

Space and Time - Phantoms of the Material World

Stanislav Konstantinov

Department of Physical Electronics, Russian State Pedagogical University, St.Petersburg, RSC"Energy",
Russia

***Corresponding Author:** Stanislav Konstantinov, Department of Physical Electronics, Russian State Pedagogical University, St.Petersburg, RSC"Energy", Russia

Abstract: The article states that the problem of the derivation of classical space-time representations from the concepts and regularities of physics of the micro world, posed on the agenda of modern fundamental theoretical physics, cannot be solved without the participation of non-baryonic matter (dark matter and dark energy). As the gravity field defines the spherical, continuous geometry of space, and the inertia field determines the linear and discrete geometry of complex time, ultimately, the physical properties and laws of the galactic and intergalactic plasma determines the geometry of space-time.

Keywords: multilayer space, base, layer, complex time, imaginary cyclical time, real cosmological time, inertial mass, gravitational mass, dark matter, dark energy.

1. INTRODUCTION

What is space and time, what is their nature? To answer this question we must turn to the fundamental physical principles of causality and the equivalence of mass, cast doubt on the SRT and GRT Einstein to abandon the Lorentz transformation and of Maxwell's electrodynamics. The causality principle provides one of the general principles of physics establishing the permissible limits of the influence of physical events on one another; the future event should not affect on all the events that have already occurred ("the cause event precedes the effect event in time" and "the future does not influence the past"). The relativist causality principle is even stronger as it also rules out the mutual influence of the events separate by a space-like interval; the notions of "earlier" or "later" are not absolute for them and they change over with the change of the reference frame. The mutual influence of these events would have been possible only with the frame of reference which includes the object travelling at a speed larger than the speed of light in the vacuum. There is much evidence and experimentation at present showing speeds many times larger than the speed of light [1]. Incidentally, faster-than-light neutrinos were observed in the supernova explosions and the neutrinos were detected first and the optic explosion was noticed hours later. Time is not accelerated nor decelerated in different reference frames, but the rates of all processes are simply equally changed under the effect of the changing gravitation potential because the mass changes. So time is regarded here as purely Newtonian and it only exists in our mind, and the requirement of relativistic invariance seems to be a hundred-year long illusion of man. The world is not solely electromagnetic waves.

The gravitational and inertial fields define the dimensions of space and the rate of flow of time. In the article suggests the conclusion of classical space-time from of the real physical laws discovered by Johannes Kepler in the analysis of long-term astronomical observations of Tycho Brahe. Rather than lay a priori given space-time at all the theoretical constructs are invited to rely on the real physical picture of the world, as set out in Kepler's laws and developed in the of Isaac Newton's, Albert Einstein's, Arthur Eddington's and Stephen Hawking's works [2].

2. GEOMETRY OF SPACE AND TIME

The problem of deriving classical space-time from the laws of the elementary particles physics now is one of the urgent problems. She it is closely connected with the physical essence of the cosmic medium (dark matter and dark energy), which determines the properties and the geometry of space and time. After all, even Kant linked the three-dimensional space with the law of decreasing strength is inversely proportional to the square of the distance. Visually, the three-dimensional space is represented and described by Euclidean geometry in Cartesian coordinates. Descartes imagined space

