3. SPHERICAL INVARIANCE AT THE DEVELOPMENT OF ABSOLUTE COSMOLOGICAL MODEL

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Developing the theory of motionless ether (absolute space) Lorentz has made a mistake repeated then by Einstein which applied Lorentz's transformations without regard for any functional dependence of the light speed in vacuum on the vacuum field parameters. The electromagnetic quantization of the vacuum field in the EQS theory defines the discrete space structure specified for the medium in terms of the quantum density, that fixes the light speed C in vacuum. The quantum density of medium is not dependent on an electromagnetic polarization and determined only by a vacuum field strain in gravitation perturbations. The nonperturbed vacuum field is specified by the calibrating gravitational potential C_0^2. At perturbing (straining) the gravitational potential balance is $C_0^2 = C^2 + \varphi_n f(v)$. The balance defines a spherical invariance of the vacuum field, where $\varphi_n f(v)$ is a perturbing Newton's potential as a function of the velocity in the absolute space (vacuum field).

The potential balance gives an accurate equation for the vacuum field and specifies the light speed in vacuum $C = C_o\sqrt{1-\varphi_n f(v)/C_o^2}$, where C_0 is the light speed in a non-strained vacuum field. The potential balance excludes infinitely high masses and energies. In Lorentz's transformations there is a simplified substitution of Newton's potential $\varphi_n f(v)$ by the squared speed v^2 giving an approximate balance $C_0^2 = C^2 + v^2$. The balance is characterized by a uncertainty lying in the basis of the relativity principle and resulting in solutions with infinitely high magnitudes.

1. Introduction. In two previous reports the new concept (developed for the first time in the EQS theory) for the old motionless electromagnetic Lorentz ether was affirmed. Starting in 1996, after discovery of the elementary quantum of space (quanton), the concept considers the concrete discrete structure of the ether as a static electromagnetic vacuum field. The electromagnetic quantization of space is resulted to filling the space by the quantons. On the level of space quantum sizes the obtained substation, called by the vacuum field [1,2], is a discrete medium with the discreteness of 10^{-25}m.

However on the elementary particle (with sizes of 10^{-15}m) level the vacuum field is considered as a continuum characterized in terms of the quantum density of medium for non-perturbed vacuum ρ_o. In the case of field deformation perturbation the continuum is specified in terms of the *pro tem* quantum density ρ_a (the action density). The vacuum field possesses the remarkable property providing the quantum density balance for medium at its gravitational perturbation [2]

$$\rho_o = \rho_a + \rho_n \qquad (1)$$

where ρ_n is a part of the quantum density of medium attributed to Newton's perturbing gravitational potential φ_n, m^2/s^2

$$\rho_n = \varphi_n \frac{\rho_o}{C_o^2} = \frac{Gm}{r}\frac{\rho_o}{C_o^2} = \rho_o \frac{R_g}{r} \qquad (2)$$

Such simple expression (1) is basic in describing a vacuum field state. Expression (1) together with (2) define a spherical deformation of space at gravitational interactions.

In the theory of relativity the state of the four-dimensional space-time is described in terms of Minkowski's interval, representing a notation form of Lorentz's transformation (see equation (17) in [2]). In the general theory of relativity (GTR) Einstein modified the four-dimensional interval into the energy - pulse tensor for substance. The tensor has not solved the problem of gravitational interactions and, on the contrary, has resulted in increasing the heap of mathematics thereby having deprived the gravitation of the physical electromagnetic essence embedded initially by the nature in a vacuum field deformation form.

In the work the unique properties of the balance for the quantum density of medium (1) are unraveled and the inconsistency of Lorentz's transformations in describing the processes in vacuum is demonstrated. As a result, we give a correct treatment for the results of Michelson's and Morley's experiments, which are undeservedly (during one century) accredited to experiments confirming Einstein's theory of relativity.

The principle of spatial dualism has been formulated in 1996. According to the principle the mathematical models describing the physical laws can give the absolutely identical final results of calculation if to take the space as the absolute emptiness (in STR), or to recognize the

space as a specific electromagnetic substation in a form of the elastic quantized medium (EQS). That was a period of establishing for the EQS theory and any competition with STR and GTR demanded the certain compromises.

Today, relying on the EQS theory results, obtained for so short time period and resulted to creation of the uniform theory of field through the joining vacuum field, my relation to the relativity theory is compromiseless as to an entirely erroneous theory. Despite of the inconsistency the relativity theory has played the colossal role in physics development by having obtained the mathematical equations, which have changed the scientific philosophy, through the purely formalistic techniques.

One of the merits of the relativity theory is a formulation of the mass-energy equivalence principle expressed by the elementary formula $E=mc^2$, which have no analytical conclusion corresponding to physical nature for this formula till now. But this nature is that the vacuum field is characterized in terms of the own gravitational potential C_o^2 determining the gravitational potential balance in deformed vacuum field.

2. Balance of gravitational potentials in deformed vacuum field. The uniqueness of the quantum density balance (1) lies in the fact that the balance is responsible for a gravitational potential balance in deformed vacuum field if to follow from the relation between the quantum density and Newton's potential (2)

$$C_o^2 = C_o^2 \frac{\rho_a}{\rho_o} + \varphi_n \qquad (3)$$

In (3) there is a component of the action potential φ_a, which determines the gravitational potential decay in the vacuum field and corresponds to the quantum density of action ρ_a

$$\varphi_a = C_o^2 \frac{\rho_a}{\rho_o} = C^2 \qquad (4)$$

The balance of gravitational potentials in the vacuum field can be represented in terms of two equivalent expressions with the account of (4) and $C_o^2 = \varphi_o$

$$\varphi_o = \varphi_a + \varphi_n \qquad (5)$$

$$C_o^2 = C^2 + \varphi_n \qquad (6)$$

In such notation form the gravitational potential balance (5) is seen to be equivalent to the balance for the quantum density of medium (1). In more rational form the gravitational potential balance for deformed vacuum field is represented by expression (6).

The gravitational potential balance is shown in the gravitational diagram (epure) Fig. 1 representing spherical deformation of the vacuum field for a perturbing mass m. The deformation epure gives a clear illustration of role for Newton's potential φ_n, which is subtracted from the gravitational potential C_o^2 of non-perturbed vacuum thereby forming a gravitational well. The well depth decreases with the distance r from the perturbing mass. In the epure the potential distribution inside the gravitational border R_s is not shown.

