Conceptual FrameWorks
Research papers

The mechanism behind probability

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Changes within observable reality at the lowest level of reality seem to occur in accordance with the probability theory in mathematics. It is quite remarkable that nature itself has chosen the probability theory to arrange all the changes within the structure of the basic quantum fields. This rises a question about the distribution of properties in space and time.

Introduction

Probability theory is used in quite different branches of science and the mathematical theory shows to give reliable results. In other words, why bother about the origin of probability?

In physics probability theory is used to predict the outcome of experiments at the smallest scale of observable reality: quantum mechanical interactions. That means that the “causality” of the outcome of the experiments is assigned to the probability theory as a mathematical model.

The origin of probability must be a creation by the basic properties of our universe, like everything we can observe in phenomenological reality is created by the basic properties of the universe. That is why the use of probability theory to describe the changes within quantum reality is a bit curious. Because the theory represents no explanation, it is determination. So how must I interpret the probability in quantum reality?

Throwing dices

Probability started as an example of experimental physics at the macroscopic scale.[1] That’s what I conclude if I read about the history of probability theory. Therefore it is not really helpful to switch to the formalism of probability theory. Because the question ought to be about the conditions that create probability.

If I want to throw dices to understand what’s “behind” the term probability, I have to exclude presumptions about the conditions of the experiments that will show probability. For example, does probability depends on the size or weight of the dice? But it showed the only conditions that must be met is a perfect symmetrical dice that is made of a homogeneous solid material. And a flat surface area of course, to throw the dices.

In other words, it doesn’t really matter in what position the dice is at the start of the throw in relation to the flat surface where the dice will land. If I change at random the numbers on the 6 faces of the dice before every throw I don’t violate the distribution of the outcome of every throw within a large number of throws.

That means that the origin of probability is the distribution of change during a period of time and it shows to be conserved within phenomenological reality.

Mutual relations

If I throw dices during 5 minutes I will recognize the probability of the outcome of the experiment. And if I test the IQ of a large number of persons between 50 and 60 years old I will notice an equal probability of the distribution of properties – the intelligent quotient – although the distribution of the properties started some 50 to 60 years ago. That’s why I have to conclude that my experiment to throw dices is non essential if my intention is to understand the origin of probability.

Even the well known Gaussian distribution – figure 1 – isn’t really helpful to understand the underlying reality that creates the observed probability of the mutual relations within observable reality.

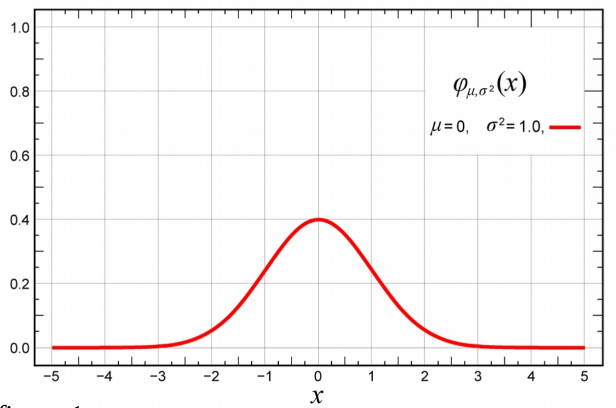

figure 1

Our universe is non-local. That means that every local change influences all the other local changes in the universe *at exactly the same moment*. In other words, our universe is one enormous volume of mutual relations without the existence of independent local changes.

Probability is about the regularity of changes that are observable within phenomenological reality. Therefore, in a non-local universe probability is about the existence of regularities that are the result of the instantaneous influence of everything in the universe.

The amount of changes within the non-local universe – spatial transformations we call energy – shows to be conserved. Probability in physics is about the conservation of local change in relation to local conditions. That is why it is obvious that probability originates from the main conservation "laws" in physics:

1. The law of conservation of energy.
2. The conservation of quanta transfer in space.[A]
3. Conservation of momentum (vectorized space).[B]

The law of conservation of energy (1) originally comprised the conservation of the energy of matter – inclusive the transferred interchange of energy between matter – within an isolated system.[2] Because the law of conservation of energy was developed with the help of the phenomenological point of view, the theoretical framework of phenomenological physics. Nevertheless, extending the law of conservation of energy to all the changes within the volume of the universe isn't a conceptional problem. And last but not least, the law of conservation of energy is not limited by a certain length of time.

Figure 2 shows a schematic representation of the conservation of energy, quantum transfer and momentum. B, C, D and E are *adjacent units* of unit A.