as something absolutely unchangeable, like an empty box, inside of which occur physical processes. Kant's idea to introduce space, based on the specific physical laws. According to Kant, Euclidean space three-dimensional, because the forces of interaction between material bodies $F = \frac{m_1 \cdot m_2}{r^2}$ (the law Cavendish) and electric charge $F = \frac{q_1 \cdot q_2}{r^2}$ (Coulomb's law) are inversely proportional to the square of the distance. Obviously, the geometric representation of this laws is a sphere. For the observer, placed in the center of the sphere, the visual space will be presented three-dimensional. The relativity of space and time means that they it depends it the attitude and the mechanical interaction of bodies among themselves. The flow of time from the past to the present and further into the future (the arrow of Eddington's time) can be due to the expansion of the universe associated with the elastic properties of the intergalactic medium (dark energy). If the deformation arising in the elastic spring or in the elastic intergalactic medium (dark energy) would is proportional to the force applied to the body of $F = k \cdot r$ (Guka's law), the space- time will represent straight lines that go from the observer to infinity. This space-time is no longer would have the continuity, and was to be discrete. Each system has its own time arrow, which begins with the birth of the system and ends with the disappearance (destruction) of the system. In the model of the intergalactic medium (analog superfluid $^3\text{He-B}$), where repulsive forces (antigravity forces) predominate, leading to an accelerated expansion of the universe, Einstein's cosmological constant Λ should play the role of the elasticity coefficient in Guka's law:

$$F_\epsilon = (c^2 / 3) \Lambda R, \quad (1)$$

The interpretation of the cosmological constant in a spirit of understanding of the antigravitating environment with a constant density was the basis for the standard cosmological model ΛCDM (Λ -Cold Dark Matter). In the model ΛCDM dark energy is taken as an invisible space environment, physical nature and microscopic structure of which is unknown. However, it is assumed that the dark energy as a macroscopic medium has a number of special, peculiar only to her properties:

- 1) She is has of positive density and negative pressure;
- 2) She is does not create the attraction and has antigravitation.

Presumably, as a result of these special properties in of dark energy in the observable universe repulsive force exceeds the force of gravity. This conclusion was made on the basis of astronomical observations carried out by a team of researchers on the Hubble Space Telescope (HST). They established an accelerated run-up of galaxies.

For of deriving classical space-time from the laws of the elementary particles physics it is proposed to expand the scope of the standard space model ΛCDM and describe the physical nature and the microscopic structure of the intergalactic medium (dark energy). At the beginning of the 21st century, works began to appear in which a model of a physical vacuum possessing the properties of a superfluid liquid was proposed, consisting of a pair of oppositely electrically charged particles - fermions with zero total spin of the pair. Such a model described the dielectric properties of vacuum and the creation in it of pairs of electrically dissimilar charged particles (for example, electron-positron). Further development of the theory of superfluid media allowed us to consider phase transitions in dark energy models, analogous to phase transitions in superfluid $^3\text{He-B}$ [2]. First of all, it should be noted that the experimentally installed electric polarization of the medium in superfluid $^3\text{He-B}$ is due to deformation of the atoms ^3He consisting of electrically oppositely charged electrons and protons. A similar mechanism must exist in the cosmic medium, the microscopic structure of which are dipole (for example, electron-positron). According to professor A. Rykov, with the size of the structural element of the cosmic medium dipole $r = 1.3988 \cdot 10^{-15}$ m, the ultimate deformation (destruction boundary) $dr = 1.0207 \cdot 10^{-17}$ m. is related by the relation $dr = \alpha r$, where $\alpha = 0.0072975$ is the fine structure constant [3]. Destruction boundary of dipole corresponds to the external photon energy $W \geq 1$ MeV. The deformation in physical vacuum is less than dr should be of an electroelastic character, and at higher values, deformation leads to the destruction of the dipole and to the creation of an electron-positron pair. This suggests that the density of the cosmic medium (dark energy) positive. The mechanism of the formation of a dipole in the model of an intergalactic medium (dark energy) is analogous to the formation of a dipole moment in superfluid $^3\text{He-B}$. Experimentally confirmed that in P-state in superfluid $^3\text{He-B}$ between the electrically oppositely charged microparticles with spin oriented along the same line, there are forces of repulsion. By analogy, in the

core of the vortex microparticles of intergalactic medium (dark energy) formed two spatially separated electrically oppositely charged "clusters" of microparticles. Therefore, one can speak of the electric dipole moment of the quantum object created by this vortex. Since vortex cores in the space environment are electric dipoles, there is the electric polarization of the medium. This means that the pair of the microparticles constituting the space environment is "stretched" along the electric field. Thus, the space environment in a twist area can be characterized by a state of "full stretch". As part of the simulation model on the effect of superfluid vortex core can be mathematically described by introducing the pressure P at the boundary of the vortex core. Sign pressure depends on the nature of the internal stresses in the environment. If these internal stresses have the character of "comprehensive sprain", the pressure will be negative. Thus the proposed in article model of the space environment (analog ${}^3\text{He-B}$) meets the characteristics of dark energy, and its microscopic structure does not contradict with of the modern physical notions.

