

# Gravitation and inertia

Rykov A.V.

The summary. *Already it is a lot of centuries, the problem of gravitation and inertia remains «a secret». Most precisely and briefly they are submitted in Newton formulas. Newton perfectly understood that mathematical representation of gravitation and inertia does not open to people this secret. In XX century attempt of the mathematical description of gravitation in the Theory of the General Relativity [1] and Quantum Mechanics (exchange particles - gravitons) is again made. It is made formally and without knowledge of the true reason of these natural phenomena. There are many attempts to correct a condition of a problem with the help of alternative representations. In given article the conclusion of structure of the vacuum, the using well-known fact of formation of masses is put in a basis by energy in 1,022 MeV pairs of electron and a positron. A source of gravitation and inertia are in the structure of vacuum.*

The world surrounding us has the electric and magnetic device. The statement about the electromagnetic nature of nuclear forces seems to the most disputable. Protons possess huge electric intensity in  $6,3998 \cdot 10^{26}$  B/M. Electric intensity of a proton polarizes a neutron which in the structure has charges (+) and (-). It is known, that forces between the polarized objects depend on distances between objects much more abruptly. Following the general principle of the electromagnetic device of the World, it is possible to assert with confidence the electromagnetic nature of gravitation and inertia. For this purpose it is necessary to find out a structure of vacuum which is around and inside all material masses according to a principle close-action. Close-action on vision by R. Feynman [2] with the help of exchange fields or virtual photons and particles remains a formally thought up way of an explanation of natural phenomena. It is possible to make the assumption, that the vacuum has not a zero electric charge which causes polarization of masses and their attraction vacuum to each other. We shall define structure of vacuum [3], proceeding from physical process of formation of substance and an substances at entering into vacuum of the necessary energy or with the help of radiation of gamma - quantum's, or at impact of particles. The minimal energy for this purpose is equal 1,022 MeB. [4] Brief outcome of structure of vacuum:

$$h\nu = e_o E \Delta r_e. \quad (1)$$

$$E = N \xi \frac{e_o}{r_e^2}. \quad (2)$$

$$\Delta r_e = 2\pi \nu r_e t_v. \quad (3)$$

$$r = r_e \sin(2\pi \nu t); \Delta r_e = 2\pi \nu r_e t_v).$$

$$h = 2\pi N e_o^2 \xi \frac{1}{r_e / t_v}. \quad (4)$$

$r_e / t_v = c = \sqrt{\eta \xi}$  – Speed of light. We shall define number  $N$ :

$$N = \frac{h}{2\pi e_o^2 \sqrt{\xi / \eta}} = \mathbf{137.035999815} = \alpha^{-1}, \quad (5)$$

Where  $\eta = \frac{1}{\mu} = 1,00000000 \cdot 10^7 [a^2 \cdot m^{-1} \kappa z^{-1} c^2]$  - Magnetic constant *of environment*,

$\xi = \frac{1}{\varepsilon} = 8,98755179 \cdot 10^9 [a^{-2} \cdot m^3 \kappa z \cdot c^{-4}]$  - Electric constant *of environment*. The unknown number appeared as return size of a constant of thin structure.

$$w = \xi \frac{e_o^2}{r_e} = 2\pi \alpha^{-1} e_o^2 \nu_{rb} \sqrt{\xi / \eta} = \mathbf{1.64936940 \cdot 10^{-13}} \text{ Дж}. \quad (7)$$

This energy surpasses energy of mass of pair a electron-positron on the small size determined in experiences on transformation of gamma - quantum in the specified pair:  $2m_e c^2 = 1.63742083 \cdot 10^{-13} J$ . Frequency of gamma - quantum for «red border» pays off on (7) and it appears, that

$v_{rb} = 2.489213 \cdot 10^{20}$  Hz. Electric intensity *of environment* between charges (+) and (-) is  $E = 1.008552 \cdot 10^{23}$  V/m. From (7) we find the value of a structural element *of environment*, from (1, 2) limiting deformation *of environment*:

$$r_e = \frac{c}{2\pi\alpha^{-1}v_{rb}} = 1.3987631 \cdot 10^{-15} \text{ Meter}$$

$$\Delta r_{rb} = \frac{hv_{rb}r_e^2\alpha}{e_o^2\xi} = 1.020726744 \cdot 10^{-17} \text{ Meter.}$$
(8)