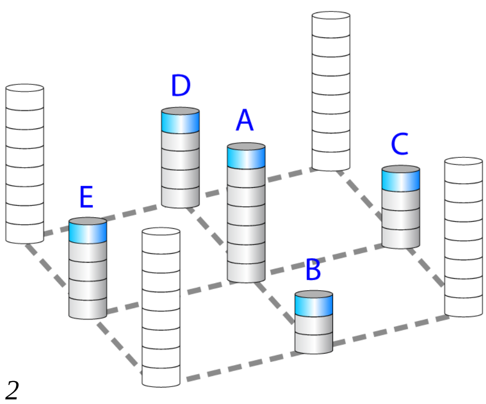

figure 2

Every unit of quantized space is represented as a pile of disks and *every disk* has identical properties, the fixed amount of energy of one quantum.

At the moment "now" every unit transfers 1 quantum to an adjacent unit. In other words, if the duration of the transfer of 1 quantum to an adjacent unit has a duration of 1 <u>t</u> (constant of quantum time) *all the units* of quantized space transfer 1 quantum during 1 <u>t</u>. This seems ridicule because this mechanism doesn't create differences within local space. But in reality only the amount of energy of 1 quantum is a fixed quantity. Thus unit A can transfer – for example – 20% of the quantum to unit C and 80% of the quantum to unit D. In this way the total amount of "disks" of all the units of quantized space is conserved: the law of conservation of energy (1). And if a unit piles up more and more disks – the storage of topological deformation – we call it mass, a local concentration of energy.

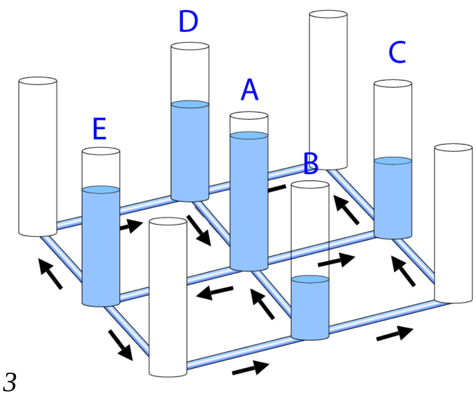

figure 3

The different amounts of topological deformation between the units is the cause of the vectorization by the distribution of quanta between the units. It is a bit comparable with cylinders filled with amounts of liquid (figure 3). Every cylinder is connected with the adjacent cylinders thus there is a flow and pressure of liquid in every connection pipe: the conservation of momentum (3). Actually vectorized space.

Momentum is created by the mutual differences between the topological deformation of every unit because of the transfer of quanta (2). The hierarchy of momentum within every unit "drives" the direction of the next transfer of a quantum. These are the synchronous changes of the electric and magnetic field. The electric field is the topological field and the magnetic field represents the vectorization of space by the local changes of the electric field. That's why both fields are fused in one term: the electromagnetic field.

“Local” conditions

If I throw dices I have created the right conditions “to do the probability trick”. And if I do an IQ-test with a number of persons I have to create the right conditions too. Every person has to solve the same questions in exactly the same time (stopwatch). Actually, I have to create a stable/invariant condition and the probability reflects the reaction of the involved phenomena. The group of people if I do the IQ-test and myself if I throw the dices. So what is it that reacts at the lowest level?

At the moment “now” all the quanta transfer in the universe is conserved. But there are local concentrations of energy – Dark matter and matter – thus “once upon a time” the distribution of energy in the universe was more homogeneous. We use probability to describe the distribution of properties in space so it is obvious to examine the distribution of energy in more detail.

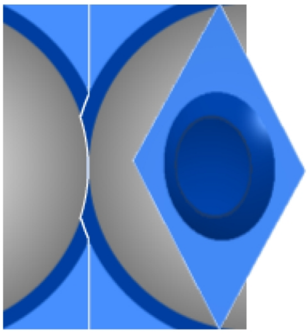

figure 4

If I “free” the concentrated energy of mass, rest mass and Dark matter I have to redistribute this amount of topological deformation all over the universe (see figure 4, the topological deformation of the joint face of both units). The result will be an increase of the minimum and maximum topological deformation of the electric field.

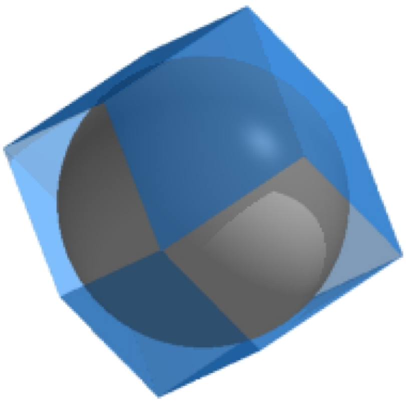

figure 5

Every unit of quantized space transfers 1 quantum – a fixed amount of topological deformation – to one or more faces with adjacent units within the constant of time (1 *t*). Every joint face of a unit and an adjacent unit – see figure 2 – reflects a surplus or a deficit of transferred quanta in relation to the flat joint face of a hypothetical 100% symmetrical unit (see figure 5).

