



Absolute Time & Space...

Existence beyond Bigbang

Volume - 1

Addressing some of the biggest questions of cosmology

- How our universe came into existence?
- What was the time before start of universe?
- Is there anything outside of this universe?
- Is time travel possible?
- Is there any multiverse or parallel universe?

Absolute Time and Space... Existence beyond Bigbang

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PREFACE

Certainly the size of this book is very small, hence it can be considered as a research work rather than a full length book. I have intentionally avoided the detailed explanation of previous theories to keep the focus on this research work. However a summarized view from previous theories has been included so that a first time reader of this subject can also understand related theories and philosophies. Sources details have been provided in the reference section in case someone wants to explore further.

The new understanding of basic dimensions absolute Time and Space will open the possibility of exploring beyond our current known universe. These absolute dimensions might supersede our current spacetime dimension and related theories. Interpretations based on these dimensions could effectively bridge the gap between theories of microscopic and telescopic worlds and it will eventually give us a better picture of our universe. This book will take us one step closer towards the understanding of our Entire Existence.

As we can see below mentioned are some of the current research related topics in the field of cosmology. This book will address all these questions and related subsequent questions of this subject.

1. How our universe came into existence?
2. What was the time before start of universe?
3. Is there anything outside of this universe?
4. Is time travel possible?
5. Is there any multiverse or parallel universe?

Harjeet Singh

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ACKNOWLEDGEMENT

Since my childhood, I had the curiosity to know about our existence. So my journey to this book started by reading all philosophical/scientific literature regarding this creation and our existence. During this quest, I also read the scriptures of Sikh Gurus, I consider them as great philosophers and heroes of that era, I realised that they have done a tremendous job in the development of philosophy. Their philosophy gave me the courage to write this book, and also the wisdom to understand all theories of our existence from ancient to the recent one.

Harjeet Singh

04 May 2020

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1 INTRODUCTION

Right now we are standing at the endpoint of whole past and at the same time we are standing at the start of all new future... Welcome to present!!

Significance of this research

Let's start with a sincere question, when and where do we come from?

The human consciousness started asking this question from basic to the most complicated one, eventually to the quest of entire existence. This question has been bothering us since the earliest times, from **Aristotle to Newton to Einstein**. In early times, the philosophers were the pioneers to start finding these answers naturally because we humans are gifted with the gift of wisdom, imaginations, notions etc. and now science has given us new wings by bringing a new set of tools to observe scientific facts to better understand the entire creation.

Philosophy only accepts the thing with a logical answer behind it whereas **Science** believes on observable evidence and mathematical calculations. We cannot define a scientific theory until a new empirical investigation's result or mathematical calculation proves a phenomenon, but we must acknowledge

that all researches start with a possibility, then with logical arguments to become philosophy and finally developed into today's science theories by scientific research to prove it.



Picture 1: Relation between philosophy of science and science theories

Human wisdom >> Possibilities >> Logical arguments >> Philosophy >> Research >> Scientific facts >> New set of Possibilities >> Again a new cycle

However, today's science has become so complicated that it is becoming more difficult for modern philosophers of science to bring new possibilities. This

can be seen as a limited approach to new notions, in order to avoid any contradiction of present scientific facts.

This book “**Absolute Time & Space... Existence beyond Bigbang**” is an attempt to bridge the gap between Philosophy of Science and Science of Cosmology. It will open the doors towards the new possibilities for science to explore any kind of **existence beyond (outside or before/after) our current universe**.

Objectives

- To understand the development on this subject throughout the history.
- To define and understand existence, creation and universe.
- To discuss absolute zero and infinity of existence.
- To define the mathematical dimensions.
- To define Absolute Time and Absolute Space.
- To discuss Absolute time and time travel.
- To discuss Spacetime and time travel.
- To discuss new possibilities based on this research work.

What is Bigbang and its relation with our Universe?

Today we know that **our universe** started with the **initial singularity**. The initial singularity was of infinite density and all the dimension were warped inside it including spacetime. It means nothing existed outside because there was no spacetime outside it. The singularity got exploded with a huge explosion known as **Bigbang** that caused our **Universe** to be like this as we see it now. We cannot observe the universe beyond (outside or before) bigbang because all the laws of physics break at point of singularity so it is impossible to observe anything beyond it with our current known technology.

However, many hypothesis/theories are being developed to explore the other possibilities of existence beyond (outside or before/after) bigbang. We will discuss them in coming chapters.

Basic known facts of universe:

- Bigbang occurred approx. 13.8 billion years ago from the explosion of initial singularity.
- Diameter of present observable universe is approx. 93 billion light years.
One light year is equal to distance travelled by light in one year at the speed of 300,000 kms per second.

Why we need to explore beyond bigbang?

Few years ago, we didn't know about the existence of some galaxies, blackholes, antimatter and many other entities in universe because we had not encountered any phenomena related to it. However we always considered that there must be some other entities which exist outside of our observation limits. Similarly, if we consider that there may be a possibility of some existence beyond the bigbang (our current known universe) then only we would be able to know, whether there is something beyond it or not.

As we know that there will always be some observation limits but we should always strive to explore further. Therefore, we are going to explore the possibilities of existence beyond bigbang from philosophical side.

2 HISTORY OF TIME AND SPACE

Since the time of Aristotle to Newton to Einstein, the history of time and space changed drastically, the possibilities of time being a progression of motion entity to a physical entity as spacetime.

There are many philosophies and theories on time and space, so here we are going to discuss the summarized aspect of those theories to get the basic understanding of time and space throughout history of philosophy and science. This development in the philosophy of time and space is very crucial for us to proceed further in this book.

Plato – 4th century BCE

The philosophers from ancient Greece were among the first to raise the question on the nature of time. They discussed in detail, what exactly is time, whether it is **linear** or **cyclical**, whether time is **infinite** or has a **start and endpoint**.

According to Plato, **present is a sort of 'mean'** in the sense of being at once at the starting point of the future and the end point of the past. By this theory he means that there must always be 'past' and 'future' to get 'present' (accordingly time is

infinite). Plato identified time as the measure of motion of the celestial bodies such as sun, moon and earth etc. So if time is the measure of motion then the motion should also be infinite and that motion must always have a past motion and future motion.

Aristotle - 4th century BCE

Aristotle was student of Plato and he was able to put the Plato's time (the motion of heavenly bodies) into more logical way. He explained time itself is nothing but an **attribute of movement** and motion of all other bodies. The motion can be galactic motion to the progression of thoughts running in mind.

It is a measure of continuous motion or it is change of number with respect to before and after. Therefore time cannot exist without any motion itself but certainly a kind of intelligence is required to measure it. Aristotle argued that motion itself cannot be termed as time because it can be fast or slow depending upon the body. According to him **time is infinite** and this **universe has always existed and will always exist**.

