On Unified Equations of GRT and Quantum Gravity

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Abstract

This article discusses unified equations of the general theory of relativity and quantum gravity.

In the last days of the outgoing 2020, the idea came to write a popular presentation of the presented Quantum Gravity in the Unified Theory. Magic words. Today the intelligence of all physicists on the planet is behind them.

There are simple rules for popularization. There are several of them. If you can explain your thought to the child, then you have coped with this task. Another rule is that each formula in the text reduces the number of potential readers, that is, people who can read this book. There is also a rule of figurative or analogous representations of those things about which there is a presentation. Either way, I will stick to these rules.

So, we are talking about a unified theory. Many examples of dramas and upheavals in the minds of people can be cited when understanding the properties of the surrounding world, from the Biblical concept of the origin of the world to the current concept of the Big Bang of the Universe, the first seconds of its dynamics . I will designate here only those revolutionary ideas that are necessary here that have changed people's perception of the world around us. Much has been said and written about the mathematical representation of the surrounding world by Plato (the era of Plato), Pythagoras, Euclidean Principles, the system of numbers, geometric figures. In this regard, I will only emphasize that all this is an Artificial System of Axioms. When we talk about 10 apples, to which we added 5 more apples ,then we are talking about 15 apples as equal by analogy apples, that is, units. But we are not saying that each apple is different from another apple . There are no 15 identical apples in Nature. This means that such an addition operation, corresponds to the only really about in the approximate shape. On the other hand, if we put 3 apples on the table, and then took one apple, then 2 apples remain. Note that we took the apple that we put on the table. Everything is real. And this operation of subtracting numbers is true. As you can see, even simple actions with prime numbers do not always correspond to the properties of Naturals from everyday life.

When Euclid in his Beginnings defines a line as "... length without width ...", then today it is the principle of uncertainty of trajectory in quantum theories. We cannot say exactly where the electron is, as “... a point that has no parts ...” in the same Euclidean axiomatic. Such an electron is really indivisible and corresponds to a point model. Where is Euclid, and where are quantum theories today. But there is a direct connection here . We will stop in a journey into the world of mathematical m dressed, or rather its bases , and move to the evolution of the physical pony mania surrounding world.

For a long time, 16-17 centuries, the ideas of Aristotle dominated that any movement is created by this or that force. Simple experiments Galileo showed that the movement just does not stop, if you do not apply any force. N For example, if an inclined plane to put the ball, after the inclined plane of the ball moves along the horizontal surface. And how far the ball moves depends on the frictional force of the horizontal surface . It will be sand, wood or glass - the forces are different. It turned out that Aristotle was wrong. In order for the material body to move, all forces must be removed. It was a revolutionary upheaval in the minds of all people.

The next revolution in understanding the world around us is associated with the study of electrical and magnetic properties. The axis showed that a change in one field gives rise to another field and vice versa. These properties are very clearly represented in Maxwell's mathematical equations. All technologies that surround us today are associated with these properties. Tesla's ideas and experiments on the presence of energy in space are very tempting .

The next revolution in the minds of people is associated with the understanding of space and time itself. As it turned out, it is similar to electromagnetic properties, when changes in space change the course of time. These properties are interconnected in a single space-time. Although mathematical models of such transformations were known as the Lorentz transformations, Einstein realized their physical essence in his Special Theory of Relativity. The basis of this theory is that the masses we know, up to elementary particles, the electron in particular, cannot move with speeds greater than the speed of light. It turned out that at high speeds, time slows down and length decreases. There are specific formulas for the same x relativistic transformations, and there are precise experiments confirming the invariability of the speed of light in

space-time. The length of the electromagnetic wave of light, photon, its frequency, energy changes, but the speed of the photon does not change. It is important that people understand it , that space and time in Newton's absolutely theories. That is, space , and time are different in different circumstances.

At the same time , quantum mechanics developed, which turned all the concepts of classical physics upside down. It turned out that it is impossible to simultaneously determine and coordinate , and time is already known to us a single, space-time. Moreover, new and new elementary particles were discovered that did not fit into the classical concepts of the structure of matter and various fields of interaction. A number of brilliant researchers have created various quantum theories, which are based on experimental data. These theories are good at calculating and predicting the results of experiments, but their physical meaning, as Feynman himself said, no one understood. Well, indeed, it is difficult in the Nature of matter to imagine, say, the wave function, the uncertainty principle, the wave of probability of events, the superposition of the wave function, the quantum entanglement of the wave function, and most importantly, to understand the causes of all these phenomena in Nature, to find all the consequences of these causes.