The gravitational diagram changes the view on the nature of gravitation by demonstrating that the perturbing mass results in a decaying gravitational potential of the vacuum field within the local spherical region around a perturbing mass.

If the perturbing mass is much more than a probing mass, the probing mass drops in the gravitational well under action of the Newton attraction forces. Naturally that in the basis of gravitational force nature there are an additional vacuum field tension obtained as a result of field deformation by the perturbing mass. The tensions create the quantized medium pressure on the probing body thereby forcing it to move towards to the perturbing mass. It is a concept of gravitation considered yet by Newton and realized in the EQS theory [2].

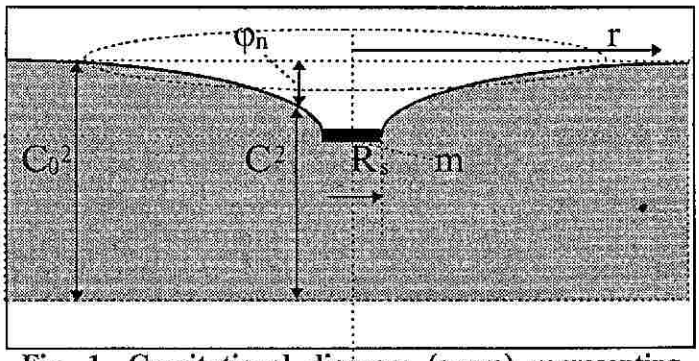

Fig. 1. Gravitational diagram (epure) representing spherical deformation of the vacuum field by mass m.

3. The light speed in vacuum. For the first time the EQS theory represents an expression for the light speed in a gravitation-unperturbed vacuum field

$$C_o = \sqrt{\varphi_o} = \sqrt{C_o^2} \qquad (7)$$

The expression demonstrates the unity

for the electromagnetic and gravitational processes in the vacuum field, in those basis there is the electromagnetic structure of vacuum.

So, the light speed in vacuum is determined in terms of the square root of the gravitational potential for the vacuum field.

According to the balance of potentials (6) at gravitational perturbation of the vacuum field the light speed in vacuum will be specified in terms of the action potential

$$C=\sqrt{\varphi_a}=C_o\sqrt{1-\frac{\varphi_n}{C_o^2}} \qquad (8)$$

In the terrestrial conditions the light speed C may be accepted equal to C_o.

At strong gravitational fields the increase in Newton's potential is seen from (8) to lead to decreasing the light speed in the vicinity of the deformed vacuum field. That fact agrees with all experimental data.

The substantial inhomogeneity of vacuum field in the vicinity of large cosmological objects possessing the strong gravitational field results in bending a light beam trajectory similarly to any inhomogeneous optical medium.

4. The light speed in black hole vicinity. The gravitational potential balance allows us to solve easily the problems to be not solved practically in GTR. In the vicinity of a black hole the strong gravitational field is treated in GTR to grasp the quantums of radiation thereby turning the black hole to invisible object. That is a very primitive explanation.

In the black hole vicinity on the gravitational border surface a spherical break of the vacuum field is supposed in the EQS theory to be obtained. It is a sole case in cosmology when the break of light-transmitting medium can be really obtained thus violating the medium continuity and interrupting the light movement both into and out of the black hole.

On the gravitational border of the black hole in vacuum the condition of continuity infringement for the vacuum field is specified by the balance (6)

$$C^2=C_o^2-\varphi_n=0 \qquad (9)$$

whence

$$\varphi_n=C_o^2=\varphi_{ng} \qquad (10)$$

Fig. 2 shows the gravitational diagram for a black hole as a distribution epure for gravitational potential in the hole vicinity. On the black hole gravitational border specified in terms of a gravitational radius $R_s=R_g$ the Newton potential $\varphi_n=\varphi_{ng}$ is equal in the magnitude to the gravitational potential of non-perturbed vacuum field C_o^2 thereby breaking the vacuum field continuity.

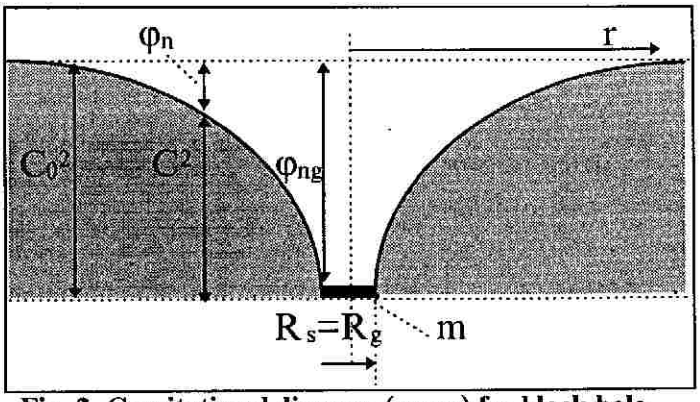

Fig. 2. Gravitational diagram (epure) for black hole.

Following from (10) we determine the value of gravitational radius

$$R_g=\frac{Gm}{C_o^2} \qquad (11)$$

In the theory EQS the gravitational radius has not the factor 2 as in GTR.

5. Limit mass and energy of particle (body) in the vacuum field. Any particle inside the gravitational border R_s is indicated in the gravitational diagram for a black hole (see Fig. 2) to contain the limited amount of quantons belonging to the non-deformed vacuum field. The quanton presence determines the latent mass and electromagnetic energy of particle. They are the limit values for the mass m_{max} and energy W_{max}, which can be associated with the particle in the vacuum field. The condition (9) allows us to determine the potential mass and energy of particle as the particle limit parameters

$$\varphi_n=\frac{Gm_{max}}{R_s}=C_o^2 \qquad (12)$$

Whence

$$m_{max}=\frac{C_o^2}{G}R_s \qquad (13)$$

$$W_{max}=\frac{C_o^4}{G}R_s \qquad (14)$$

For the objects such as a black hole the limiting parameters are realized as a result of static deformation for the vacuum field

6. Normalized relativistic factor. It is obvious, at reaching the light speed by a particle the particle mass and energy can not exceed the limit values of (13) and (14). It allows to normalize the relativistic factor γ excluding the infinite values for the mass and energy of particle in the relativistic speed range (when $v= C_o^2$)

$$\frac{m}{\sqrt{1-k_n\frac{v^2}{C_o^2}}}=\frac{C_o^2}{G}R_s \qquad (15)$$

Where k_n is the normalization coefficient obtained from (15) at $v= C_o^2$

$$k_n=1-\frac{R_g^2}{R_s^2} \qquad (16)$$

With the account of (15) and (16) we get the normalized relativistic factor establishing the limit values for the relativistic particles

$$\gamma_n=\frac{1}{\sqrt{1-\left(1-\frac{R_g^2}{R_s^2}\right)\frac{v^2}{C_o^2}}} \qquad (17)$$

It is obvious, at reaching the light speed the particle passes into the state of dynamic black hole with the limit mass (13), (15).