St. Thomas Aquinas - 13th century AD

Now the above explanation of time by Aristotle led to an argument that if time is the measure of motion and it is also running in thoughts then there should

be two different times. Let's suppose if someone measure the duration of a day in his thoughts then he would still be able to roughly measure the duration of a day when there will be no motion. This led to a further discussion of real time and imaginary time.

Aquinas tried to separate **real time** dependent on motion and **imaginary time** (independent of motion) depends on thought flow. But he was never able to establish any relation between both of them.

René Descartes - early 17th century AD

Regarded as the first modern philosopher; according to him all the materials have a **spatial extension property** but **not temporal sustenance**. This means that all the materials have some spatial dimensions such as length, breadth and height. However regarding temporal sustenance, it says that past things are just in our memories, they does not exist now, so all the material in past also does not exist, as we can observe only present things. This was considered as a problem as where the present things come from? Therefore he gave a solution to this problem as that God creates present with all the material every moment. So time is a kind of constant re-creation of God. This view was further developed by Presentism theory later in 20th century.

Sir Isaac Newton - 1687

Isaac Barrow (Teacher of Isaac Newton) was first to reject the Aristotelian definition of time that it is an attribute of motion. He completely changed the idea of time given by Aristotle that it depends on the motion. He argued that time is eternal and it was there before the universe and it will be there after the universe.

Isaac Newton wrote a book in the year 1687 “**Philosophiæ Naturalis Principia Mathematica**”. He further developed the theory of Isaac Barrow and defined that **Absolute time (ab. Time)** runs constantly throughout the universe independent of any motion, it is infinite in nature and it should be considered as a dimension in which all the events occur. Similar theory for **Absolute space (ab. Space)** was given that it is independent of anything and infinite in nature. It means that absolute Time and Space exist before the universe and they will exist after the universe without being affected by anything.

Gottfried Leibniz - 1715-16

During the years 1715-16, **Leibniz** had some correspondence with Newton regarding the possibility of absolute time, he believed that time makes no sense if there would be no object to interact with. In fact the event taking place

among the various objects are time themselves. If someone tries to think of any moment in time, he would only be able to think of that event took place in time. This philosophy is often called **relational time**.

Immanuel Kant - 1781

In his famous philosophical book "**Critique of Pure Reason**", he described time and space as our different notions to think. These notions makes us to experience things in a sensible way, in this way time and space are not physical entities themselves. Our mind is built to see **Space as a three dimensional geometry** (length, breadth, height) and **Time as linear mathematical line** to understand the sequence, duration and intervals of events.

Albert Einstein - 1905 & 1916

Special Theory of Relativity 1905 & General Theory of Relativity 1916

Since the publication of these theories, our understanding of time has been changed drastically, the new notion of time as one dimension of **Spacetime** in special relativity, and **dynamically curved spacetime** in general relativity is much more prevalent now. The spacetime is a real entity woven together and is considered as fabric of universe. At the time of bigbang explosion, all the

dimensions unwarped (including spacetime) and that was the start of time and expansion of space.

Special Theory of Relativity suggests that spacetime can be explained as four dimensions in Euclidean geometry and **universe is a four dimensional spacetime block**. Time can be referred as fourth dimension in which universe is existing in past but we have already passed through that time and universe is existing in future but we have not encountered it yet.

For example if we moving on a road and passing few places behind hence they exist, but we have passed through that location so we cannot see them now. Similarly few places are yet to come on our way but we have not reached there to see them.

General Theory of Relativity suggests that spacetime fabric of universe is dynamically curved due to the presence of matter. This curve causes time dilation depending upon the gravity. There are many practical significance of this theory; one of them is time dilation effect on the clocks of International space station and GPS satellites compared to the clocks on earth. Gravity is less compared to earth's surface because International space station (ISS) is approx. 408 kms and GPS satellites are generally more than 20,000 kms above the earth surface.

First theory restricts to travel in spacetime because nothing can travel more than speed of light. However second theory suggests spacetime is bend due to gravity, hence allowing a person to travel in spacetime through the bend (shortcut) spacetime and reaching to **another point in spacetime** (past/future). These theories opened up the **possibility of time travel** and it was one of the revolutionary ideas in the history of time and space.

We will discuss these theories in details in the chapter of spacetime and time travel.

Recent developments in 20th century

The philosophy of time in which the present is only real is called **presentism**, according to presentism only present objects and present observation can be said as exist. Past does not really exist now and future is yet to become present to exist. This theory is inspired by the philosophy given by Rene Descartes in 17th century.

The philosophy in which past and future are equally real as present is called as **Eternalism**. It refers all the past and future events exist but we cannot observe them at present. The flow of time is just an illusion of consciousness

because in reality, time is always everywhere. Eternalism is based on Einstein's special theory of relativity up to an extent.

A little different approach can also be seen by few philosophers/scientists that past exists but future does not exist because universe is a growing block. Future is not yet born because it depends on the "present".

Adolf Grünbaum - 1963

According to Adolf Grünbaum, time is just a measure by the clock. We use time to measure the sequence of the events and to measure the duration of those events.

In his book "**Philosophical Problems of Space and Time**", he defined time as "time applies the contemporary mathematical theory of continuity to physical processes, it is a linear continuum of instants and is a distinguished one-dimensional sub-space of four-dimensional spacetime".

Stephen Hawking - 1988

In addition to Einstein theory of relativity (Spacetime), Stephen Hawking in his famous book "**A Brief History of Time**", proposed **imaginary time** and said that point of singularity might not be the beginning of universe. This imaginary time can help us to determine the state of singularity. According to

him there is an imaginary time also which can be explained as perpendicular line to the real time line. It is very similar to the imaginary numbers in mathematics. As we can see in real time, universe does have a start point in time known as bigbang but that imaginary time has no boundary conditions very similar to North Pole of earth with no boundaries.

Quantum theory of multiverse: Although we are discussing the history of time and space but some parts of this theory needs a special mention here to understand above **Stephen Hawking's imaginary time**. According to this theory, in the disconnected time lines there are potentially infinite number of parallel universes, this creates the possibility of multidimensional time (including imaginary timeline) in which other dimensions of time can sometimes interact or merge into one but we may not have been able to observe it yet.

3 OUR CURRENT UNDERSTANDING OF UNIVERSE

In previous chapter of history of Time and Space, Isaac Newton gave the theory of absolute Time (**ab. Time**) and absolute Space (**ab. Space**). (from here onwards it is also represented as **ab. Time & Space** on many occasions). According to this theory ab. Time and Space are not affected by any entity of universe and they are infinite in nature.

However there was another theory given by Einstein (theory of relativity) which says that Time and Space are one single physical entity called **Spacetime**, which bends and deform according to the presence of matter in universe. It has a definite start point called Bigbang explosion.

