such elementary systems. The so-called “wave-particle dualism” from the early days of quantum mechanics led to the seemingly ineradicable misunderstanding that an electron is either a particle or a wave. By contrast, the formalism of quantum theory implies that there are infinitely many pairs of states of an electron which are neither wave-like nor particle-like, although they are dual in the same sense as wave-like and particle-like states.” (p. 2) [↑](#footnote-ref-359)
360. “The distinction between epistemological discourse and ontological discourse is not sufficient to exhaust the different ways in which the notions of reduction and emergence are used. In addition, it is also important to distinguish between different types of features which are to be related to others. There are three main categories of relations: theories/laws to other theories/laws, properties to other properties, and wholes to parts. Clearly, relations between theories/laws are predominantly epistemological. The relation between wholes and parts, on the other hand, is primarily discussed ontologically insofar as it refers to elements of reality rather than their description. In the literature on property relations, both epistemological and ontological frameworks can be found. Property relations are sometimes meant ontologically (i.e., regarding properties of elements of reality) and sometimes epistemologically (i.e., regarding descriptive terms referring to properties of elements of reality).” (Atmanspacher 2007, pp. 2-3) Interestingly, Atmanspacher indicates Hartmann (1935) who introduced the “ontological relativity” (“ascribing ontic elements to all levels of description”, p. 4) and then Quine (1969) and Putnam with his “pragmatic realism”. (p. 4) We notice that Hartmann and the others two worked within the unicorn world: if we ascribe “ontological entities” to all levels of description”, then we reach strong ontological contradictions! Therefore, all kinds of “ontological relativity” were constructed within the unicorn world... [↑](#footnote-ref-360)
361. “Every quantum system with charged elementary systems (like electrons) inevitably interacts with the electromagnetic radiation field.” (p. 15) This statement also indicates that the authors are working within the unicorn world! [↑](#footnote-ref-361)
362. “Both ontological relativity and relative onticity refer to a conception of realism where the states and properties of objects have to be described relative to a context, and they agree with regard to a basic assertion according to which there is a ‘real world as such’. These basic issues can be successfully implemented in a sound formal manner, if epistemic and ontic descriptions are properly distinguished and related to each other.” (p. 20) Only within the unicorn world, can someone write such statements! [↑](#footnote-ref-362)
363. “Thermodynamical phases such as liquidity (e.g., of water) cannot be strictly (i.e., without further assumptions) derived from the properties of individual (e.g., H2O) molecules. Another example we discuss in more detail below concerns the alleged reduction (Refs. 30 and 41) of temperature as a thermodynamical property to the kinetic energy of molecules.” (Bishop and Atmanspacher 2006, p. 1755) [↑](#footnote-ref-363)
364. Obviously, Atmanspacher is against any kind of “reductionism”: there are high-level features which cannot be reduced to the low-level properties: “temperature is a novel property emerging from a lower-level statistical mechanical description, but it is not derivable from this lower-level description alone. The concept of contextual emergence addresses such situations properly. Contextual emergence is characterized by the fact that a lower-level description provides necessary, but not sufficient conditions for higher-level descriptions. The presence of necessary conditions indicates that the lower-level description provides a basis for higher-level descriptions, while the absence of sufficient conditions means that higher-level features are neither logical consequences of the lower-level description nor can they be rigorously derived from the lower-level description alone. Hence, the notion of strong reduction is inapplicable in these cases.” (Atmanspacher 2007, pp. 13-4) However, Atmanspacher’s nond-reductionism view is constructed within the unicorn world, therefore, for avoiding any ontological contradiction, he uses the distinction between “ontic” and “ontological” elements, but “ontic” elements are quite under the epistemological “discourse” (just “phenomena) available for any scientific theory, while “ontological elements refer to the “noumena” (which will not be able to observe or acquire knowledge). [↑](#footnote-ref-364)
365. “(A) Emergent properties at a higher-level arise out of properties and relations characterizing the entities and properties at a lower-level. (B) Emergent properties are unpredictable, even given exhaustive information concerning the lower-level. (C) Emergent properties are inexplicable/irreducible by/to lower-level properties. (D) Emergent properties have novel causal properties irreducible to the causal efficacy of lower-level properties. In the next section, where we sketch a formal way to represent contextual property emergence, we will also analyze Kim’s conditions (A)–(D) in more detail and demonstrate how they can be (re)formulated more precisely. As mentioned above, we will focus our attention on the epistemological interpretation of these conditions.” (Bishop and Atmanspacher 2006, p. 1759) [↑](#footnote-ref-365)