7. Analytical conclusion for rest energy of particle. The theory EQS gives the simplest and clearest conclusion for the rest energy of particle (body). Considering the vacuum field as an electromagnetic field, specified through the gravitational potential $\varphi_o = C_o^2$ and joining gravitation and electromagnetism, it is easy to estimate a work W_o associated with the transport of the gravitational charge (the rest mass m_o) from the infinity with zero potential into the region of the gravitational potential C_o^2

$$W_o=\int_0^{C_o^2} m_o d\varphi = m_o C_o^2 \qquad (18)$$

The situation described by (18) is realized at particle creation in vacuum field [1]. In the EQS theory the physical essence for the rest energy of particle (18) is treated as a manifestation of the energy of particle interaction with the vacuum field (the energy of coupling with vacuum). It is the gravitational energy of vacuum field deformation (equivalent to the electromagnetic energy for spherically deformed vacuum) to be determined by the particle mass.

8. Equivalence betweem gravitational and electromagnetic energy in the vacuum field. The classical mechanics and GTR could not estimate the role of gravitational interactions, which are defined in the absolute space of vacuum field not by Newton's potential φ_n but by the gravitational potential of action $\varphi_a= C^2$ (9)

$$\varphi_a = C^2 = C_o^2 - \varphi_n = 0 \qquad (19)$$

The classical mechanics find the work W as the transport of a probing mass m_2 from the infinity into the region of Newton's gravitational potential φ_n of a perturbing mass m_1 over the distance r between the masses

$$W=\int_0^{\varphi_o} m_2 d\varphi = m_2\varphi_n = m_2\frac{m_1 G}{r} \qquad (20)$$

The EQS theory specifies the work W through the transport of a probing mass m_2 from the infinity into the vicinity of the gravitational potential of action φ_a of a perturbing mass m_1.

$$W=\int_0^{\varphi_a} m_2 d\varphi = m_2\varphi_a = m_2(C_o^2-\varphi_n)=$$

$$= m_2 C_o^2 - m_2\frac{m_1 G}{r} \qquad (21)$$

Comparing (20) and (21) it is easy to notice the enormous distinction in the gravitational interaction energy for the range of weak gravitational fields, although the force F_n of Newton's interaction between the masses, both in that and another case, remains constant, since the derivative of the constant C_o^2 equals zero

$$F_n=\frac{dW}{dr}=m_2\frac{d}{dr}(C_o^2-\varphi_n)=\frac{m_2 m_1 G}{r^2} \qquad (22)$$

Where $r^2=rr$ (with the purpose of notation simplification).

9. Equivalence between gravitational and electrical energies for free electron. The field energy equivalence is evidently exhibited at electron synthesis in the vacuum field, when, due to electrical (and magnetic) polarization for the vacuum field by an electrical massless monopole charge (e), the spherical deformation of vacuum

field occurs and the electron mass is formed [1]

Let's equalize the energies of gravitational and electrical fields for a free electron in the vacuum field taking into account the calibrating potential C_o^2

$$m_e(C_o^2 - \varphi_n) = e\varphi_e \qquad (23)$$

where φ_e is the electrical potential of electron, V

$$\varphi_e = \frac{1}{4\pi\varepsilon_o}\frac{e}{r} \qquad (24)$$

$\varepsilon_o = 8{,}85\cdot10^{-12}$F/m is the electrical constant.

From (23) and (24) we find the overnormalized gravitational Newton potential φ'_n, which takes into account the gravitational interaction of the electron with the vacuum field and is expressed through the electrical parameters of electron in view of the electron classical radius r_e

$$\varphi'_n = C_o^2 - \frac{e\varphi_e}{m_e} = C_o^2\left(1 - \frac{r_e}{r}\right) \qquad (25)$$

$$r_e = \frac{1}{4\pi\varepsilon_o}\frac{e^2}{m_e C_o^2} = 2{,}8\cdot10^{-15}\text{ м} \qquad (26)$$

Introducing the overnormalized Newton potential (25) for the vacuum field allows us to write the gravitational potential balance (6) in an overnormalized form

$$C_o^2 = (C^2)' + \varphi'_n$$

The non-overnormalized Newton potential φ_n takes into account no interaction of the electron with the vacuum field and determines only the force of gravitational interaction of the electron, for example, with a proton. This force is incommensurably weak in comparison with the force of electrical attraction between the particles.

Substituting (25) in (23) we find a distribution for the uniform energy of gravitational and electrical fields for the free electron coupled with vacuum

$$W = m_e(C_o^2 - \varphi'_n) = m_e C_o^2\frac{r_e}{r} \qquad (27)$$

So, the found expression (27) defines the equivalence of gravitational and electrical interaction of the electron with the vacuum field. At rapprochement to the electron the energy of gravitational and electrical interaction for the electron is seen to grow and to be equal to the rest energy at distance of the classical radius of electron.

Formulated by Einstein the principle of mass-energy equivalence, in essence, equalizes the energy of electrical and gravitational interaction of particle with the vacuum field.

Of particular role is the principle of equivalence between gravitational and electromagnetic energy at emitting an orbital electron.

10. Defect of orbital electron mass at emitting. In physics of orbital electron emission out of atom there is no shortage of questions to be answered. A source of electron emission is assumed to be the electrical energy change at electron transition from an exited orbit to the stationary one. But the mechanism of energy transformation is not clear. Moreover the electrical energy for an electron-proton system in hydrogen atom is increased actually at simultaneous emission of energy.

On the other hand, the realistic electron motion along orbit is very complicated and the single coil may be considered as a strongly elongated elliptic orbit (see Fig. 3). In this case the proton-electron distance is steadily varied as well as the energy of electrical interaction between the electron and proton is changed. But the electron does not emit.