According to the theory of relativity, the initial singularity was infinitely dense due to which there was infinite spacetime curvature. It means no space and time beyond it. With the bigbang explosion from that singularity, all the dimensions unwarp and we are able to see the spatial expanse of the universe as it is now. Theory of relativity completely changed the notion of ab. time & space (not a physical entity) to relative Spacetime (physical entity) opening the possibility of going backward/forward in time.

There are some other theories describing **the state and source of initial singularity** which we will discuss in next chapter Existence and Universe. We will also see if there was any “Time & Space” existed beyond that bigbang or not. In order to check this, first, we need to discuss whether universe should be called **Existence or Universe** itself.

According to our current definition of universe, both seems to be same because nothing exists outside the universe and universe itself is whole existence. Now we need to explore them further to understand the difference between the definitions of these words.

Let’s move further with some questions arisen due to the above discussion, also we are going to address few supplementary questions inside these upcoming chapters.

- 1. What is the difference between existence and universe?**
- 2. What is ab. Time and ab. Space?**
- 3. What is Absolute Time and time travel?**
- 4. What is Spacetime and time travel?**

4 EXISTENCE AND UNIVERSE

The word **Existence** has been carefully chosen instead of **Creation** or **Universe** or **Multiverse** because here it is representing the **Entire Existence** (from here onwards denoted by **Existence / EE** on many occasions) which can exist.

We have used the word **Existence** instead of **Creation** because creation can be considered to come under the definition of Existence (EE). Existence is a bigger entity that includes any entity that has been created anytime and also the entities that always existed.

Regarding the word **Universe**, if anything exists beyond it (outside or before/after) then it can also be said to be the part of **Existence**. Hence in case of **Multiverse** (more universes) exists outside of our universe then it can also be included in the definition of Existence. In other case of nothing existing beyond our current universe, then Existence would be equal to universe without changing the definition of universe. It will mean that the universe is Entire Existence and nothing exists beyond it.

Considering above, Bigbang can also be said to be a part of Existence. Limitation of science ceases the opportunity to observe beyond this specific

point as all the laws of physics break, it means we cannot observe anything beyond it with our current technology.

Definition of Existence (EE)

According to above argument, we can include anything into the definition of Existence which could possibly exist.

Existence (EE) :

Existence includes universe/multiverse/entire creation, it can be defined as self existing multi-dimensional entity, infinite in nature, it consists of all other entities that ever existed or existing now or will exist; such as matter, antimatter, waves, energy, force fields, spatial expanse (includes emptiness and non emptiness) etc.

Non-Existence (NE) :

It can be defined as an entity that never existed, nor existing now and will never exist.

It can be little confusing that “**Non-Existence**” word exist. These words are just a symbol to represent non-existing but actual entity does not exist. The definition of Non-Existence itself defines it cannot exist anywhere anytime.

Particular state of Existence:

It can be defined as a particular state with no change of state (no motion at all) of any entity of Existence. This includes matter, antimatter, waves, energy, force fields, spatial expanse of Existence etc.

In simple words it is like a picture captured of a moving object.

The duration of this particular state can be represented as " $\Delta t = 0$ "

Change of state of Existence:

It can be defined as the change of state (any motion) of any single or multiple entity of Existence that happened. This includes matter, antimatter, waves, energy, force fields, spatial expanse of Existence etc.

The duration of this change of state can be represented as " $\Delta t \neq 0$ "

Spatial expanse of Existence:

It can be defined as a physical entity (part of Existence) which can contain nothing inside it (emptiness) or some physical entity filling it (non-emptiness).

All physical entities are present in the infinite spatial expanse of Existence very similar to a particle/wave of light penetrating into the water and getting absorbed. This spatial expanse of Existence could be so vast that if we consider our universe as a small particle of light then the spatial expanse might be

equal to the Pacific Ocean or more. This example is just for an illustration purpose as spatial expanse could be infinite in nature.

There is a theory of presence of dark matter (it has never been detected directly) in the emptiness of our universe due to which our universe is expanding exponentially. It might be possible that our universe is just getting absorbed into the vast infinite spatial expanse of Existence. (The detailed discussion of this topic has not been included in this book as it is a full research topic to cover).

Note: Vacuum does not mean spatial expanse, it just represents emptiness, while spatial expanse includes vacuum and non-vacuum both.

By above definitions, now we have a better understanding of Existence, Non-Existence, State of Existence, Spatial expanse of Existence

The continuous change of state of Existence

As we can see that a continuous change of state of Existence is happening which is very well defined by the laws of existence itself. Even if hypothetically, there is a non-change of state of existence, then no one would be able to observe it. As there would be no change of state (no progression of

thoughts to observe) inside Existence and nothing is existing beyond it to observe.

According to current theories of science, this continuous change of state of existence can be explained by two theories i.e. **Second law of thermodynamics** and **Moment of inertia**. However both might not be able to explain it fully.

Second law of thermodynamics:

Entropy is a concept that defines the energy in a system will spread out through the space available to it until it reaches the state of equilibrium. However, if the system's energy is in a low entropy state, the rate of spreading out of energy would be high and when the system would reach in high entropy state (near to equilibrium), the spreading out of energy will slow down. The second law of thermodynamics thus states the energy from a system tends to spread out, until finally it is evenly distributed and reaches equilibrium.

Since our early universe, the energy is mainly concentrated in stars separated by low temperature vacuum outside, so it can be seen that there is continuous flow of energy from stars to into the vast expanse of universe, hence the entropy of the universe is increasing according to the second law of

thermodynamics. We can see that second law of thermodynamics applies to all big stars and to all daily life activities as well.

The moment of inertia:

Newton's first law of motion states that anything which is in a continuous motion will remain in motion and the thing which is in rest would remain in rest until unless any external force is applied on it. This law applies to almost all physical entities and it is called as moment of inertia of object.

If everything in the Existence would stop for certain time duration including all motions from an atom to huge galaxies, such as: from the small electron revolving round the proton to the planets revolving the sun and also the progression of thoughts of the mind (brain process information by some electrochemical activities which is a part of physical entity), then no one would be able to notice the passage of time as already discussed earlier.

In this hypothetical case when Entire Existence would stop (no motion) with no change of state, then it will also create a problem with the law of moment of inertia, as such there would be no moment of inertia in any of the existing entity to re-run at same pace again without any external force applied on it.

Considering both these above theories, we can conclude that the state of Existence is always changing and there is always a continuous motion well defined by physical laws of existence.

Next we will discuss whether there was (any motion) change of state of existence before bigbang or not.

Existence beyond Big-bang

In general terms we know that something physical can only exist with some duration in time and some volume in space. According to modern physics the universe started with a point of Initial Singularity with a Bigbang explosion and there was no spacetime beyond it.