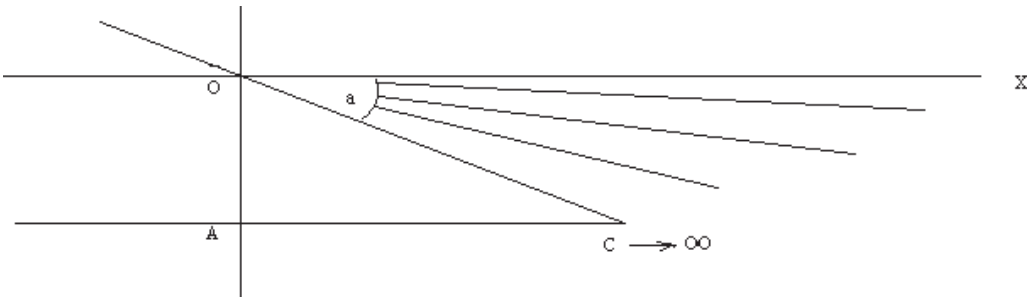
The next revolution in understanding the laws of Nature was made by the same Einstein. We are talking about the General Theory of Relativity. In fact, we are talking about a freely falling elevator, a space-time coordinate system in which there is no acceleration, as well as in rectilinear, uniform motion or at rest. On the other hand, free fall with constant acceleration is due to the force of gravity. Mass is known to be a measure of inertia in space without gravity. This means that the force accelerating the mass of the rocket in open space and the force of accelerating the mass in the gravitational field are the same. We are talking about the fundamental principle of the equivalence of inertial and gravitational mass in Einstein's General Theory of Relativity. We can talk about the principle of equivalence of inert and gravitational masses of two different masses connected by a thread on a fixed block. The weight of a large mass falling down and a small mass moving up is the same. Here, different masses have the same weight. This means the acceleration of inert mass and the acceleration of gravity are equivalent. They can be added and subtracted.

Now about the main thing, in Einstein's General Theory of Relativity. If in a stationary elevator e direct the flashlight beam horizontally to the opposite wall, then when the elevator moves with acceleration up or down, the point of incidence of the beam will shift down or up, respectively. And according to the principle of equivalence, the gravitational field will deflect a beam of light. This conclusion of Einstein's theory was brilliantly confirmed by a solar eclipse observed from Earth. A ray of light from distant stars behind the Sun curved its trajectory around the Sun and was visible on Earth. This effect was called the gravitational lens.

Now, after confirming the theory in experiment, Einstein's General Theory of Relativity itself gives in many ways unexpected ideas about the world around us. It turned out that gravity is caused by the curvature of space and vice versa. Mathematically, this is reflected by the Einstein tensor. Its right side indicates the energy-momentum tensor of fixed gravitational potentials. The key word here is fixed gravitational potentials. This condition set by Einstein is the same as the principle of equivalence. But the equation of Einstein's General Theory of Relativity indicates many other fundamentally new properties of the world around us, the Universe. We've all heard about the expanding universe, black holes, dark matter, and dark energy. All these properties are confirmed by experiments.

When we talk about the fixed gravitational potentials of the Einstein tensor, then these key concepts, already tested and confirmed in experiments, Einstein's General Theory of Relativity, are directly opposite to the principle of uncertainty of coordinates in time, in quantum theories. These are the fundamental contradictions of two proven in practice, fundamental concepts or properties, physical theories. Einstein dreamed of creating a unified theory that would resolve these contradictions. And the main criterion for such a theory is the theory of quantum gravity, which unites Einstein's General Theory of Relativity, and quantum theories.

The intensity of research in the search for such a theory is so great that sometimes the question has been raised, is this theory crazy enough to be correct? These questions are still relevant today. The guiding threads in the search for such theories are mathematical truths and physical facts in experiments. These problems cannot be resolved directly. It is not possible to combine the principle of uncertainty of the position of a point in space and time, with a fixed state of quite definite gravitational potentials at a given point in space and at a given time. And here we return to the beginning of the Principles of Euclid, his axioms in the definitions of the point "... without parts ...", the line as "... length without width", and the parallelism of these lines.



In the modern axiom of parallelism, known to all, through a point outside a straight line, in a plane, there is only one straight line OX, parallel to the original line AC.

Figure: 1

Parallelism means that the lines OX and AC do not intersect at infinity. These are clear and obvious concepts. They are generally accepted. But if you look carefully, then when moving along the AC to infinity, within the angle α, there is a dynamic bundle of straight lines that never intersect the original straight AC at infinity. So, we are talking about parallel lines. Since infinity cannot be stopped, this dynamic bundle of straight parallel lines, along each XYZ axis of Euclidean space, always exists. Moreover, when moving along any line-trajectory, AC in this case, there will be a space of dynamic bundles of parallel straight lines nearby, into which we cannot get.