In "Fundamental Theory" Eddington tried to constructively realize the idea of the derivation of the classical concepts of length and time from the physics of the microworld. He was an ardent supporter of Planck units, in modern notation having the form: $l_p = \hbar / (m_p c)$; $t_p = \hbar / (m_p c^2)$ and considered that the introduction of the length and the corresponding time interval assignment must be preceded by the specification of all other physical quantities, and their quantitative part should consist of dimensionless numbers. In connection with this, Eddington wrote: "Only in quantum theory is the method of specifying the physical structure of dimensionless quantities-numbers of elementary particles in a quantum system. Thus, the length standard must be a quantum-definable structure." [4]. Meanwhile, it is difficult to doubt that macroscopic concepts, including our spatial and temporal representations, actually have their roots in the microcosm. As in Newton's gravitational field, the orbits of planets are stable only because of the five-dimensionality of the curved space-time (to such conclusions leads of analysis of the equations of geodesic lines in Riemannian geometry), so and in the model of the Bohr atom, electrons form stable constructions with the nucleus of the atom only due to the three-dimensionality of space and Two-dimensionality of time (in a different variety from the solution of Schrödinger-type equations with electrostatic potential it follows that the negative level of the electron energy extends to infinity). The electrons in these atoms will be infinitely "jump" down, emitting photons. In his latest work, Arthur Eddington argued that, according to his theory, the universe, consisting entirely of charged particles, should occupy three-dimensional space and have a two-dimensional time. In contrast to the five-dimensional world of T. Kalutsa, where time (t) is cyclic and invariant, in the five-dimensional world of Eddington the fifth coordinate (t_0) is a cosmological, non invariant time describing the evolution of the system. Law of the cosmological time is linear and discrete, the so-called "arrow of time" Eddington describing real processes of evolution of the Universe. However, time is two-dimensional in nature. To describe the evolution of the system, when the system becomes non-integrable and it is dominated by irreversible processes, you must appeal to the Eddington's five-dimensional system, contains three spatial dimensions and two time dimensions (complex time) [4]. Of the complex time includes the imaginary invariant cyclical time of cosmic systems circulation around the central of gravity (or classical and quantum oscillators in the micro and macro world of particles) and the real, non-invariant, cosmological time, the time of evolution of cosmic systems (particles) from their birth to disappearance. This time is divided into separate quanta - time horizons, within which we can predict the state of the system, its development path, and then the initial state of the system cannot serve as a basis for prediction. Eddington's fifth dimension has a special status and does not allow to cramming the Universe into the Procrustean bed of symmetric invariant solutions of Einstein's theory.

The duality of the time noted Nobel laureate I.R. Prigozhin in his book "Time, chaos, quantum". He wrote: "We need to go beyond the concept of time as a parameter describing the motion of individual systems. In harmonic oscillators (classical and quantum), the time is unambiguously connected to laws of motion, while in non-integrable systems it plays a dual role. If sustainable systems are associated with a notion of the deterministic symmetric time, then instable chaotic systems are associated with a notion of the probabilistic time." [5]. Applying the theory of linear sets of measures, professor I.N, Taganov proved that if the state of the physical processes are always measured with the ultimate uncertainty (Heisenberg uncertainty relation between the coordinates and momentum of a particle and the time and energy), the moments of physical time can be represented by only complex numbers. In the book "Physics of irreversible time" I.N. Taganov suggested that the geometrical image of the complex physical time can serve as a helix with variable pitch and diameter in a pseudo-