Constant of thin structure is  $\alpha = \frac{\Delta r_{rb}}{r_e}$ . The structure of vacuum in the form of a crystal lattice with elementary charges (+) and (-) remains uncompleted. Between charges there can not be "emptiness". As it is not strange, but the output offers equality of electric and magnetic Coulomb forces:  $\xi e_o^2 = \eta \Phi^2$  at equal distances between charges and streams of a magnetic induction *of*  $\Phi$ . From the equation we receive the value of a stream of a magnetic induction between electric charges:

$$\Phi = \sqrt{\frac{\xi}{\eta}} e_o = 4,8032042 \cdot 10^{-18} \text{ Weber.}$$

$\Phi = \Phi_o / \alpha^{-1}\pi$ ;  $\Phi_o = h/2e_o$ , Where  $\Phi_o$  - quantum of a stream of the magnetic induction, applied by theoretical consideration pairs of electrons in superconductivity.

For weak charge of vacuum the difference of sizes of charges (+) and (-) size is necessary in

$$\Delta e_o = \sqrt{\frac{G}{\xi}} m_e = 7,8490194 \cdot 10^{-41} \text{ Q. Any mass causes polarization of structure of}$$

$$\text{vacuum } \sigma_q = \frac{q}{4\pi R^2}; \quad q = \sqrt{\frac{G}{\xi}} m; \quad \sigma_q = \sqrt{\frac{G}{\xi}} \frac{m}{4\pi R^2}. \text{ Due to polarization of structure of}$$

vacuum, the law of an attraction of masses to each other by Newton force will be transformed to a kind:

$$F = G \frac{m_1 \cdot m_2}{R^2} = \xi (4\pi R)^2 \sigma_{12} \sigma_{21}. \quad (9)$$

Polarization  $\sigma_{12}$  is created by the first mass in structure of vacuum in a point of the second mass, and polarization  $\sigma_{21}$  is created by the second mass in structure of vacuum in a point of the first mass. Thus force of gravitation of Newton is formed and the nature ("mechanism") of this force is determined. Acceleration from gravity gets a corresponding kind:

$$g = G \frac{m}{R^2} = 4\pi \sqrt{\xi G} \sigma_q. \quad (10)$$

Here polarization of structure of vacuum is made on sphere of radius  $R$ . Polarization is formed at deformation of electric structure of vacuum  $\sigma_q = S(\Delta r)^2$ ,

$$\text{Where there is } S = \frac{e_o}{4\pi\alpha^2 r_e^4} = 6,25456357 \cdot 10^{43} \text{ Q/M}^4.$$

The problem of inertia of any mass also is solved with the help of structure of vacuum. The matter is that any mass of particles arises at entering into structure of vacuum the needed energy and is determined by a stream of a magnetic induction. As an example we shall take masses a electron and a

$$\text{proton: } m_e = \sqrt{\frac{\eta}{G}} \Delta_e \Phi = 9,1093818850 \cdot 10^{-31} \text{ kg and}$$

$m_p = \sqrt{\frac{\eta}{G}} \Delta_p \Phi = 1,67262311 \cdot 10^{-27} \text{ kg}$ . It is known, that any change of a stream of a magnetic induction shows inertia. The current in a self-induction cannot change sharply (instantly). Therefore, any masses occurring from a stream of magnetic induction  $\Phi$  will inherit inertia of a magnetic induction. It is possible to show, that there is an equivalent of a self-induction for any mass particles which gives the inertia to any mass [3]. Force of inertia also can be expressed through polarization of structure of vacuum:  $f = ma = 4\pi \sqrt{\xi G} \sigma_q$ .

In summary it is possible to make some statements, concerning the common physics.

1. Electromagnetic character of gravitation and inertia looks convincingly. In theoretical physics there are less proved positions in comparison with a material of given article.
2. The problem of Great Unification of all force interactions is executed on the basis of electromagnetism.
3. In the nature there are no other physical "fields", except for electric and magnetic fields, shown in different forms from gravitation up to nuclear forces.
4. The way for the further research and specification of many known phenomena with the help of structure of vacuum of the universe is open.

#### The literature

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