This interpretation leaves us with different set of possibilities; whether there was any entity of Existence beyond it or there was Non-Existence at all.

There are some theories which describe **the state and source of initial singularity**. These theories are being developed in order to explore the possibilities of any entity of existence beyond Bigbang.

Such as: Initial singularity came from **Non-existence to Existence**, second possibility suggests that it came from **Big-bounce (Big-crunch) Quantum**

fluctuation of earlier universe and the third possibility states that initial singularity was **Infinitely existed** etc.

What was the Cause/Source of initial singularity?

Case 1: Non-existence to Existence

In the case where point of initial singularity got self created from **Non Existence (NE)**, then the chances of self creation of point of singularity from NE outside of our universe is infinitely high (our universe can be considered to be covered by NE all around), hence the chances of such huge explosions like Bigbang would also be very high. However no such phenomenon has been observed yet because such a massive explosion would definitely create a sort of havoc in our universe. Fortunately, this possibility has not been predicted by many physicists as it does not provide any strong reasoning behind it and it also lacks the description of **cause / source** of initial singularity itself.

Case 2: Big-bounce (Big-crunch) Quantum fluctuation

This theory predicts that our universe will end up by opposite phenomena of Bigbang and it will shrink down to singularity again known as Big-crunch. Once our universe will expand and reach upto a certain extent, and then the

process of contraction will start eventually reaching to point of singularity again. Accordingly, the earlier Big-crunch's material from previous universe was the **source** of matter and **cause** for initial singularity. According to this theory there must be a change of state of existence before our universe was born. It leads us to consider the infinite cycles of Bigbang and Big-crunch happened earlier. So some absolute dimensions are required to measure those cycles of existence because current spacetime dimension cannot measure that part of existence.

This theory also suggests a different view that there may be potentially infinite number of parallel universes in the disconnected time lines, this creates the possibility of multidimensional time in which other dimensions of time can sometimes interact or merge into one but we may not have been able to observe it yet. These multiple universes could be the cause of initial singularity. Here again we need the absolute dimensions to understand and measure that part of existence because these imaginary timelines are not yet well defined to measure Existence.

Case 3: Initial Singularity existed infinitely

The third possibility is that the initial singularity was self existing infinitely without any external source and any previous universe/multiverse. The initial

singularity itself was the source of all material of universe and nothing existed/existing outside of that.

So the question arises: whether there was a **change of state** in the initial singularity or it just remained in a **particular state** of existence?

If the initial singularity remained in a **particular state of existence** and there was no change of state, then there must be an external **cause** (it could be a wave or particle or anything which we don't know yet) for **Bigbang** to occur because no change of state was happening inside initial singularity. Initial singularity should have remained in that particular state of existence infinitely, it could not explode unless any external cause interacted to it. Hence we must agree that there was a **cause outside** initial singularity, let say it was "Cause X". This Cause X can be considered as infinite in nature else we have to consider another "Cause Y" for this "Cause X" to occur and so on. These mentioned **Causes** must be considered as part of existence according to our definition of Existence. To measure that existence, we need some absolute dimensions because that part of existence is outside of that initial singularity where spacetime dimension did not exist.

And, if the initial singularity was in a **continuous change of state of existence** since infinity, then we can consider it as a valid reason that nothing existed

outside. This is also a valid justification for Bigbang to occur due to internal cause. Once again, we need absolute dimensions to measure that change of state of existence for initial singularity.

Considering all the above cases for description of initial singularity, we can conclude that:

The Bigbang explosion is certainly not the start of Existence however it could be considered as the start of our universe only. There is an infinite chain of causes behind the bigbang which could be anyone of the above mentioned theories. These causes must be considered as part of Existence as per our definition. The initial cause of all the causes and the initial source of all the sources is still very far from us to be understood, but now we know that there was existence of some entities existing beyond the initial singularity.

Results from the above discussion:

- There is an **Infinite Existence** beyond Bigbang explosion and initial singularity.
- Bigbang is a part of Existence and the **cause/source** of Bigbang must be considered into account for further exploration of Existence.

- There are currently no dimensions available to measure the Existence beyond initial singularity (imaginary timeline which is not well defined to measure existence and spacetime does not exist beyond it).

To measure existence beyond bigbang (initial singularity), we are going to explore absolute dimensions. In next chapter we are going to consider Ab. Time and Ab. Space as two separate dimensions to measure Existence. Now we are moving forward with next question:

What is ab. Time and ab. Space?

5 ABSOLUTE TIME AND ABSOLUTE SPACE

In this chapter we will explore the properties of the ab. Time and Space dimension to measure the existence. As concluded in previous chapter about infinite Existence, we will re-define these dimensions to check the possibility of this ab. Time and Space to be applied beyond Bigbang.

To elaborate the topic - let's understand dimensions first:

Dimension:

It can be defined as the measure of a particular property of an entity (Existence or part of Existence).

Basic dimensions: Mass, Length, Time, Temperature etc.

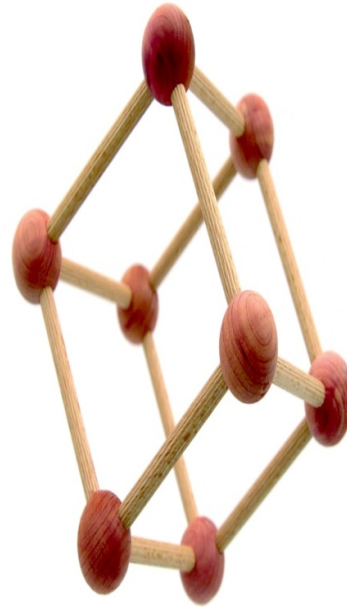
S.I. Unit of dimensions: Kilogram, Meter, Second, Kelvin etc.

Mathematical entities: Volume, Cube, Line, Area, Triangle etc.

We can clearly make a distinction for spatial dimension; Length is just a mathematical dimension but certainly not a physical entity. Basic dimension and mathematical entities are also not physical entities such as: **length of a line is not a physical entity** itself. The mathematical dimensions and mathematical entities can be applied on to a physical entity to measure it or

describe it, but without physical entity, these dimensions cannot become a physical entity themselves. (See picture 2)

By exploring the case of spatial dimensions such as length, breadth and height, we see these dimensions can be combined together to measure a certain **area** (length x breadth) or **volume** (length x breadth x height). And if no boundary condition applied to them, then this **area** and **volume** can be regarded as **plane** and **space** respectively. But these are not physical entities themselves; they just become another mathematical entities/dimensions again.



Picture 2: A cubic physical entity

The mathematical entities (line, length etc.), word from a language (table, chair etc.) and various theories of science and philosophy are just a form of knowledge/information. This knowledge/information of any entity is not the actual entity itself but just a symbol to measure/describe actual entity.