three-dimensional space [6]. The concept of the spiral of time in physics microcosm eliminates the problem of the spreading of the wave packet representing the microparticles with finite masses and dimensions. For a new interpretation of quantum mechanics "wave-particle duality" is not a problem, because with the free movement of individual microparticles in each moment of time the complex has a well-defined complex coordinates. In 1955, M. Bunge introduced the complex time into the theory of electron $T = (t + i\tau)$, where t - is the time of an electron live in an atom and τ - is the continuous cyclic time, equal to an electron spin $(\tau = \frac{h}{4\pi mc^2} \quad \tau = 10^{-21}\text{s.})$.

So, we can talk about the two-dimensionality of time, similar to the three-dimensional space. On the one hand, this is a valid cosmological time associated with evolutionary changes in the quality system or the termination of its existence (the probabilistic outcome of the development of the system). On the other hand, it is alleged cyclical time associated with the stationary state of the system, return to its original state. Duality the time can be a theoretical basis for the introduction to the physics concepts of the multilayer space, consisting of a base (the coordinate space) and layer (momentum space). First of all it is a theoretical justification of space having fiber bundle $Xm (Xn)$ when geometrisation of dynamical systems. The basis of it is n -dimensional differentiable manifold Xn (a base- coordinate space), and layer - m -dimensional manifold (a layer - momentum space). In the formation of the concept of the "base" Of return to the initial state is decisive and allows you to describe the state of the system (classical and quantum oscillators) of the symmetric invariant equations, while the system is in a steady state. This system corresponds to the concept of the time horizon within which we can predict the state of the system, its development path, and then the initial state of the system cannot serve as a basis for prediction. Of the transition system to a new level, in which the system to become non-integrable, it is dominated by irreversible processes and she is loses time invariance property, corresponds to the concept of "layer". To describe the state of the system (classical and quantum oscillators) in the base can be used symmetrical, invariant equations, but in the layer to describe irreversible processes require a different mathematical apparatus.

Basic stationary position of the planets in the solar system is only possible at Kepler's constant (K) equal to the strictly defined relationship between the two-dimensional time and three-dimensional space (the energy levels of the planets relative to the sun).

The answer to can be found in the three Kepler's laws:

1. All planets move in elliptical orbits in one of the foci is the Sun;
2. Area of space described by the radius vector of the planet is proportional to the time;
3. The ratio of period squares of any two planets is a ratio of cubes of their large semi-axes of elliptical orbits, along which they rotate around a central body. This implies that the ratio of the cube of the orbit radius to the square of the orbit time of the planet is constant.

J. Kepler formulated them as a result of long-term analysis of astronomical observations of Tycho Brahe in 1609 – 1619y.

From Kepler's third law it implies that the five-dimensional world of the universe includes two-dimensional and three-dimensional space time associated constant K:

$$K = \frac{R^3}{T^2} \tag{2}$$

Where

R is a distance from the centre of the planet to the centre of the Sun,

T is complex time, $T = (t + i\tau)$,

t is time of planet movement around the Sun,

τ is the continuous cyclic time equal to the period of rotation of the planet around its own axis, K is Kepler's constant.

Kepler calculated K values for all planets known to him in the Solar System:

$$K = (3.33 - 3.35)10^{24} \text{ km}^3 \cdot \text{year}^{-2}$$

So, using Kepler's laws can determine the elliptical orbit of any planet of the solar system, or satellite and all its parameters. Kepler's laws allow you to associate time and space for the undisturbed planetary motion without attracting Newton's law of universal gravitation, and such dynamic concepts like mass, energy, force, angular momentum, and the like. Metaphysics Kepler has been further developed in the works of I. Newton, A. Einstein, A. Eddingtona.

In the Bohr's model of the atom, electrons form a stable structure with the atom nucleus only in by three-dimensional space and two-dimensional time. In another variety of in an atom the electron will are infinitely jump to all the lower energy level.