To avoid the paradoxes in description of the orbital electron emission is shown in the analysis to be impossible without employing the gravitational interactions, by basing on their equivalence with the electrical interactions. In this case, the orbital electron emission is possible only as a result of the mass defect at abrupt jump-like transition to the stationary orbit.

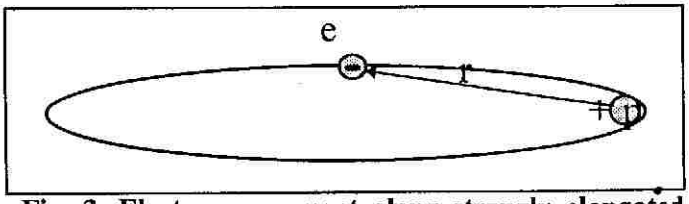

Fig. 3. Electron movement along strongly elongated elliptic orbit in atom.

No matter what orbit along which the electron may rotate, the orbital electron movement is shown in Fig. 4 to occur within a gravitational well of the nucleus (in our case it is a proton). At rapprochement of the electron to the proton from point 2 to point 1, the potential of action C^2 decreases. Since the electron mass is formed as a result of spherical compression of the vacuum field, the reduction of the electron gravitational potential is equivalent to decrease

in the quantum density of medium, of which the electron mass is created. In result, at transition from point 2 to point 1 the electron loses a part of the mass. If this process occurs spasmodically, the mass defect energy transforms into the energy of orbital electron emission.

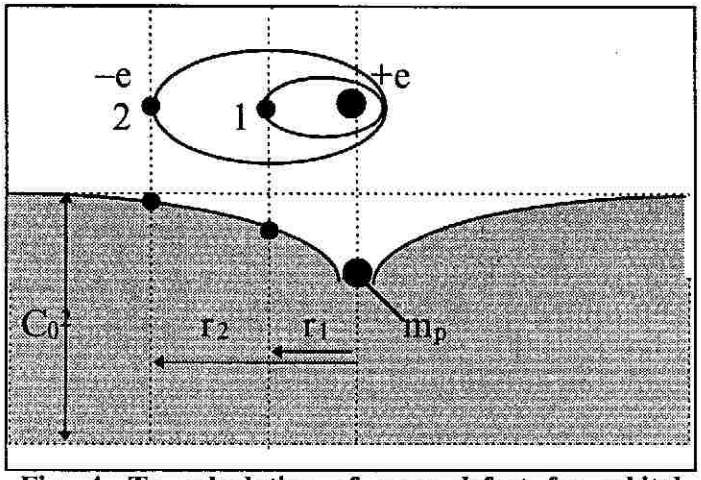

Fig. 4. To calculation of mass defect for orbital electron

Let's write the energy balance for orbital electron in atom in order to establish the range for the mass defect values. Let's designate the relevant energy components in the total balance by the sign plus at increasing the total energy of electron ΣW_e and minus at reducing: the rest energy $+W_o$, the kinetic energy $+W_k$, the electrical energy $+W_e$, the energy of electron mass defect $-\Delta W_o$, determining consistently the energy value

$$\sum W_e = W_o + W_k + W_e - \Delta W_o = \\ = m_e C_o^2 + \frac{1}{2} W_{el} + \frac{1}{2} W_{el} - W_{el} = \\ = \sum W_e = m_e C_o^2 + \frac{m_e v^2}{2} + \frac{1}{8\pi\varepsilon_o} \frac{e^2}{r} - \\ - \frac{m_e}{m_p} \frac{C_o^2}{G} r_e \varphi_n = m_e C_o^2 = \text{const} \quad (28)$$

where φ_n is Newton's potential for proton.

$$\Delta W_o = W_{el} = \frac{m_e}{m_p} \frac{C_o^2}{G} r_e \varphi_n = W_o \frac{r_e}{r} \quad (29)$$

The energy balance for orbital electron (28) shows, that on the stationary orbit the electron does not emit in view of constancy conservation for the electron energy $m_e C_o^2$ as an completed system coupled with the vacuum field. The electron orbit trajectory can be different, not only circular but also with the variable distance r to the proton nucleus. Naturally, the electron energy balance establishes a correlation strictly between the gravitational and electrical energies thereby defining the speed of electron movement along the orbit.

The orbital electron energy attributed to the mass defect is seen from (29) to be specified by the same expression as for the uniform energy (27) of free electron in vacuum. The distinction is that the distance r in (29) is determined by a distance between the electron and proton and in (27) by a distance in vacuum to the electron.

Finally a part of the possible electron mass defect is transformed in emission

$$\Delta m_e = \frac{1}{2} \frac{\Delta W_o}{C_o^2} = -\frac{1}{2} m_e \frac{r_e}{r} \quad (30)$$

Even for the extreme case of Bohr's orbit distance the relative value for the orbital electron mass defect is notably low and equals

$$\frac{\Delta m_e}{m_e} = -\frac{1}{2} \frac{r_e}{r} = -2{,}7 \cdot 10^{-5} \quad (31)$$

At abrupt transition from the exited level state from point 2 ($r_2=4r_1$) on the first stationary orbit in point 1 ($r_1=0{,}53\cdot10^{-10}$m), according to (30) the orbital electron mass defect will be

$$\Delta m_e = -\frac{1}{2} m_e r_e \left(\frac{1}{r_1} - \frac{1}{r_2} \right) = -\frac{1}{2} m_e \frac{r_e}{r_1} \left(1 - \frac{1}{4} \right) \quad (32)$$

$$\Delta W_e = -\frac{1}{2} m_e C_o^2 \frac{r_e}{r_1} \left(1 - \frac{1}{4} \right) = -10{,}2\,\text{eV} \quad (33)$$

The orbital electron mass defect (32) is completely equivalent to the emission energy of electron (33). At the abrupt change in the electron mass the gravitational energy in vacuum field is released as a result of the spherical deformation modification. Taking into account, that the vacuum field is analogue of solids, as a result of the mass defect the vacuum perturbation can generate only a photon with the transversal electromagnetic field. The problem on the possibility for the orbital electron to emit the longitudinal gravitational waves is not considered.