366. “The approaches used in quantum chemistry cannot be directly derived from fundamental equations of quantum physics, but, rather, appear to be strategies and solutions corresponding to different equations, where ‘new concepts which cannot be inferred from the underlying fundamental laws are required (Ref. 59, p. 32). Molecular structure is just such a concept and plays a crucial role in molecular physics and chemistry.” (Bishop and Atmanspacher 2006, 1765) [↑](#footnote-ref-366)
367. “Given these features of the theory, standard quantum mechanics neither predicts nor explains structural properties of real molecules. The laws and properties of the standard theory are insufficient to yield molecular structure, minimize the correlations, break the symmetries, and modify the algebra of observables. A rigorous description of molecular structure may emerge at the chemical level of description when a suitable contextual topology is provided. They key point is that such a contextual topology is not given or implied by fundamental quantum mechanics since such a new topology is absent. The theory makes no claims about molecular structure. At most it can supply necessary conditions for the description of these features of real molecules. This is precisely the conceptual scheme of contextual emergence, where the emergent property is the chiral (or other) structure of a molecule. Such emergent properties can act in a way that is neither contained in, nor derivable from, nor predicted by the fundamental quantum description alone. Although one might think of them as merely “descriptive” terms, they have real consequences which suggest some ontological significance for them. For example, molecular structure and chirality are crucial for the explanation of optical activity where particular materials, optical isomers, rotate plane-polarized light passing through it (Ref. 59, p. 32). They are invoked in typical descriptions and interpretations of single biomolecule spectroscopy (Ref. 58) and in the nanomechanical properties of molecules (Refs. 22 and 53).” (Bishop and Atmanspacher 2006, p. 1767) The authors are almost within the EDWs perspective! However, we have to recall they have always worked in an epistemological framework within the unicorn word. Even the examples they offer, within the unicorn world, would send directly to strong ontological contradictions! Moreover, the authors introduce certain discussion about the “downward causation”, a notion (totally against the EDWs perspective) which can be constructed only within the unicorn world. [↑](#footnote-ref-367)
368. In his article from 2007, Atmanspacher indicates “emergent features” within cognitive neuroscience: from the features of individual neurons to different features of patterns of neurons and from patterns of neurons to “cognitive capabilities”. (p. 9) The author suggests that the “contextual emergence” can be a tool for explaining the relationship between the neuronal properties and the mental features, i.e., the mind-brain problem! (p. 9) [↑](#footnote-ref-368)
369. At the beginning of 20th Century, Mach, James, and Russell introduced the new trend on Spinoza’s neutral monism. (for more details, see Banks, 2012) The reader has not to confuse Spinoza’s dual-aspects or neutral monism with EDWs. Obviously, both other approaches are constructed within the unicorn world! [↑](#footnote-ref-369)
370. The nonlocal quantum correlations and mental-neuronal correlations are “synchronic correlations”. (Atmanspacher and Martin 2019, p. 15-6) [↑](#footnote-ref-370)
371. “Micro-causation is a general physical description of all micro-states in all possible micro-configurations: all are causally closed, all are the result of micro-factors acting together in concert in configurations. Macro-causation, however, describes how some class of macro-configurations A either fosters, limits, or rules out another class of macro-configurations B. This is more specific information not contained in the micro-descriptions of either events or configurations micro-physically described, hence macro-causation is not redundant, or epiphenomenal. Instead, macro-physical configurations may be taken to instantiate legitimate higher-order natural dispositions which are not exhausted, or screened off, by the micro-physical dispositions that realize them case by individual case.” (Banks 2010) [↑](#footnote-ref-371)
372. “However, a fourth metaphysical position, called dual-aspect monism offers a surprisingly elegant and parsimonious (but also challenging) way to make sense of mind–matter correlations. Sloppily speaking, dual-aspect monists regard the mental and the physical as epistemic aspects of an ontic base reality that itself is neither mental nor physical, but ‘psychophysically neutral’. So dual-aspect monism combines a base ontology with its derivative epistemologies. Using (and perhaps overstretching) Ismael and Schaffer’s [64] wording, the mental and the physical are “scattered reflections of a more unified underlying reality”.” (Atmanspacher and Martin 2019, p. 13) Again, we see that this dual phenomenological aspects are just levels of descriptions (epistemological emergence), and only the “monistic level” hast a real ontology. [↑](#footnote-ref-372)
373. In reality, Chalmers introduces the existence of certain “epiphenomenal properties”. (in Banks 2010, p. 182) However, Banks criticizes Chalmers’ point which cannot explain “causation” between physical and mental states. [↑](#footnote-ref-373)
374. We have to mention that Carlo Rovelli is on Gabriel Vacariu’s list of UNBELIEVABLE SIMILARITIES between Vacariu’s ideas (2002, 2005, 2007, etc.) and many other thinkers (Carlo Rovelli’s works from 2015, 2017, 2019)! These UNBELIEVABLE SIMILARITIES refer to the existence of EDWs, not to the “missing ontology” of spacetime (space and time). Anyway, in our work from 2016, working within the EDWs perspective, we furnished completely different arguments for the missing ontology of “spacetime”! [↑](#footnote-ref-374)