Half a century after Kepler, Newton introduced forces into the spatial model of the universe. The space of the universe produces gravity and inertia forces acting following quadratic laws of interaction between bodies (laws by Coulomb and Cavendish). Having articulated his laws of dynamics and universal gravitation, Newton got Kepler's third law as consequence of the universal gravitation law and the second law of dynamics as follows:

$$K = GM \frac{m_{gr.}}{m_{in.}} = \frac{R^3}{T^2} \quad , \quad (3)$$

Where

$m_{gr.}$ is the planet gravitational mass, interacting with the Sun, the M mass, produces a centripetal force of gravity;

$m_{in.}$ is the inertial mass of the planet. It is rotating around a circle of R radius and producing a centrifugal force of repulsion,

G is the gravitational constant.

According to Newton's law of universal gravitation planet moves in a stationary orbit only on condition that the centrifugal and centripetal forces acting on the planet are equal, then the equation of Newton and Kepler's law identical for fixed inertial motion systems. In the equation of Newton appears cosmological time (horizon) within which the need to fulfill two conditions:

- 1) The presence of a planet's gravitational and inertial mass;
- 2) The simultaneous impact of gravitational and inertial forces.

In the General Relativity Theory (GRT), Einstein proposed a new interpretation for acceleration. The acceleration, explained by Newtonian physics in terms of the gravitational interaction, is considered within the GRT as a result of the curved space-time. In Einstein's gravitational theory of the curvature of space - time determines the existence of matter-energy. More specifically, general relativity connects two mathematical objects called tensors: on the one hand, the metric tensor, which describes the curvature of space - time, on the other - stress tensor, which determines the distribution of matter in terms of the density of matter - energy and pressure. This equation of Einstein likened to a building, one wing of which is built of precious marbles, and the other - from cheap wood [7]. Indeed, the mathematical form of the tensor is the result of subtle geometric considerations, whereas the stress tensor that specifies the "source" of the curvature of space-time is described in terms of macroscopic concepts of pressure and energy density. Also, to obtain physical meaning of the stress tensor is necessary to introduce additional boundary condition. This condition requires that in the limit of weak gravitational field of Einstein equation reduces to Newton's equation. Stephen Hawking proposed the introduction of imaginary time $\tau = ist$ metric in general relativity. If Euclidean space metric is $ds^2 = dx^2 + dy^2 + dz^2$, in general relativity the metric is $ds^2 = c^2dt^2 - (dx^2 + dy^2 + dz^2)$ and imaginary time c^2dt^2 enters $-d^2\tau$. This eliminates the distinction between time and space in the range ds^2 GRT metrics. In the standard model A. Fridmana universe on a large scale can be considered homogeneous and isotropic. Then the metric takes the simple form:

$$ds^2 = c^2dt^2 - R^2(t)d\Omega^2 \quad (4)$$

Where $d\Omega^2$ is spatial element, which may correspond to the zero curvature, either positive or negative curvature (spherical or hyperboloid);

$R(t)$ is the radius of the universe, corresponding to the limiting distance achievable for astronomical observations.

The standard model establishes the relationship between the radius of the universe $R(t)$ and the curvature of space on the one hand and an average density of mass - energy, which is denoted σ , and the pressure P .

Instead of $R(t)$ is often administered to the Hubble function:

$$H = \frac{1}{R} \left(\frac{dR}{dt} \right) \quad (5)$$

The ratio between P and density σ is given by the equation of state. Therefore, in the standard model there are only two independent variables: density (σ) and the Hubble's function (H). To define them, you need two equations, which gives Einstein's theory. One of the equations binds Hubble function H with a density of σ ; the second equation expresses the adiabatic space evolution of the universe. Adiabatic means that between the environment and the elementary volume in Einstein's general relativity no heat exchange:

$$dQ = 0 \quad (6)$$

In general relativity, Einstein irreversible processes are absent, the entropy of the universe remains constant. Herewith, the true cosmological time, included into the Newton's Second Law, disappeared from consideration. In the standard cosmological model Λ CDM total energy of the universe is assumed to be zero. It can therefore be assumed that $H = 0$. Therefore, considering the wave function of the universe, from the Schrodinger equation:

$$H\Psi = i\hbar \frac{d\Psi}{dt} \quad (7)$$

It follows that $d\Psi / dt = 0$; the wave function does not depend on the time (equation $H\Psi = 0$ equation is often called the Wheeler – DeWitt Equation). This is a paradox. The cosmological time is excluded from consideration in the flat Minkowski space. However, if we recall the presence of the fiber bundle, consisting of a base and a layer, it can be assumed that the four-dimensional world of Minkowski - Einstein describes only the "base". This is the second boundary condition, in order to GRT stress tensor have physical meaning. The limits of applicability of Einstein's equations for an adequate description of physical reality - is the requirement of a stationary state of the system. This state corresponds to the imaginary part of the complex time - cyclical time. The energy of the electromagnetic field W and inertial mass m_{in} are linked Einstein's relation:

$$m_{in} = W / c^2 \quad (8)$$

Thus, the inertial mass of electromagnetic field in the "base" and "layer" describes the different ratios. In the layer in the formula (3) includes a time; and in the formula (8) - a constant c^2 . The equality of gravitational and inertial masses, as well as the value of the Reynolds number is an indicator of stability of the stationary state of the system.

"Equivalence principle", formulated by Einstein to the gravitational and inertial mass is a measure of a stationary, reversible state of the system and can be broken when the system goes into an unstable, irreversible state. The physical nature of the forces of inertia is different from gravity. As the field of gravity determines the spherical, continuous geometry of space and inertia field determines the linear and discrete geometry of cosmological time, ultimately, the geometry of space - time determines by the physical properties and the laws of the space environment. In addition, it is the environment (dark matter and dark energy) supports the constancy of cosmological density ρ_v , synchronizing the processes of accelerated expansion of the Universe and the matter birth. Non-baryonic matter, which forms the basis of the intergalactic medium, is in constant force interaction with the baryonic substance of planets and stars that is born from it.

3. FINSLER'S SPACES AND DMITRY PAVLOV'S "GEOMETRY OF TIME"

The metaphysical, mystical connection of mathematics and physics is manifested in the fact that the formal mathematical derivations can find real confirmation in the real physical world and this allows us to extract a large number of mathematical models that enable us to build a physical theory on the basis of fundamental relationships.

The reason for writing this comments was the article Dmitry Pavlov “Geometry of time”. He has created a mini-science city of Murom, which examines Finsler’s spaces and their possible applications in physics. The result of these studies was the discovery of a field called hyperbolic, which Pavlov interpreted as a time field. Tension hyperbolic field in this concept is perceived as time flow rate that can theoretically be varied. In practice, the implementation of time management is proposed to carry out with the help of the hyperbolic lens device that converts time. During the experiment, the researchers hope to register a powerful flash, which is expected in the transmutation of the known chemical elements, and the emergence of new elements. I think that in their practice transmutation and the birth of new elements with the help of the hyperbolic lens, experimenters are dealing with a manifestation of the space environment (dark matter) energy, not of time. Experiments have shown that the environment (dark matter) besides passive properties, also possesses active properties, i.e. the motion directivity and the density that determine an extent of its activity. As a result, the environment (dark matter) does not only provide a chance for a progress of processes, but also can influence them and a state of the matter as a kind of physical reality. In a stable stationary state, the active external influence on the system is negligible, but it can be very significant if the system goes into a nonequilibrium state. Recognition of the existence of an inhomogeneous space environment with positive density opens up an inexhaustible source of conceptual innovations for humanity in all spheres of activity. Instantaneous transfer of information and energy to any point of the solar system, control of gravity, generation of an unlimited amount of electrical energy at the subatomic level, fundamentally new electric motors - this is far from a complete list of innovations that can be realized on the basis of the quantum space environment (dark matter). Orthodox science does not recognize these new physical devices, nevertheless, many of them are already in the stage of technological development and implementation. Latent energy the of Universe becomes apparent in the course of the perturbation of the physical vacuum, in moments the birth of matter, in moments of accelerate its movement.