Absolute Time and Absolute Space

Aristotle defined time as a measure of continuous motion of infinitely existing universe; hence time is also infinite in nature. We have also discussed in our previous chapter that Existence is infinite in nature and so is the continuous change of state of existence. We are going to proceed further with some developments and corrections in the definition of ab. Time and Space given by Isaac Newton. Let's define ab. Time and Space to proceed further:

Absolute Time (ab. Time) :

It is a mathematical dimension to measure the change of state (any motion) of Existence (includes universe/multiverse/entire creation).

Absolute Space (ab. Space) :

It is a mathematical dimension to measure the spatial expanse of Existence (includes universe/multiverse/entire creation).

If we consider **ab. Time and ab. Space as mathematical dimensions**, then the measurement of one unit of dimension will not be affected by any entity of Existence and it would also be able to measure upto infinite value. It means the value of a unit of these mathematical dimensions would remain constant irrespective of any change in the property of any physical entity of Existence.

It is similar to mathematical numbers such as: 1, 2, 3, 4, 5..... The values of

these **mathematical constants** are always same. It can never be affected by any physical entity of Existence. Once we **derive the unit of ab. time and ab. space by fixing multiple parameters**, then in the case of variation in a particular parameter, we will always be able to retrieve the measurement of original unit with the help of other parameters. This will ensure the measurement of particular dimensional unit to work as mathematical constant without being affected.

If the ab. Time and ab. Space will be considered just as mathematical dimensions to measure Existence then the application of these dimensions will need a physical entity (part of existence) to be applied upon. Let's take two different examples to understand ab. Time and Space.

Example 1:

Considering a situation where ab. Space can be understood as a mathematical dimension to measure spatial expanse of Existence as physical entity.

The density outside the earth's atmosphere is less than 1 hydrogen atom per cubic centimetre. So we can consider the distance between the 2 hydrogen atoms is min. 1 centimetre. Only if we consider spatial expanse as a physical entity of Existence between them, then only we will be able to observe the

distance between 2 hydrogen atoms. Else we would not be able to observe distance between them, because there is empty vacuum only and nothing else exists between them. And if we consider this empty spatial expanse as Non-Existence then there should not be any distance between them.

Example 2:

Considering a situation where ab. Time can be understood as a mathematical dimension to measure the change of state of Existence.

Let's suppose a train is running at the speed of 100 kms per hour and we know Earth's rotational speed is equal to:

$$1 \text{ rotation/day} = 360 \text{ degrees/24 hours} = 15 \text{ degrees/hour}$$

It means earth is rotating 15 degrees in one hour. So one hour can be replaced with 15 degrees rotation of earth, so the speed of train can be represented as 100 kms/15 degree rotation of earth. Hence the speed of train can be measured by the change of states of Existence.

However earth's rotational speed is not a very precise universal instrument to measure change of state of Existence. The measurement of unit which will be least affected by any physical condition can be fixed as a unit of ab. Time. In the coming chapter of "Spacetime and time travel" we will discuss new technologies (which are already under development stage) to measure the

change of state of Existence without being affected by any local physical condition so that the value of a single unit of time will remain as constant.

We can conclude that this newly developed definition of “ab. Time & Space” provides us the required dimension to measure the Existence without being affected by any physical entity and local physical conditions. Let’s see how it will be like to travel in time. Moving forward to our next two questions:

What is Absolute Time and Time travel?

And

What is Spacetime and time travel?

6 ABSOLUTE TIME AND TIME TRAVEL

Let's start this chapter with a question; is it possible to change the present state of existence to the previous state of existence?

All past states of existence were existed and they do not exist anymore.

At present only present state of existence exists.

Future states of existence are yet to exist and they do not exist till now.

Although past and future state of existence do not exist now but they are **part of Existence**. These states of existence cannot be regarded as Non-existence according to the definition. However changing the state of Entire Existence to **previous or future state** against the laws of physics (moment of inertia and second law of thermodynamics) is not possible. The state of whole existence has been changed in last moment and it is changing continuously by the laws of physics. This change of state is happening from a tiny particle to huge galaxies of cosmos.

In order to travel in ab. Time, one has to change the state of entire existence to the previous/future state which is impossible. Ab. Time is the measure of

change of state of existence which cannot be stopped and it cannot be slowed down or made fast.

It might be interesting plot for a science fiction movie that someone can move backward and forward in time but it means changing the state of Entire Existence.

Let suppose a hypothetical situation:

Case 1

If we would be able to change the state of entire existence to previous state including ourselves (including our progression of thoughts) then we won't be able to realise that we are in past because our progression of thought also went back to past state.

Case 2

In another case, if we changed the state of entire existence to previous/past state but excluding ourselves (means our own thoughts did not go back to past state) then certainly we will be able to live in the past state of existence. However anyone would never be able to realise that we came from 'present' state to 'past'. Although we could tell about the 'present' to everyone who is in past state however the existence may not be back exactly the same way as it was in the start of this hypothetical case. Because if we tell any information or

change anything in past state then it will lead to change of state of existence in a different way. And if we do not tell any information or change anything in the previous state, then only the existence would come to present state exactly the way as it should be. Interestingly, we would still not be able to travel in ab. Time because absolute time would still be running (our progression of thoughts which comes under the Existence) during the change of state to past and the change of state back to present.

The above cases were based on hypothetical condition of changing the state of Entire Existence to previous state which itself is a big non-possibility. However study of these cases provided us the clarity of impossible time travel in ab. Time.

7 SPACETIME AND TIME TRAVEL

To start this chapter of Spacetime and time travel, I will highlight our time measurement techniques once. We measure time through different types of clocks, and clocks are the devices to measure unit of time defined by us (S.I units). It might very precisely measure the unit of time depending on the technology but we know that it is just a human made device to measure the change of state of Existence. These clocks cannot measure the unit of time independently without being affected by the physical laws of existence and have to abide by these laws.

Special Theory of Relativity

Spacetime terminology came into discussion when **Albert Einstein** gave the **Special Theory of Relativity in 1905**.

According to this theory Space and Time are one **physical entity** called **Spacetime**. Time can be referred as fourth dimension in which universe is existing in past but we have already passed through that time and universe is existing in future but we have not encountered it yet. He described that if an object is travelling at certain velocity then it can travel in time but the effect

would be very small to observe. However if the speed can be increased near to speed of light then the time dilation effect will be more easy to observe, and when that object reaches upto the speed of light i.e. 300,000 kms/second, then the time would eventually stop for it.

For example if we moving on a road and passing few places behind hence they exist, but we have passed through that location so we cannot see them now. Similarly few places are yet to come on our way but we have not reached there to see them.