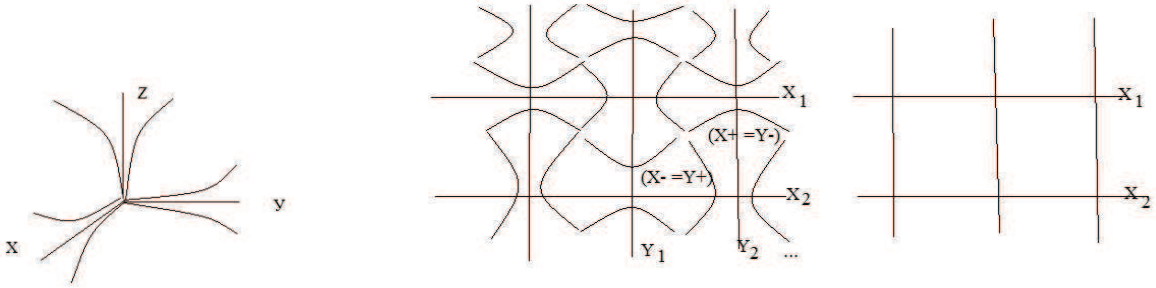


Figure: 2

As you can see, the coordinate system of the Euclidean space is changing, and we can talk about a non-stationary Euclidean space, with the same isotropy properties in all directions. On the other hand, we can talk about a single and inseparable discrete space-matter.

Since the main property of matter - motion follows from the experiments of Galileo, we will identify the space of dynamic bundles of parallel straight lines with matter. Now, we proceed from the following fundamental fact that there is no space without matter and there is no matter outside of space. This means that space-matter is one and the same. Today it is difficult to fully understand, but these are the facts of reality. In the presented lattice of Euclidean axes
on the right in Figure 2, we do not see the complete picture of dynamic space-matter on the left.
As you can see, in a dynamic space-matter, we can no longer take a simple line as "... length without width ..." with the uncertainty principle in Euclidean axiomatics. This is either (X-) or (Y-) trajectory, with a dynamic angle of parallelism of a bundle of straight parallel lines.

The next step in understanding the properties of space-matter, as a whole, is that the geometric properties, we emphasize, of dynamic space, correspond to the physical properties of matter. If we postulate the properties of space-matter as an electro (Y + = X-) magnetic field, then there are mathematical truths of Maxwell's equations for such a single electro (Y + = X-) magnetic field. The truth of these equations is that the dynamics of the electric (Y +) field generates a vortex magnetic field and vice versa. Now, already in strict exactly such mathematical truths, the equations of the dynamics of gravit (X + = Y -) mass fields are derived . Already from these equations it follows that, like the induction of a magnetic field in the dynamics of an electric field, in exactly the same way inductive (Y -) mass fields arise in an alternating gravitational (X +) field. No options.

The same attempt to deduce the equations of the Special Theory of Relativity in strict mathematical truths of dynamic space-matter, led to the equations of quantum relativistic dynamics in exactly such mathematical truths. If in the first case the zero angle of parallelism of the Euclidean axiomatics was taken , then in the case of quantum relativistic dynamics, this angle is nonzero, and different for (X-) and (Y-) trajectories. It is fashionable now to talk about the Quantum Theory of Relativity. So, the equations of the Quantum Theory of Relativity, at a zero angle of parallelism of the Euclidean axiomatics, go over into the

equations of the Special Theory of Relativity, and in strict mathematical truths. In other words, it is impossible in principle to create a Quantum Theory of Relativity in Euclidean axiomatics. What does this lead to in practice? Let's give one example.

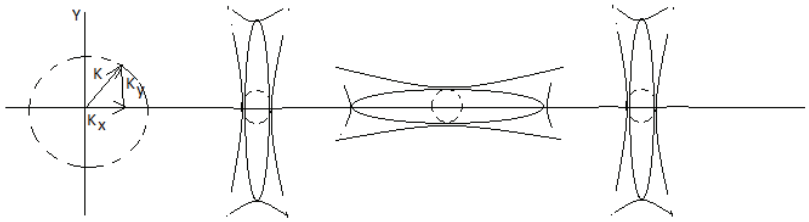


Figure: 3

From the Quantum Theory of Relativity it follows that being inside a stationary sphere with isotropic Euclidean space, in a dynamic space-matter, such a sphere has the form of a dynamic ellipsoid. These are the mathematical truths of geometric properties. This is a very interesting case of such a state of dynamic space-matter. And there are reasons for that.