11. Balance of gravitational potentials for moving body (particle). The gravitational potential balance (6) for the vacuum field is represented

for a static case, which is applicable for the range of low speeds (much lower than the light speed). For moving dynamic object the balance of gravitational potentials takes into account the change in Newton's potential normalized by the relativistic factor γ_n (17)

$$C_o^2 = C^2 + \varphi_n\gamma_n \quad (34)$$

Whence

$$C^2 = C_o^2 - \varphi_n\gamma_n \quad (35)$$

$$C = C_o\sqrt{1-\frac{\varphi_n\gamma_n}{C_o^2}} \quad (36)$$

The balance (34), (35) and (36) defines the spherical invariance of vacuum field for moving objects. It means, that the spherical deformation of vacuum field is a constant at any speed of particle (body) movement.

12. Total energy balance in deformed vacuum field. Let's obtain the total energy balance from the balance of gravitational potentials (34) by multiplying (34) by the limit mass (13)

$$C_o^2 m_{max} = C^2 m_{max} + \varphi_n\gamma_n m_{max} \quad (37)$$

or

$$\frac{C_o^4}{G}R_s = \frac{C^2C_o^2}{G}R_s + m_oC_o^2\gamma_n \quad (38)$$

The expression $m_oC_o^2\gamma_n$ in (38) specifies the energy of spherical deformation for the vacuum field by mass at any speed of body movement in vacuum. From (38) we find the remaining latent energy W_v of particle (body) in the vacuum field

$$W_v = \frac{C_o^4}{G}R_s - m_oC_o^2\gamma_n \quad (39)$$

13. General solution of Poisson's equation for gravitational potentials. The classical mechanics describes the gravitational field in terms of Poisson's equation as the sum of partial derivatives of the second order from Newton's static potential. The solution for the equation is in finding a spatial distribution for Newton's potential and the gravitational field strength.

The spherical invariance principle for vacuum field allows us to write the Poisson equation for dynamics, expressing the partial derivatives through the gravitational potential of action φ_a

$$\frac{\partial^2\varphi_a}{\partial x^2} + \frac{\partial^2\varphi_a}{\partial y^2} + \frac{\partial^2\varphi_a}{\partial z^2} = G\rho_m\gamma_n \quad (40)$$

The solution of the new Poisson equation permits to find a distribution of the action potential for the spherically deformed vacuum field in the whole range of speeds both in the external and internal regions of the gravitational border

$$\begin{cases} \varphi_1 = \varphi_a = C_o^2 - \varphi_n\gamma_n \doteq C_o^2\left(1-\dfrac{R_g\gamma_n}{r}\right) \\ \varphi_2 = C_o^2 + \varphi_n\gamma_n = C_o^2\left(1+\dfrac{R_g\gamma_n}{r}\right) \end{cases} \quad (41)$$

where φ_1 and φ_2 are gravitational potentials correspondingly in the external and internal regions of the gravitational border, m^2/s^2,

$$\varphi_n = \frac{Gm}{r} = C_o^2\frac{R_g}{r} \quad (42)$$

The solution of Poisson's equation is seen from (41) to result in the balance of gravitational potentials (36) for deformed vacuum field. It is natural, since in essence the Poisson equation is an equation describing elastic body deformation.

On the gravitational border there is a jump in the gravitational potential $\Delta\varphi$

$$\Delta\varphi = \varphi_2 - \varphi_1 = 2\varphi_{ns}\gamma_n \quad (43)$$

The gravitational potential jump is seen from (43) to be specified by the multiplier 2. The factor 2 is obtained also in the Schwarzschild solution for a centrally symmetric field of gravitation as 2φ [4]. But the Schwarzschild solution is shown from the solution of the gravitational equation for a spherically deformed vacuum field in the EQS theory to be erroneous, since it take into account no jump of potential on the gravitational border. As a result, owing to a mistake in the solution the multiplier 2 passes in the expression for the gravitational radius thereby overestimating unreasonably its value twice.

Fig. 5 represents a distribution epure for the gravitational potential in spherically deformed vacuum field. The epure is constructed on the basis of the solution (41) provided that γ_n=1 (the range of non-relativistic speeds). On the gravitational border R_s there is a jump in potential $2\varphi_{ns}$. For the range of relativistic speeds the deformation of vacuum

field grows thereby increasing the perturbing mass m. In the epure it will be depicted through the depth increase for the gravitational well and the jump in potential on the border.

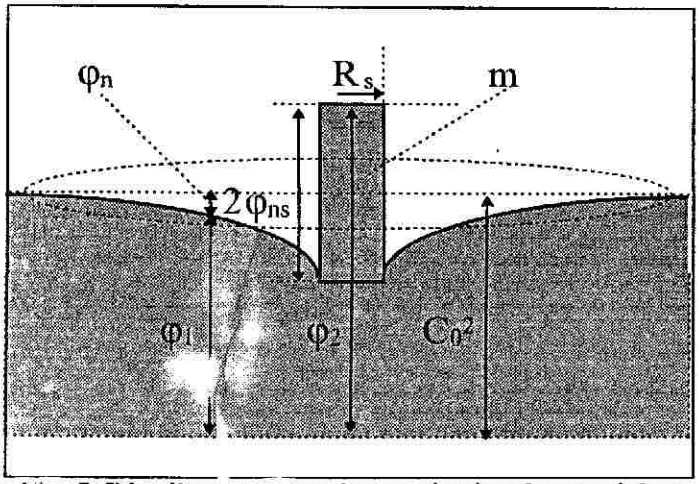

Fig. 5. Distribut on epure for gravitational potential at spherical deform ation of vacuum field.

The e pure of gravitational potential distribution is shown to be similar to the distribution epure for the quantum density of medium in spherically deformed vacuum field (see Fig. 1 in [2]).

For the range of relativistic speeds the EQS theory explains the particle mass increase by simple capture of quantons from the external region of the gravitational border into the internal one. It is possible only for the high speed range due to the vacuum field deformation delay. But in any case, the increase in the quantum density inside the border is possible only at the cost of density redistribution from the external region. Taking into account the enormous tension of the vacuum field, the gravitational border keeps a spherical shape.

Generally, the gravitational borde should be considered as a mesh ensuring th vacuum field deformation transfer in th absolute motionless Lorentz's space [2]. The mesh reminds a fishing net, which tension is increased with the net speed relative to the water.

14. Spherical invariance and Michelson's experiment. The discovery of the spherical invariance principle for vacuum field in the EQS theory allows to eliminate a century mistake in analyzing the light speed under the terrestrial conditions and to show that the experiments of Michelson and Morley in past century has proved experimentally this principle. Now, the negative results of the experiments of Michelson and Morley on «the ether wind» detection are treated wrongly as experiments proving the absence of the light-transmitting medium in the nature.