When I increase the average energy distribution within vacuum space the topological deformation of every face of a unit of quantized space will increase. That means that the amount of surface area of the whole unit increases. The size of the surface area – every unit has 12 faces – is directly related to the amount of volume transfer within the boundary of the unit, the invariant volume. Thus:

$$\sum \Delta V_1 + \Delta V_2 + \ldots + \Delta V_{12} = 0 \qquad [1]$$

But I have to assign a positive or negative value to the transferred quanta – fixed amounts of volume – within the boundary of the unit to maintain the invariant volume of the unit of quantized space (the choice of a rule to describe the topological deformations).

The average surface area of a unit is larger than the surface area of the hypothetical unit in figure 5. The reason behind this surplus of surface area is the scalar mechanism of every unit.

The properties[C] are:

1. Every unit has an identical invariant volume.
2. The shape of every unit is deformable.
3. Every unit has an identical internal spherical shape forming mechanism (scalar mechanism).

An internal scalar mechanism means that every unit tries to force the shape of a sphere. It is a bit like the influence of high pressured air inside a balloon in relation the atmospheric pressure outside the balloon. But in quantized space there are only other units and all the units tessellate space. Actually all the units “try” to push against the boundary of the adjacent units to establish the shape of a full sphere.

The tessellation of all the units of quantized space forces the units to synchronize their push force with all the other units around. But the tessellation of the universe splits the volume of every unit in 2 parts:

- An undistorted scalar mechanism (the inscribed sphere).
- A remaining deformed volume (topological part).

The undistorted scalar mechanism of every unit is known as the basic scalar field (Higgs field) and the remaining deformed volume is the electric field. In other words, where is vectorized space that reflects the local deformation of the units of quantized space? (figure 3)

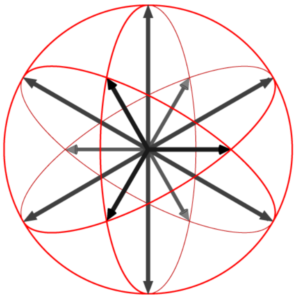

figure 6

Every undistorted part of the scalar mechanism (inscribed sphere of the unit) has a radius that is determined by all the other scalars of the units around. Figure 6 shows the vectors of the push force. Every vector is related to the points of contact with the undistorted scalars of the units around. Figure 7 shows the configuration of identical scalars in space (flat Higgs field).

The transfer of quanta to a joint face will increase the distinct vector in figure 6 with the momentum of one quantum if the whole quantum is transferred to the joint face. Conclusion: the transfer of the volume of 1 quantum to a joint face – the electric field – creates an increase of the local vector within the scalar field with the magnitude of 1 quantum (the synchronous change of the magnetic field). However, this is only possible within a volume of space where every scalar has the same magnitude (figure 7).

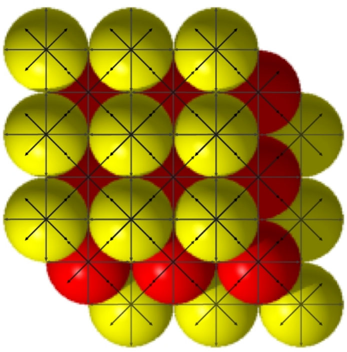

figure 7

The previous description explains the diverse relations between known force fields.[B] Phenomena that interact with the stable/invariant condition that is created to investigate the regularities of change. Actually these interactions have to elucidate the mechanism behind the existence of probability.

The non-local universe

Suppose I redistribute all the concentrated energy in our universe in such a way that everywhere in the universe the energy is nearly homogeneous. That means that the universe doesn't contain mass and rest mass. And – because of that – no Newtonian gravity.[D]

However, the scalar mechanism of every unit of quantized space "tries" to obtain the shape of a full scalar. In other words, the whole volume of the unit becomes a sphere. The result is a mutual push force between all the units of quantized space that is responsible for the concentration of topological deformation.

The distribution of all the concentrated energy over the volume of the universe will increase the average deformation of every unit. Actually it is the redistribution of all the quanta within the electromagnetic field. Figure 8 shows the size of the units of quantized space (λ) and an imaginary waveform in relation to the average deformation of all the units of quantized space.