375. According to Mach, the water rotates in relation with the “full matter content of the universe”. (Rovelli 2006, p. 30) [↑](#footnote-ref-375)
376. Working within the unicorn word, two paragraphs later, Rovelli writes that “The gravitational field has quantum properties, and therefore it cannot define a spacetime continuum in the small.” (Rovelli 2006, p. 27) Obviously, within the micro-EW, among the microparticles (not “continuum”) is “nothing” (no ontology) which corresponds to the electromagnetic field (which is continuum!). [↑](#footnote-ref-376)
377. “More formally, in the mathematics of classical GR we employ a background ‘spacetime’ manifold and describe the fields as living on this manifold. However, the diffeomorphism invariance of the theory demands that the localization on this manifold is pure gauge. That is, it is physically irrelevant. The manifold is just an artifice for describing a set of fields and other physical objects whose only ‘localization’ is with respect to one another. A state of the universe does not correspond to one field configuration over the spacetime manifold M. It corresponds to an equivalence class under active diffeomorphisms of field configurations. Therefore localization over M is physically irrelevant. In fact, M has no physical interpretation. It is a mathematical device without physical counterpart. It is a gauge artifact. M cannot be interpreted as a set of physical ‘events’, or physical spacetime points ‘where’ the fields take value.” (Rovelli 2006, p. 31) [↑](#footnote-ref-377)
378. Rovelli rejects the existence of “time” based of Einstein’s notion of relative “simultaneity” of two events in the Universe. (Rovelli 2006, p. 33) We can not talk about an universal “now” in the Universe, since at “best, we can talk of time lapsed along individual world lines, or time experienced by individual observers.” (Rovelli, p. 34) Rovelli emphases that, because of GR, we have to reject the notion of “time” as “an ultimate aspect of reality”. (Rovelli 2006, p. 34) “Proper time does not flow uniformly in the universe. It is defined along a world line and, generically, if two world lines meet twice, the two proper times lapsed between the two encounters differ. Proper time S depends on the gravitational field, which is influenced by the interaction with many systems.” (Rovelli, 2006, p. 34) In the end, Rovelli introduces “quantum mechanics” in discussion to reject completely “time” which has nothing to to do with “mechanics” but maybe only with “statistical mechanics, thermodynamics and perhaps psychology and biology”. (Rovelli 2006, p. 35) [↑](#footnote-ref-378)
379. The reader, don’t forget, “you” do not perceive directly the objects. All mental perceptions are the mind-EW; the photons (the micro-EW) interact with the microparticles (which correspond with the macro-object), some photons are reflected by these microparticles in the microparticles which correspond with “our” eyes (parts of our body, the macro-EW; with our eyes, we cannot see the photons, anyway!), and in this way, the corresponding mind-EW constructs the image of that “lighted” object (this image is part of the mind-EW)! In the macro-EW, there is no light, only because of the correspondences between the wave/field-EW + photons (the micro-EW) and the macro-EW, we can perceive “lighted macro-entities” which belong to the macro-EW. It would be totally wrong to consider that a macro-object is lighted by the photons or the electromagnetic wave! [↑](#footnote-ref-379)
380. As we indicated in a previous chapter, there are two alternatives for the dark energy. The second alternative informs us that the extension of Universe is due to such correspondences! [↑](#footnote-ref-380)
381. We recall that in other works we investigate topics from Physics that are not investigated in this work. For instance, in our book 2017, we investigate “thermodynamics” and the EDWs perspective. [↑](#footnote-ref-381)
382. “Chaos is merely order waiting to be deciphered.” (Jose Saramago, The double) [↑](#footnote-ref-382)
383. “Everything is energy and that’s all there is to it. Match the frequency of the reality you want and you cannot help but get that reality. It can be no other way. This is not philosophy. This is physics.” (Einstein) The first EW after the Big Bangs was the field-EW, in that moments “everything was energy” and, indeed, matching the “frequency of the reality” we get the EDWs. However, the discovery of these EDWs was a philosophical step, not a scientific one! This could be be the reason, so many scientists published, long time after Gabriel Vacariu, UNBELIEVABLE similar ideas to his ideas… [↑](#footnote-ref-383)
384. “The opposite of a fact is falsehood, but the opposite of one profound truth may very well be another profound truth.” ([Niels Bohr](https://www.brainyquote.com/authors/niels-bohr-quotes)) It is about the truths of all EDWs… “Discovery consists of seeing what everybody has seen and thinking what nobody else has thought.” (Albert Szent-Györgyi) It is about the EDWs perspective! [↑](#footnote-ref-384)
385. “I would never die for my beliefs because I might be wrong.” ([Bertrand Russell](https://www.brainyquote.com/authors/bertrand-russell-quotes)) The EDWs perspective is not wrong, but even it is not “truth”, it is a much better view than the “Universe”/“world”. The EDWs perspective is just a new Copernican revolution, the most important in human knowledge until now… [↑](#footnote-ref-385)
386. “The universe is not only queerer than we suppose, it is queerer than we can suppose.” (J. B. S. Haldane in Kaku 2005, p. 45) Obviously, since the “Universe” does not exist, it is, indeed, queerer than we ca imagine! [↑](#footnote-ref-386)