There are many paradoxes associated with **Special Theory of Relativity** which are already a matter of discussion worldwide so we are going to take one of them (Grandfather Paradox) and there could be few more paradoxes if we think deeply about time travel.

Grandfather paradox: This is one of the most famous paradox of time travel, it raises a contradiction that if someone 'A' goes back to past and kills own grandfather in his childhood then 'A' won't exist anymore because his parents would not be born. If 'A' don't exist then who killed the grandfather. There were several attempts to answer these time travel paradoxes such as parallel universe theory, time line protection hypothesis and many more. This parallel universe theory suggests that if someone changes the past then he will reach

to a different parallel universe, or the changes made by him will create another parallel universe where he would not be existing.

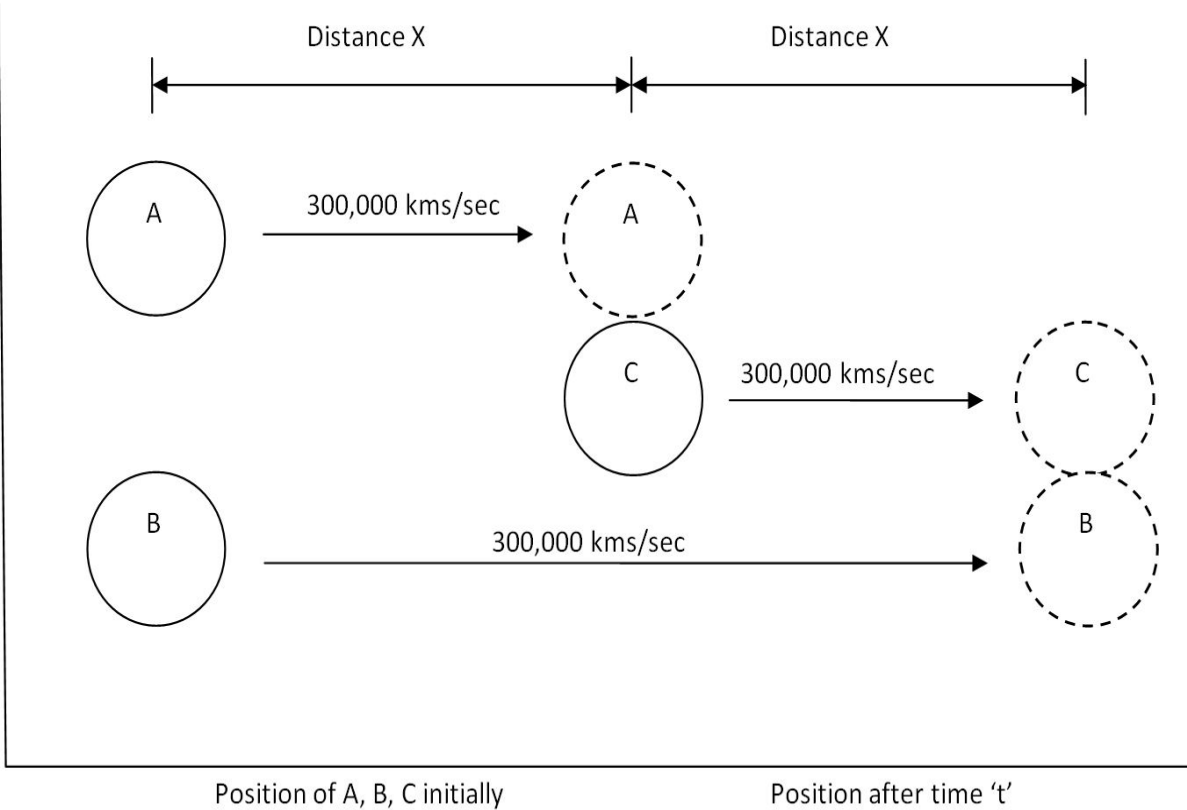
There is a long list of paradoxes such as: Predestination Paradox, Bootstrap Paradox, Let's Kill Hitler Paradox etc. (link has been provided in references to check these interesting paradoxes).

Basic assumption paradox: This paradox is a part of this research which has been added for further discussion. It is one of the fundamental paradox in the basic assumptions of this theory. Special theory of relativity is based on this basic postulate that the **speed of light** will **remain constant** in vacuum irrespective of speed of observer and source of light. The implication of this postulate was that speed-related measurements and duration were changed in order to accommodate this theory.

Let's understand this from a hypothetical case: (See picture: 3)

If an object 'A' and an object 'B' ('B' part of light beam) are initially at same location and moving towards object 'C' (located at 'X' distance apart initially) with the velocity of 300,000 kms per second. And 'C' is also moving ahead in same direction of 'A' and 'B' with same velocity of 300,000 kms per second. In this case, 'A' won't be able to reach 'C' because the relative velocity between

them would be zero and 'A' would remain in rest with respect to 'C' with same distance between them 'X' after time t. However 'B' will still be able to reach 'C' with the velocity of 300,000 kms per second as it is a part of light beam. (Speed of 'B' will remain constant with respect to 'C' as per the basic postulate of special relativity theory).



Picture 3: Basic assumption on speed of light

The basic assumption of this theory is that the velocity of light will remain constant irrespective of velocity of observer and source of light. It raises a

serious contradiction that why velocity of 'B' (part of light beam) remained constant with respect to 'C' moving with same velocity in same direction. In addition to that if 'C' would also be a part of another light beam, then under this condition, velocity between two light beams would relative or constant?

Hypothesis to remove this paradox: If we consider a hypothesis to remove this paradox by considering that **speed of light** is also **relative** between two objects depending on the speed of source and observer.

Any observer, who is travelling in the direction of light will observe time running slow for any event because the relative velocity of light will slow down with respect to that observer. It would seem to observer that time has been slowed down because he will be able to see the light waves coming slowly, enabling him to see the past event. It means he will be able to see the event later than it actually happened sometime ago.

However sound waves will take their own time to reach the position of observer because the **speed of sound** is very less compared to **speed of light**. So this kind of time travel won't open any possibility to time travel in actual, but only makes possible to see past/future because observer's speed is relative with respect to the speed of light.