Academic A.Veynic in his monograph “Thermodynamics of real processes”, pointed out the existence of two kinds of time: real physical time, which is characteristic of any body and the conditioned time, invented by man to organize their practice, it always flows evenly (24 hours in day). He wrote: “Most ridiculous mistake the theory of relativity in is that Einstein said about the variability of the conditioned time, this is meaningless. Substitution of real physical time on conditioned time, and vice versa - is the cause of many errors in modern science.”. So Pavlov perhaps confuses speed of transmutation of chemical elements under certain conditions of the space environment and the course of time. In medicine, there are cases when a person is aging rapidly due to flaws in genetics, and the metabolic processes in the body it occurs with great speed, and he dies in 20 years a very old man. However, this does not mean that the time has accelerated its pace, just changed the biochemical reactions in the body.

4. ETHEREAL SPHERE EARTH

A team of researchers in the Military Engineering Space Academy A.F. Mozhayskogo led by Deputy Chief of the Academy for of professor V.F. Fateev discovered with the help of magnetometers and of the clock installed on artificial satellites, in the near-earth space of the sphere formed of the dark matter [8]. Such spheres, formed by dark matter, should exist around other planets, stars and galaxies. This discovery allowed researchers to amend the law of universal gravitation of Newton and propose a new formula for calculating time on artificial satellites of the Earth instead of the relativistic Einstein-Lorentz formula. When calculating the motion of a spacecraft according to Newton's law of gravitation, it is necessary to take into account the additional variable mass of dark matter that forms a sphere around astrophysical bodies. When the spacecraft leaves the planet, the mass of the center of gravity (the system of the planet - the sphere formed by dark matter) will change because of the dark matter. In the new theory, the law of gravity will look like this:

$$F = G \frac{(M_e + M_d)m}{R^2} \quad (9)$$

Where M_e is Earth's mass,

M_d is variable mass of dark matter in near-Earth space,

m is spacecraft mass.

Availability of a sphere formed by dark matter near the sun can explain the strange acceleration, marked by American scientists in removing automatic interplanetary station "Pioneer 10" and "Pioneer 11" from the Sun at a distance of more 20a.e. when solar radiation effects has practically disappeared.

The course of time on the satellite depends on the density of dark matter, but density of dark matter itself depends on the gravitational field (potential U) in which the system is located and on the speed of the satellite relative to dark matter. Since the sphere formed by dark matter in the near-Earth space rotates around the Earth, for satellites circulating in the equatorial plane in the same direction as the earth's rotation, change of the clock on the satellite and on the ground will depend only on the difference in gravitational potential, that is the height of the orbit, as the relative speed difference will not. If the satellite is moving perpendicular to the equator, it will have a velocity relative to the ether equal to its orbital velocity. Thus, the course of time rate depends on the satellite orbit and inclination angle to the plane of the Earth's equator. So, if the period of time measured by the clock on the Earth's surface is Δt_e , the same of time measured by the clock on the satellite Δt_s , of determined by the formula:

$$\Delta t_s = \Delta t_e \sqrt{\frac{1 - \frac{v^2}{c^2} (1 - \cos \alpha)^2}{1 + (U_e - U_s) / c^2}} \quad (10)$$

Where: v it the orbital velocity of the satellite relative to the Earth;

α it angle of inclination of the satellite's orbit to the plane (magnetic) equator of the Earth;

U_e , U_s it the gravitational potentials on the surface of the Earth and the satellite orbit.