In first, the modern physics does not know the laws of light propagation in the deformable vacuum field as in a light-transmitting medium. In the relativity theory this unknowingness is provoked by the erroneous rejection of the idea of the existence for such medium, by recognizing the space as the absolute emptiness and the electromagnetic field as an autonomous substation possessing no own carrier.

Secondly, the calculations, associated with the Michelson and Morley experiments on determination of the light speed in directions to and against the Earth movement, are erroneous. They are postulated on a false concept that the light speed is a speed in a mechanistic (but not electromagnetic) ether, when the light source generates a spherical wave but itself is displaced relative to the wave front in the movement direction similarly to the acoustic wave from a source mo ng in air. In this case the calculated speeds of light nd Earth are subtracted (c-v) or summed (c+v) correspondingly for the equal or opposite move ent directions. The obtained calculation diff rence in ray path lengths was sufficiently to measure the light speed with using Michelson's inte ferometer, which sensitivity was ±1km/s relative to the light speed [3].

In order to demonstrate distinction in the approaches to the speed light, we shall write the balance of gravitati nal potentials for the EQS theory (35) and the conditional balance of gravitational potentials for the relativity theory following from Lorentz's transformations or from the four dimensional interval approach (see (16) in [2])

$$C^2 = C_0^2 - \varphi_n\gamma_n \qquad (44)$$

$$c^2 = C_0^2 - v^2 \qquad (45)$$

The equation (44) is an exact equation describing the vacuum field state. The relativity theory, by having alternated the gravitational potential $\varphi_n\gamma_n$ to the squared light speed v^2, gives only a rough approximated description for the space state. Therefore, in the relativity theory even the extreme complication of mathematical means can not resolve the current problems of physics.

The exact expression for the light

deviation in vacuum (44) gives considerably low value in comparison with (45). It is caused by that in the nonrelativistic speed range the perturbing Newton's potential φ_n is of the primary parameter influencing on the light speed change. The relativistic factor γ_n is of secondary importance for the light speed change. But without the gravitational potential the estimation of the movement speed influence is senseless.

Despite of this fact, we shall find the light speed deviation σ_v, which gives the approximated balance of potentials (45)

$$\sigma_v = \frac{C_o - C}{C_o} = 1 - \frac{C}{C_o} = 1 - \sqrt{1 - \frac{v_o^2}{C_o^2}} \qquad (46)$$

We expand (46) in the power series and reject the terms of higher orders in view of their low values. Finally we obtain the required deviation by taking into account that for the solar system and Earth the maximal speed of movement in the absolute space is of $3 \cdot 10^5$ m/s

$$\sigma_v = \frac{1}{2}\left(\frac{v_o}{C_o}\right)^2 = 0{,}5 \cdot 10^{-6} \qquad (47)$$

Following from the formula (47) for the Earth conditions the deviation of the light speed value is less than one part from a million. In the absolute units it equals about 150 m/s.

The deviation for the light speed value in deformed vacuum field of the Earth σ_φ is determined by the value of Newton's gravitational potential of the Earth from the exact balance of gravitational potentials (44) at $\gamma_n = 1$

$$\sigma_\varphi = 1 - \frac{C}{C_o} = 1 - \sqrt{1 - \frac{\varphi_n}{C_o^2}} \qquad (48)$$

Expanding (48) in the power series and rejecting the terms of higher orders in view of their low values we obtain the deviation of the light speed value σ_φ for gravitational field of the Earth (the mass $m = 6 \cdot 10^{24}$kg, the radius $R_3 = 6{,}37 \cdot 10^6$m, the gravitational radius $R_g = 4{,}45 \cdot 10^{-3}$M

$$\sigma_\varphi = \frac{1}{2}\frac{\varphi_n}{C_o^2} = \frac{Gm}{2C_o^2 R_3} = \frac{R_g}{2R_3} = 0{,}35 \cdot 10^{-9} \qquad (49)$$

The deviation of the light speed value in neighborhood of the Earth surface is less than one part from a milliard in comparison with the non-deformed vacuum field. In magnitude it will be only 0,1 m/s . The deviation (49) takes into account the terrestrial gravitation effect only. The Earth movement relative to the vacuum field is not included in the consideration.

To take into account the influence of the Earth movement speed, it is necessary to understand, that the vacuum field deformation is made by the gravitational field, i.e. by the mass, and the mass increase with speed results in the additional speed deviation σ_w at movement

$$\sigma_w = \sigma_\varphi \sigma_v = \frac{1}{2}\frac{\varphi_n}{C_o^2} \cdot \frac{1}{2}\frac{v_o^2}{C_o^2} = \frac{1}{4}\frac{\varphi_n v_o^2}{C_o^4} \qquad (50)$$

or

$$\sigma_w = \sigma_\varphi \sigma_v = \frac{1}{4}\frac{R_g v_o^2}{R_3 C_o^4} = 1{,}75 \cdot 10^{-16} \qquad (51)$$

The equation (51) allows us to estimate the Earth movement influence on the light speed change, which is about $5 \cdot 10^{-8}$ m/s, for the vacuum field from the deviation magnitude. It is an exact estimation of the order for given parameter. This very small quantity lies beyond the sensitivity for the interference-based techniques, that allows us to reconsider the result treatment for the Michelson and Morley experiments [5].

On the other hand, as a quantized electromagnetic medium, the vacuum field is shown in the EQS theory to cannot be considered in terms of an acoustic wave measure. The spherical invariance principle establishes that the gravitational field of the Earth keeps a spherical shape independently of the movement speed. But, as a special form of static electromagnetism with the discreteness of 10^{-25}m, the gravitational field defines the light propagation speed in vacuum by the value of the gravitational potential of action (35), (36). Therefore the spherical invariance principle establishes, that in the vacuum field the light from a terrestrial source to all directions will be propagated identically, irrespective of the terrestrial source speed.

Paradoxically, but the fact is a fact, for a light source in the terrestrial conditions, independently of the Earth movement speed in the vacuum field, the gravitational field, which is a light-transmitting medium, will be observed as a motionless one. It is a fact, which was established in the Michelson and Morley experiments. The spherical invariance principle

for vacuum field can be broken only as a result of fluctuations in the quantum density of medium in vacuum. But while we do not know the required accuracy for devices in order to detect these fluctuations.