In this case equation of relative time travel would change to:

$$\Delta t = \Delta t_0 (1 - v/v_0)$$

Δt = the observing time duration (s)

Δt_0 = the actual time duration on observer's clock (s)

v = velocity of observer (m/s)

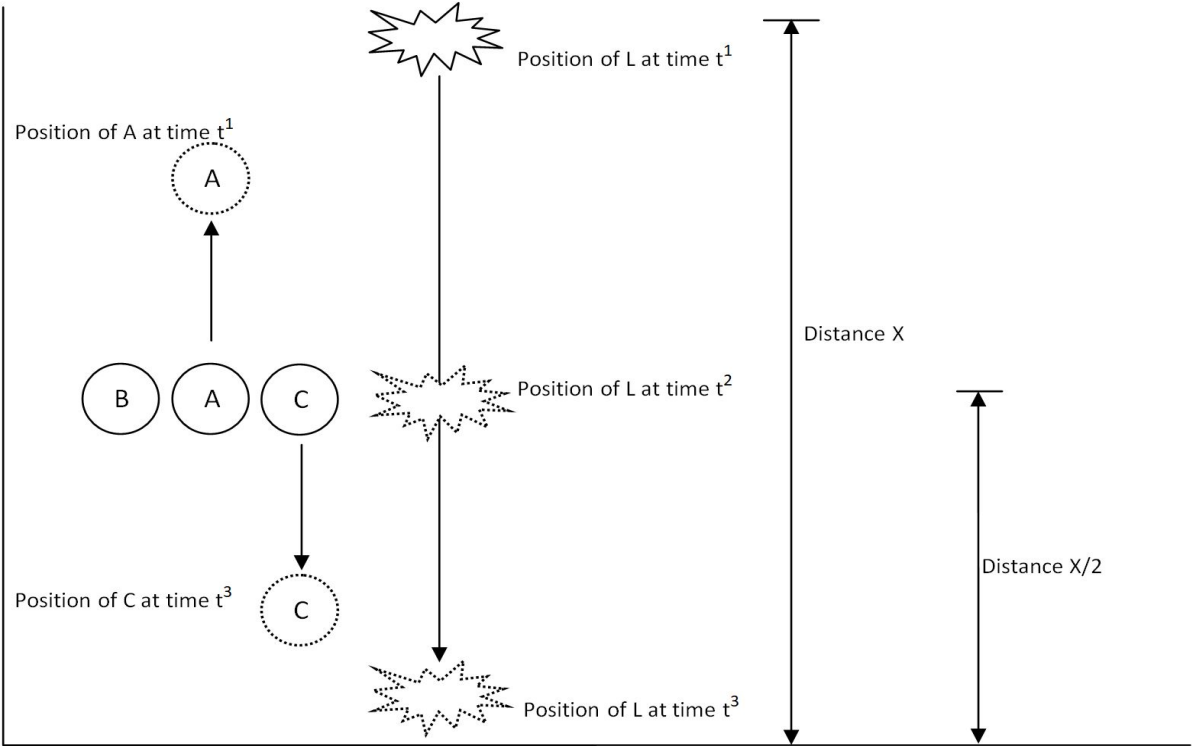
v_0 = velocity of light in that medium (m/s)

Example: Lightning from sky clouds (See picture: 4)

In general we can listen that thunder sound is coming few seconds later than the actual lightning in the sky. We know that sound waves travel at approximately 343 metre per second and light waves travel at approximately 300,000 kms per second, so light waves reach to us much before than sound waves. Similar kind of phenomena could be observed with respect to light to see the past/future if we can travel near to speed of light.

Let's suppose, initially there were three persons (A, B, C) located at middle point between sky and earth surface, at 'X/2' distance from earth surface. Person 'A' started travelling towards the sky and person 'C' started travelling towards earth surface while person 'B' remained at same position. The lightning 'L' occurred at an altitude of 'X' distance in the sky at time t^1 (Time is progressing as t^1 t^2 t^3). The 'L' will reach to 'B' at time t^2 and to earth surface at time t^3 . The three persons will observe the same lightning event at

difference timings. Person 'A' who travelled towards sky would see the future event with respect to stationary person 'B' because the light waves would take time to reach person B location at time t^2 . Person 'C' would see the past with respect person 'B' because light wave will reach to earth surface at time t^3 , later than person 'B' location.



Picture 4: Lightening from sky

However light travel at very high speed so this time difference would be so small that we will need special arrangements to measure it. The effect of seeing past/future of same event will be more visible, if those persons will be able to travel near to the speed of light.

General Theory of Relativity

According to **General Theory of Relativity** spacetime is dynamically curved due to the presence of matter. It causes time dilation depending upon the curvature of spacetime (Gravity). This time dilation effect has been observed through various experiments in the history.

The atomic clocks installed on GPS (Global Positioning System) satellite and ISS (International Space Station) shows different time compared to the clocks on earth. Basically there are two reasons for this time dilation, first is gravity (General theory of relativity) and second is the velocity of these systems (Special theory of relativity). These atomic clocks are one of the precise time measuring devices available as of now. As such there is no place in the space where gravity is absolutely zero but at very high altitude such as GPS satellite, the **effect of gravity** becomes very small which causes the clocks to **measure time differently**. The clock on earth measures the unit of time, relative to the gravity of earth, therefore the measurement of time would be different in other gravity zones. If a clock would be placed near the gravity of Sun, Jupiter etc. it will measure time differently depending upon the gravity. Hence these clocks on ISS and GPS satellites are being calibrated regularly in order to match the clocks on earth.

Let me tell you that discussion for universal time measurement has already begun. The focus of the discussion is to standardize the time more accurately. Although there are many discussions going on at different forums but it has not been fully concluded yet. Suggestions have been made that operating a **clock in microgravity** environment like International space station will provide much accuracy and stability for maintaining standard base of time unit. Several new technology based clocks are in development stage such as optical clocks etc.

Apart from local disturbances (thermal noise and vibration sensitivity), if a clock measures time differently due to effect of velocity and gravity then, should we consider it as actual time dilation or another local disturbance. To define a time unit which will be universally constant everywhere could be much more effective to measure Existence.

What if we consider a clock to be operate where it will be least affected by any physical laws (gravity, velocity, acceleration, waves etc.) and local disturbance (thermal noise and vibration sensitivity). Keeping a clock in quiescent space environment with least gravitational effect will provide higher level of accuracy in time measurement and it would measure the unit of ab. Time as universal constant without being affected by local disturbances.

Time dilation and clocks

To conclude this chapter, I will reiterate the same from where I started, we need to consider our time measurement techniques again. Should we consider time dilation shown on our clocks as actual time dilation?

The laws of existence affect all the physical entities in a different way. All the physical entities have a different effect of gravity on them depending on their nature. It is not necessary that the biological clock of living beings would be affected in same measurement scale as it affects the normal clocks. Rather than considering the time dilation effect in atomic clock (at International Space Station and GPS satellites) as actual time dilation, it could be considered as local disturbance due to velocity and gravity on that particular clock with particular time measurement technology.

If we pay close attention to the clocks from ancient times to recent ones, the people started measuring time by day and night of earth. The Earth rotates about its axis making it day and night but that duration is not very precise, so humans made hourglass clocks to further measure the time more accurately. Today's highly sophisticated clocks measure time up to a high accuracy level of billionth of second. Ultimately, these clocks are just **measuring day and night of earth** which is eventually the **change of state of Existence** only.