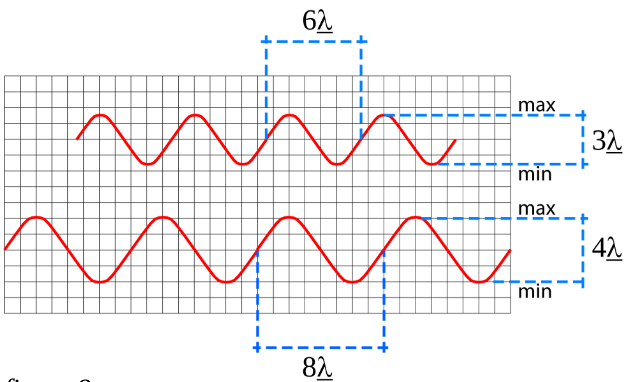

figure 8

The schematic figure 8 *doesn't suggest* that vacuum space – volume where the scalar field is flat – is totally filled with "undistorted" wave forms. It only shows that the mutual increase or decrease of topological deformation between adjacent units – an increase of the average deformation of all the units of quantized space – will result in higher amplitudes with the same ratio in relation to an imaginary wave length.

The minimal average amount of free energy in vacuum space will be achieved at the moment no more free energy – the "blue disks" in figure 2 – is available to concentrate. Once this lack of free energy – like zero point energy – will occur because of the continuous concentration of quanta during the evolution of our universe: the creation of matter. Just because the scalar mechanisms try to acquire a minimal amount of deformation.

Now I can conclude that I have determined a bandwidth of available energy during an amount of time. The time between the start and the end of the present cycle of our (local) non-local universe.

Figure 9 shows the relation between the invariant volume and the variable surface area – the red horizontal line – of one unit of quantized space. The value 1.0 of the surface area represents figure 5, the hypothetical minimal surface area. The unit of quantized space is the building block of the universe, thus the graph in figure 9 represents the whole universe too. Now the red horizontal line isn't the variable surface area of one unit, it is the average surface area of all the units together. Actually, the horizontal line represents the average amplitudes – topological deformation – of the electric field in the universe.

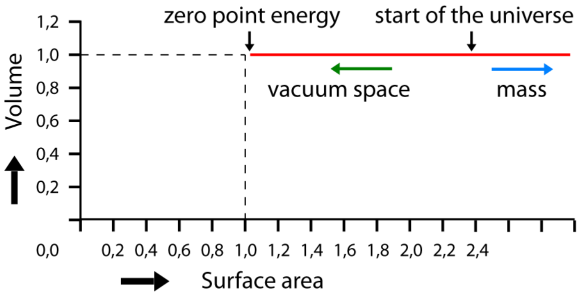

figure 9

Nearly all the volume of the universe represents the flat Higgs field: vacuum space. The average deformation of every unit in vacuum space is decreasing from the start of the present cycle of the universe (green arrow) because of the evolving concentration of energy (blue arrow) within a small number of units (decreased scalars of the Higgs field).

Where is the probability of the graph in figure 1?

The transfer of quanta is conserved at the moment "now" (2), all the changes within the universe during the whole evolution of the universe are conserved (1) and all the synchronous vectors (3) are conserved too.

The topological deformation of every unit is the transfer of a flux of infinite small amounts of volume within the boundary of the unit. All the units tessellate space thus all the changes in the universe are 100% linear in time. Otherwise there is no conservation of quanta transfer, no conservation of energy and no conservation of momentum (vectorized space).

There is no "object of invariance" to be find like the dices and the questions of the IQ-test. Conclusion: probability exists only is we use the phenomenological point of view to create concepts about the mutual relations between local observable phenomena. Like there are no fixed amounts of energy at the lowest scale of reality.[E]

In other words, if we "zoom in" on local conditions and try to figure out a model like the local conditions are some kind of an isolated system, we ignore the coherence of all the changes within our non-local universe. Coherence that is obvious because of 1, 2 and 3.

"Enclosures"

A. "*Quanta transfer in space is conserved*" https://zenodo.org/record/3572846
B. "*Relational concepts in generalized quantized space*", https://zenodo.org/record/3710740
C. "*The objective reality of space and time*" https://zenodo.org/record/3593872
D. "*On conceptual problems in cosmology*" https://zenodo.org/record/
E. "*Tessellation and concentration in quantized space*" https://zenodo.org/record/3684959

References

1. Everitt, Brian. (2006). *The Cambridge dictionary of statistics* (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN 978-0-511-24688-3.
2. William John Macquorn Rankine (1853), "*On the General Law of the Transformation of Energy*," Proceedings of the Philosophical Society of Glasgow, vol. 3, no. 5, pages 276-280.

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