At body movement the elastic quantized (space) medium (EQS) is specified through the remarkable behavior in comparison with all known mediums. The EQS completely excludes the effects similar to «ether wind».

15. Substance and antisubstance. The EQS theory gives a clear distinction between the substance (plus - mass) and antisubstance (minus - mass). Let's rewrite the balance of gravitational potentials (35)

$$C^2 = C_o^2 \pm (-\varphi_n \gamma_n) \qquad (53)$$

The balance (53) describes a minus - mass state (which is represented in the gravitational diagram of Fig. 6) in the vacuum field.

Comparing the gravitational diagrams from Fig. 5 and Fig. 6 indicates the principal distinction between the substance and antisubstance.

For the substance the gravitational border contracts the vacuum field inside the border at the cost of substance rarefying in the external region.

For the antisubstance the gravitational border constrains the vacuum field tension of the external region, preventing the field breaks. As a result, inside the gravitational border the quantum density is less than one in the external region. But such system state is unstable and characterized by the quantum density "hill" for antiparticle (Fig. 6). The most stable state of system is defined by the gravitational "well" for particle (Fig. 5). Probably it explains the substance asymmetry (expressed through the quantitative prevalence of the substance above antisubstance) for the vacuum field.

In this context, the positron is a conditional antiparticle with respect to the electron, since the positron possesses no minus-mass and is a carrier for the electrical charge of positive polarity thereby (as well as electron) deforming spherically the vacuum field.

The EQS theory uncrowns a myth on antimatter. Our Universe is uniform as the electromagnetic matter in a vacuum field form and capable to generate both particles and antiparticles (i.e. the substance and antisubstance). The matter is proved by the absence of the antimatter (not found experimentally) in the Universe to be uniform.

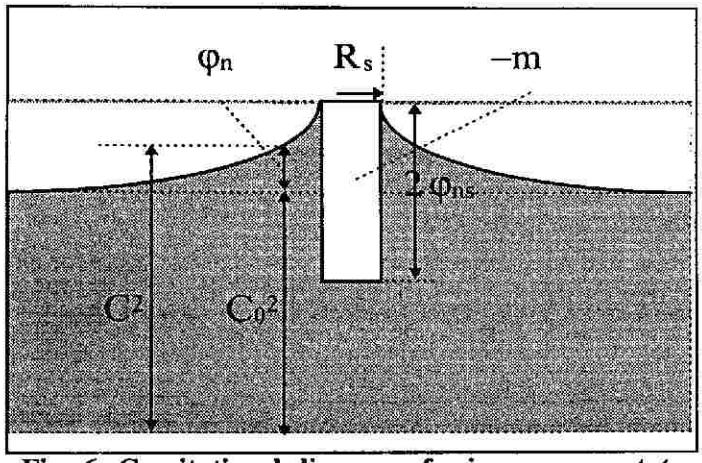

Fig. 6. Gravitational diagram of minus - mass state (distribution epure for gravitational potential at spherical deformation of vacuum field by antiparticle)

The EQS theory uncrowns also a myth that all reactions of interaction between particles and antiparticles are associated with releasing the energy corresponding to the mass defect. So, for example, two nucleons (a proton p and an antineutron $\tilde{n}$) annihilate by being transformed in the positron e^+ and the neutrino ν (54). On the contrary, an antiproton $\tilde{p}$ interacting with a neutron n gives the electron e^- and the antineutrino $\tilde{\nu}$ (55) [5]

$$p + \tilde{n} \rightarrow e^+ + \nu \qquad (54)$$

$$\tilde{p} + n \rightarrow e^- + \tilde{\nu} \qquad (55)$$

The reactions (54) and (55) are not associated with releasing the excessive energy in an emission form. It would seem the obvious infringement in the preservation law for the energy and mass is observed. But so it would be possible to think not knowing the gravitational diagram for nucleon and antinucleon, represented in Fig. 5 and Fig. 6. At superimposing the diagrams between themselves there is their mutual compensation without wave perturbation for the vacuum field. The emission is absent. The reactions (54) and (55) are the brightest confirmation that the release of excessive energy is connected to the obvious particle mass defect, which results in wave excitation for the vacuum field. The released excessive electrical charge generates a positron (electron) in vacuum. The nucleon shells are contracted from a neutrino (antineutrino) in cluster.

16. Space-time problem. Supposing in [1], that elementary quantum of space (quanton) is a real carrier of time, the problem of time was already mentioned. In the context of a universal timer, the quanton represents an elastic volume element, the oscillation period of which T_o is defined by the time of propagation for electromagnetic wave perturbation through the quanton in the non-deformed vacuum field

$$T_o = \frac{L_{qo}}{C_o} = 2{,}5 \cdot 10^{-34}\,c \qquad (56)$$

In the deformed vacuum field the oscillation period changes. At spherical deformation of vacuum field inside the gravitational border the quantons are compressed thereby accelerating a course of time. In the external region the quantons are stretched and slow down a course of time. Generally the course of time is described in terms of Poisson's equation for the elastic state of vacuum field. In space the time is distributed in a continuous chronal field form. Composing the Poisson equation is resulted to replacing the gravitational potential of action in (40) by its analogue expressed through the spatial-temporary parameters of quanton

$$\varphi_a = C^2 = \left(\frac{L_q}{T}\right)^2 = \frac{L_q^2}{T^2} \qquad (57)$$

$$\frac{\partial^2 \frac{L_q^2}{T^2}}{\partial x^2} + \frac{\partial^2 \frac{L_q^2}{T^2}}{\partial y^2} + \frac{\partial^2 \frac{L_q^2}{T^2}}{\partial z^2} = G\rho_m\gamma_n \qquad (58)$$

The solution of the chronal Poisson equation (58) allows to find a distribution of the spatial-temporary parameter L_q/T for spherically deformed vacuum field in the whole range of speeds both in the external and internal regions of the gravitational border

$$\begin{cases} T_1 = T_o \dfrac{L_{q1}}{L_{qo}} \left(1 - \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{2}} \\ T_2 = T_o \dfrac{L_{q2}}{L_{qo}} \left(1 + \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{2}} \end{cases} \qquad (59)$$

where L_{q1}/T_1 and L_{q2}/T_2 are spatial-temporary parameters in the external and internal regions of the gravitational border, m/s.