Picture 5: Hourglass clock and other clocks

Hence we can conclude from this chapter:

Actual time travel is not possible, even if we will be able to travel near to the speed of light then we could only see past events and future events with respect to stationary observer. In this condition we won't be able to hear anything because sound waves would take their own time to reach that location. In addition to that, time in general theory of relativity shows variation (time dilation effect) due to local physical conditions on clock. The local physical conditions of Existence change so drastically (such as point of initial singularity) that makes spacetime non-relevant at all, so spacetime is not very useful in terms of measuring the Entire Existence.

8 CONCLUSION

This research can be seen as a small milestone in the journey of knowing our **Entire Existence (EE)** and developing the **Theory of Everything**, however it might be an infinite quest of knowledge and we will always remain a student to this existence. Since the ancient times we have always strived to understand this cosmos through our consciousness. Our knowledge of universe has been evolved to this stage with better reasoning and new observation techniques. Still when we look at sky above, it compels us think; do we know an iota of it?

In this research, we have introduced the term **Existence (EE)** to explore new possibilities. The definition of Existence includes this entire creation, the universe and all multiverse as a part of existence itself. We have formulated a new set of dimensions to measure this existence, because a clear understanding of these basic dimensions 'Absolute Time & Space' is must for future research works on this subject. Various possibilities of time travel and related paradoxes discussed to bring clarity in this topic. This research also provides the hypothesis to remove basic assumption paradox related to Spacetime travel. Based on this hypothesis, we know that our time travel to restricted to only see past/future events with respect to stationary observer.

We were also able to conclude that **Absolute Time and Space** are the dimensions to effectively measure entire existence because **Spacetime** dimension becomes irrelevant when it comes to point of initial singularity beyond Bigbang. However, in absence of spacetime as a physical entity, we need to study how gravity works and its other characteristics.

Interpretations based on this research will definitely give us a better picture of Existence. The relation between microscopic universe and larger cosmos can be better established by this research work.

Research result summary

The term **Existence (EE)** has been introduced which includes all the entities that exist including universe, multiverse and entire creation (definition provided). This research provides a new understanding of **absolute dimensions Time and Space** to measure the Existence (EE) more effectively and accurately. These dimensions also provide more convenience to measure the Existence because units of these dimensions would be **constant in Entire Existence (EE)** without being affected by any local physical conditions.

Our consciousness is one of the greatest gift through which we can observe this wonderful Existence. This might be a sole reason for us to here.

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Pictures

1. Picture credit - Front cover hourglass clock - Enrique Zafra

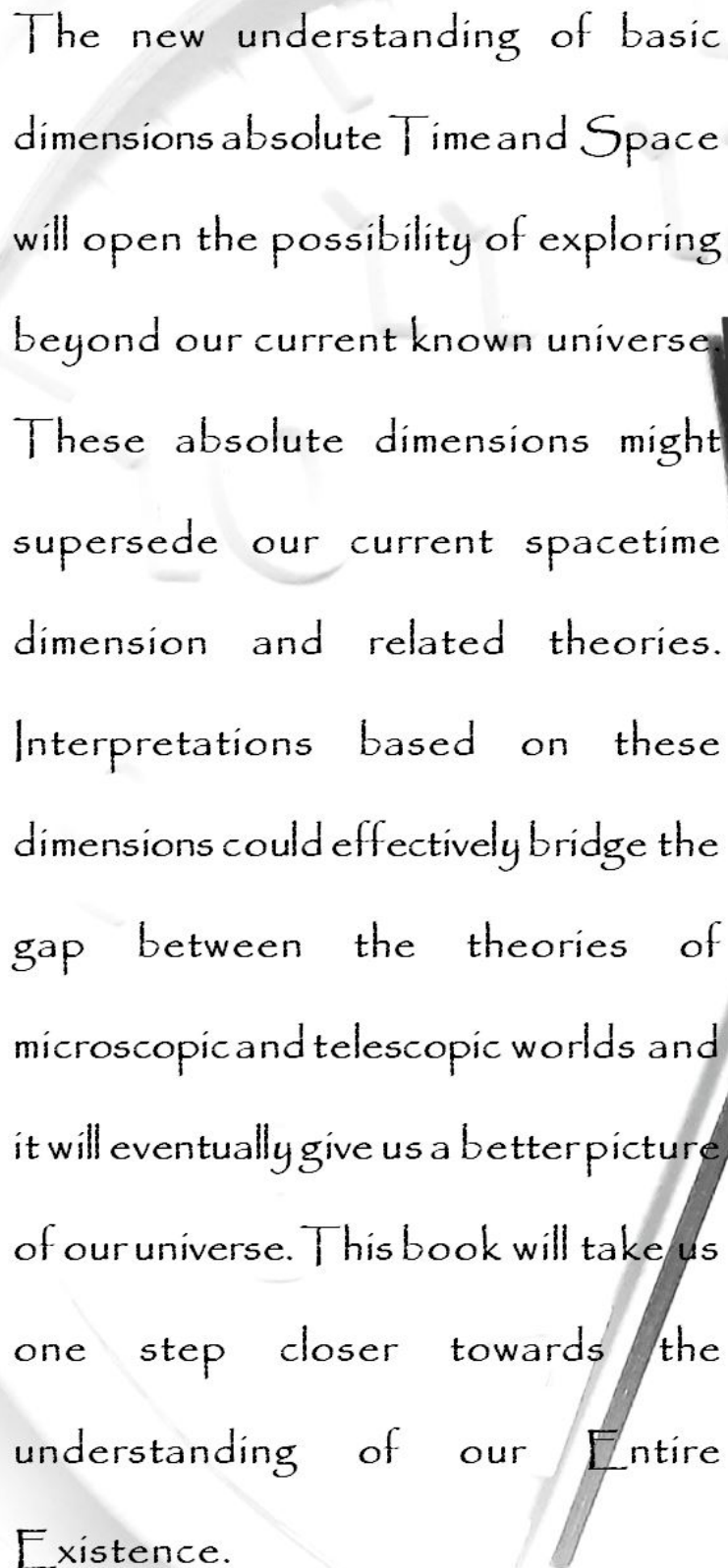
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2. Picture credit - A cubic physical entity- Enrique Zafra

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3. Picture credit - Hourglass and other clocks - Jordan Benton

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The new understanding of basic dimensions absolute Time and Space will open the possibility of exploring beyond our current known universe. These absolute dimensions might supersede our current spacetime dimension and related theories. Interpretations based on these dimensions could effectively bridge the gap between the theories of microscopic and telescopic worlds and it will eventually give us a better picture of our universe. This book will take us one step closer towards the understanding of our Entire Existence.