The validity of the formula (10) was confirmed in experiments with satellites and the latest high-precision measurements at the international space station. It allowed made it possible to detect the accelerated course of time at the international space station. The time on the satellite should vary depending on the difference in the gravitational potential and the absolute speed of the satellite relative to dark matter and should not depend on the relative speed of the satellite and the ground observer, as required by the Einstein's-Lorentz's formula (11):

$$\Delta t_s = t_e \left(\frac{U_s - U_e}{c^2} - \frac{v_s^2 - v_e^2}{2c^2} \right) \quad (11)$$

Where U_s , v_s - gravitational potential and the velocity related to the satellite;

U_e , v_e - gravitational potential and the velocity related to ground chronometer.

The above experimental facts can serve as a confirmation of the existence of dark matter in the near-Earth space.

5. CARL JUNG'S ASTRAL FLIGHTS OUTSIDE OF TIME AND SPACE

Book famous Swiss psychiatrist Carl Gustav Jung's "Memories, Dreams, Reflections", which was published in New York in 1961, was first perceived by readers as the imagination of the scientist philosopher, but after the accumulation of factual material about near-Earth space, Jung's book required a serious scientific analysis. Drawn of Carl Jung bright pictures of near-Earth space, preserved in memory of the after his return to life from a state of "clinical death" provide food for thought. Analysis of the reliability of astral visions Jung proves the reality of what he had seen. In this comment I would like to focus on the perception of Jung of time and space in astral flight. It is fundamentally different from the perception of these concepts by people in their earthly life and astronauts during their space flight. If we consider the individual's transition into another world as the end of the evolution of the "man" of the system, then the naturally disappear concepts of space and time, and the related restrictions on the system, namely, the location of the body in three-dimensional space and temporal ordering in the form of the past, present and future. According to Jung, "My vision and experience were absolutely real, they do not have anything subjective, they all had a quality of absolute objectivity. These experiences I can only describe as ecstasy is a temporary state in which the past, the present and the future exist simultaneously." And further: "I have seen the three-dimensional world of artificially constructed over the horizon of the cosmos, in which each person puts himself in a little box." These memories Jung cannot be explained by hallucination that arise in the human brain, when the blood supply to the brain is disturbed (hypoxia occurs), since the Jung's

pictures of near-Earth space, and all the colorful hues, fully coincide with photographs taken from space at an altitude of 1000 km. Jung, describing in the middle of the last century of our planet from space, as if he had before it a compilation of high-quality images from the orbit that we have in the XXI century. Thus, if Jung's perception of space and time in the astral flights true, it is necessary to recognize a statement to Kant that space is three-dimensional Euclidean because the forces of interaction between material bodies are inversely proportional to the square of the distance. Once Jung's soul has found a material body, it again became is subject to physical laws gravity, and returned to the three-dimensional space (box). He writes: And now I should once again to convince himself, as if to live in a box is important. Life and the world seemed to me to prison. I felt dislike to her doctor for what he brought me back to life ... Although the belief in the world returned to me, but I'm never free from the impression that this life is played out in a three-dimensional box, that the universe was created just for this. And there is something else that I remember quite clearly ... Everything that happened, it was integrated into an indivisible whole. Nothing was distributed in time, nothing was impossible to measure the concept of time. This experience can best be defined as a state of feeling which cannot be created through imagination. How can I imagine that I exist simultaneously the day before yesterday, today and tomorrow".

6. CONCLUSION

The article proposes the solution of the urgent problem of deriving classical space-time from the laws of the elementary particles physics of based on a new approach to the physical nature of the intergalactic medium (dark energy and dark matter) and correction of standard cosmological model Λ CDM. As the gravity field defines the spherical, continuous geometry of space, and the inertia field determines the linear and discrete geometry of complex time, ultimately, the physical properties and laws of the galactic and intergalactic medium determines the geometry of space and time. It is suggested that outside the material world and interactions between bodies and elementary particles, the notion of space-time does not exist.

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Citation: S. Konstantinov, "Space and Time - Phantoms of the Material World", *International Journal of Advanced Research in Physical Science (IJARPS)*, vol. 4, no. 7, pp. 1-9, 2017

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