We are still on the path to quantum gravity. In the most general view, the equations of quantum gravity follow from the equation of Einstein's General Theory of Relativity. In fact, as already noted, all the equations presented extend the properties of already existing theories and ideas about space-time. Let's say more. Space-time itself is a special case of a fixed state of dynamic space-matter. Let's say that fixing any angle of parallelism of a discrete dynamic space-matter gives a multi-sheet Riemannian space. It is in such a fixed Riemannian space that the Einstein tensor is represented. And the Einstein tensor itself represents the mathematical truth of the difference in relativistic dynamics at two fixed points in Riemannian space, one of which is reduced to the Euclidean sphere. This is a mathematical truth that cannot be refuted in any way. And every attempt to ignore General Relativity is an attempt to ignore mathematical truths. This is nothing. The very space of a dynamic bundle of parallel straight lines with a fixed angle of parallelism corresponds to a space with Lobachevsky's geometry. We are talking about fixed states, as facts of reality, recorded in experiments with a certain degree of probability of one or another state of dynamic space-matter. That is, outside the experiment, the dynamic space-matter has, say, the space of the Lobachevsky geometry with variable asymptotes of hyperbolas, or a sphere with non-stationary Euclidean space, and the same isotropy.

Let's move on to a closer examination of the indicated properties of dynamic space-matter. The very unity of the gravitational (X +) field and mass (Y -) trajectories corresponds to the principle of equivalence of inert and gravitational masses. A nonzero angle of parallelism of mass (Y -) trajectories gives us the principle of uncertainty of the trajectory itself. Let's say more, two points of such a trajectory, symmetric about the Euclidean line with a zero angle of parallelism, gives us the quantum entanglement of these points, as a fact of the reality of dynamic space-matter. These two points are exactly the same. We are talking now about two points, one of which is fixed in the experiment in space-time. But space-matter is a space of expanded possibilities. And there are many such absolutely identical points outside the experiment, that is, in reality.

As for the mathematical truth of the Einstein tensor, and with the controversial λ - amendment. There is no dispute here. This is a mathematical truth and it is derived under the condition of a discrete dynamic space-matter. The question is closed. Now, already in such an equation, which is derived in dynamic space-matter, the principle of equivalence of mass (Y-) trajectories in
Gravitational (X +) field and the principle of uncertainty of the most massive (Y-) trajectory. In contrast to the fixed gravitational potentials of Einstein's General Theory of Relativity, it is already possible to consider the gradient of such gravitational potentials, at the wavelength of the quantum field. And already such quantum gradients of gravitational potentials give quantum (X +) gravitational acceleration fields. The mathematical features of such differential solutions give quasi potential quantum gravitational acceleration fields, which follow from the equation of Einstein's General Theory of Relativity.

These are, in general terms, the properties of quantum gravity in a unified theory. We are talking about the unified mathematical truths of Maxwell's equations for electromagnetic fields and equations of the dynamics of gravity - mass fields. It is about the unified mathematical truths of the equations of Einstein's Special Theory of Relativity and the equations of quantum relativistic dynamics. And we are talking about

the unified mathematical truths of the equations of Einstein's General Theory of Relativity and the equations of quantum gravity. All of this is presented in one mathematical truth.

Let us briefly note the properties that follow from these mathematical truths.

1. Geometric, as well as the physical fact of dynamic space-matter, is the fact of the presence of antimatter in matter itself , for example, a proton and an electron.
2. The induction of relativistic mass in Einstein's Special Theory of Relativity, in accordance with the principle of equivalence, is the same as the induction of gravitational mass in an alternating gravitational field.
    a. If this is the field of Strong Interaction of a proton, then we can measure this mass, closed in space, in an experiment.
    b. If these are inductive mass trajectories of quasi potential quantum gravitational acceleration fields, then we are talking about hidden mass fields, like dark matter.
3. Black holes, due to the presence of an "event horizon" and in Einstein's Theories of Relativity, cannot absorb matter, the same positron in Hawking 's vaporization , because for this, the same positron needs to be accelerated to the speed of light, which is impossible.

The event horizon itself arises in the relativistic view of Newton's law as a special case of Einstein's General Theory of Relativity. But for this, in a mathematical procedure, you must divide by zero. This is impossible neither in mathematics nor in the Nature of such black holes. Although "black holes" exist in dynamic space-matter, as objects of singularity with different energy levels of the physical vacuum. There are calculations of the mass range of such black holes, at least of three types in galaxies, as well as in quasars and in the core of quasar galaxies. These are questions beyond the scope of this presentation.