From (59) we find

$$\begin{cases} T_1 = T_o \dfrac{L_{q1}}{L_{qo}} \left(1 - \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{2}} \\ T_2 = T_o \dfrac{L_{q2}}{L_{qo}} \left(1 + \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{2}} \end{cases} \qquad (60)$$

From the solution of Poisson' equation for the quantized medium distribution in deformed space [2] we find the ratios L_{q1}/L_{qo} and L_{q2}/L_{qo}

$$\begin{cases} \dfrac{L_{q1}}{L_{qo}} = \left(1 - \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{3}} \\ \dfrac{L_{q2}}{L_{qo}} = \left(1 + \dfrac{R_g\gamma_n}{r}\right)^{-\frac{1}{3}} \end{cases} \qquad (61)$$

Finally, substituting (61) in (60) we obtain the chronal field distribution in deformed vacuum field

$$\begin{cases} T_1 = T_o \left(1 - \dfrac{R_g\gamma_n}{r}\right)^{-\frac{5}{6}} \\ T_2 = T_o \left(1 + \dfrac{R_g\gamma_n}{r}\right)^{-\frac{5}{6}} \end{cases} \qquad (62)$$

The system (62) allows to establish a course of time in space for any particle (body) moving in the whole range of speeds (up to the light ones). From (62) follows, that the time is arrested completely in the external regions on the gravitational border of static and dynamic black holes (period T tends to the infinity). Inside the black hole the time is accelerated only by a factor of 2.3, taking into account that the increase in the quantum density of medium is only a factor 2.

The course of time in space is determined first of all by the gravitational perturbation and then by the speed factor. The expression (56) specifies the shortest time in non-perturbed vacuum and, accordingly, the highest possible frequency for the electromagnetic processes

$$f_{max} = \frac{1}{T_o} = 4 \cdot 10^{35}\,Hz \qquad (63)$$

The term "chronal field" was introduced ed by professor A. Veinik [6], who supposed (as

well as astrophysicist N. Kozyrev) that the time possesses the own carrier in a form of realistic particle chronon. However the solution for the chronal field has been found only in the EQS theory by having fixed the chronal properties to a realistic particle (quanton) joining space and time.

17. Energy hierarchy and cosmological model in the EQS theory. The modern physics accepts wrongly the energy level for vacuum as a zero one. Simultaneously, in the press there are sensational announcements concerning the works of physicist-theoreticians (including even the physicists form such orthodox scientific establishments of Russian Academy of Sciences as Landau's Institute of theoretical physics). «And the practical conclusion from the last achievements of physicists has the enormous value for us: the vacuum possesses the huge energy and it is necessary to search for ways of releasing that» [7].

With the whole responsibility I can declare, that the gentlemen theoreticians from Landau's institute have been late. The EQS theory gives not only physical models and mathematical means for calculation of the energy processes in vacuum field, but also the new ways for extraction of this enormous energy. In all known and unknown energetic cycles existing in the nature, the energy is uniform. It is the electromagnetic energy of vacuum field, irrespective of the fact, by which way the energy release is carried out. It can be faint burning of a candle or the powerful thermonuclear explosion.

It is necessary to note that the release of excessive energy from the vacuum field is associated only with the particle mass defect. In chemical reactions the release of energy is due to the electron mass defect, in nuclear ones - to the nucleon mass defect. The EQS theory gives new ways for the energy releasing as a result of synthesis of elementary particles from the vacuum field.

The EQS theory establishes the strict energy hierarchy by subordinating all physical processes to the enormous vacuum field energy, the total balance (39) of that is determined for the first time in the theory EQS.

The EQS theory considers the Universe structure through well-known models for open and isolated cosmological systems. Of the greatest interest is the model of shell structure for the quantized Universe, which pulsation (expansion or compression in the determined limits) is associated with periodic transformation of the electromagnetic energy of system deformation to a huge gravitational wave and inversely. Since all material objects (from the elementary particles up to the cosmological systems) are an indivisible part of the vacuum field joining the whole Universe, the movement of the huge spherical wave together with the objects in direction of the shell expansion for the Universe is detected in observation as "galaxy's departing" [8].

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V. S. LEONOV

FOUR REPORTS

ON THE THEORY OF ELASTIC QUANTIZED SPACE (EQS)

(Conference proceedings)

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Leonov V.S.

L 47 Four reports on the theory of elastic quantized space (EQS). (Proceedings of the Sixth International Conference «Modern Problems of Natural Sciences », August 21-25, 2000, St.-Petersburg, Russia)

The theory of elastic quantizedoй space (medium) (EQS) is the first informal theory of electromagnetic structure of vacuum (to be exact, of vacuum field). In the basis of the theory EQS there is an electromagnetic quantum of space (quanton) discovered on January 1996. In the same year the first part of the theory EQS has been published (in 1997 - the second: «New Sources of Energy»).

Now the third part of the theory EQS «Synergetics of uniform vacuum field » is prepared for publication, the part of materials from which has been stated in the «Four reports»:

1. **Role of superstrong interactions at synthesis of elementary particles.**
2. **"Relativism" as a special case of Newton's classical mechanics.**
3. **Spherical invariance at the development of absolute cosmological model.**
4. **Benefit and harm of relativism for fundamental science.**

In essence the «Four reports» are an incomplete summary of the third part of the theory EQS, which represents the informal uniform theory of field. The joining particle (quanton) in structure of continuous elastic quantized medium (vacuum field) is an uniting criterion in the uniform theory. Joining both electricity and magnetism into electromagnetism and gravitation, the quanton is a realistic carrier of the electromagnetic field. Joining space and time the quanton is a carrier of time. The vacuum fields is a medium from that the elementary particles are synthesized and which joins the known fundamental interactions. The interaction of quantons inside vacuum field is the fifth type of superstrong joining fundamental interactions.

The theory EQS discoveries the enormous prospects in development of new power ecologically clean technologies based on production of excessive energy resulted from synthesis of elementary particles from the vacuum field. It is confirmed experimentally.

The author of the theory of elastic quantized space (medium) (EQS), the winner of the premium of Government of Russian Federation in the branch of science and engineering, the valid member of International academy of ecology (IAE), the candidate of engineering science Vladimir Leonov, who has discovered the elementary quantum of space - quanton in 1996, works in the field of development of quantum theory and its practical application in the newest power technologies, the opponent of construction NPS with reactors on uranium fuel as ecologically and economically unpromising.

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