

# Ethereal Models of Electron and Proton

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**ABSTRACT:** Over the past five years the company "New Inflow" conducted theoretical and experimental studies aimed at promoting a new concept of creating energy devices. At the request of the company the author created a logically consistent mathematical theory of physical vacuum (ether), which allows to understand the mechanisms of appearance of matter and its transformation into energy. Separate sections of the theory were published in some scientific journals. In the present paper, the mathematical models of electron and proton are presented in the form of wave solutions of the nonlinear system of ether equations derived from the laws of classical mechanics. The definitions and formulas for calculating of their charge, energy, mass and magnetic moments are given. Numerical values of the magnetic moments are almost exactly the same as the experimental so-called "anomalous" values.

**KEYWORDS:** Electron, proton, charge, energy, mass, magnetic moment, fine structure and Planck constants.

## I. INTRODUCTION

Elementary particles, such as electron and proton are the main structural units of matter. However, today it is possible to state with regret that modern physical science has no reasonable theoretical idea, that from itself actually represent these elementary particles. Experimentally determined values of the magnetic moments of proton and electron are "anomalous" from the point of view of modern physics. For example, experiments show that the magnetic moment of the electron is twice the magnetic moment which is calculated from the theory of the motion of an electron in Bohr orbit and called the Bohr magneton. Out of the current unpleasant situation, theoretical physicists introduced electron spin to fit to the experimental data. The missing half of the magnetic moment came to be called the spin or intrinsic magnetic moment of the electron. In sum, the two halves gave, naturally, desired experimental value of the magnetic moment of the electron. However, to carry out a similar fit of the theoretical magnetic moment of the proton at its experimental value was not so easy, as the experimental value of the magnetic moment of proton was almost three times greater than its theoretical value, called the nuclear magneton.

In the present paper the basic structural units of matter, such as proton and electron, are presented by solutions of the nonlinear system of ether equations. The formulas of their charges, energy, mass and values of their magnetic moments are found, which coincide with the experimental "anomalous" values. In addition, formulas and values for the Planck constant and the fine structure constant are obtained from the system of ether equations. The mechanism of production of the particle and antiparticle from the photon of the twice energy and the mechanism of particles annihilation are described.

## II. RELATED WORK

On notions of modern physics electron is considered a point particle on probabilistic orbit around proton, that it is as if smeared over the space, and we can only know the probability of finding it in a particular region of space around the proton. It is considered that the question of the size of electron and proton, and the reasons of equality of the absolute values of their charges is incorrect. The value of magnetic moment of electron is the sum of orbital and spin magnetic moments, and the value of the anomalous magnetic moment of proton is due to its internal quark structure [1-4], but modern physical science does not know the nature of the charge of the particles, and all the numerous searches for quarks in a free state were unsuccessful. There is also no reasonable explanation for the processes of annihilation and birth of pairs of particles (electron-positron, proton-antiproton), an essence of difference between particle and antiparticle and the reasons for the absence of antimatter in the Universe. There is also no reasonable explanation for the origin of the masses of proton and electron.

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In [5-10], the author proposed a mathematical model of the ether in the form of dense nonviscous compressible medium in three-dimensional Euclidean space with coordinates  $\vec{r} = (x, y, z)^T$ , having at each time  $t$  the density  $\rho(\vec{r}, t)$  and the velocity vector  $\vec{u}(\vec{r}, t) = (u_1(\vec{r}, t), u_2(\vec{r}, t), u_3(\vec{r}, t))^T$  of propagation of small perturbations of the density. It was proposed to describe the dynamics of the ether by two nonlinear equations. They follow from the equations of classical mechanics of Newton and are invariant under Galilean transformations:

$$\frac{\partial \rho}{\partial t} + \text{div}(\rho \vec{u}) = 0, \quad \frac{\partial(\rho \vec{u})}{\partial t} + (\vec{u} \cdot \nabla)(\rho \vec{u}) = 0, \quad (1)$$

where the first equation is the continuity equation, and the second - the law of conservation of ether momentum.

In [5-8] the equations of Maxwell and Dirac, the laws of Coulomb and Biot-Savart-Laplace were derived from the system of equations (1). The correction of Ampere's law was found, which is valid not only for parallel, but also for perpendicular currents. The basic formulas of quantum mechanics, the formulas for magnetic induction and for intensities of electric and magnetic fields of an element of the current were obtained, the appearance of an electromotive force in the conductor, the forces of Ampere and Lorentz were explained from the standpoint of classical mechanics. There were found not only the well known values of the energy levels of the excited states of the hydrogen atom, which coincide with the experimental values, but also new stable nonradiative hydrinos states of the hydrogen atom, that can not be described by the Schrödinger equation [9-10]. In [12] it is shown that the dimensions of all physical quantities determined from the system of equations (1) coincide with the dimensions of these quantities in the CGS system.

### III. THE SYSTEM OF EQUATIONS OF ELEMENTARY PARTICLES

Electron and proton are truly elementary particles that make up matter. These particles together with their antiparticles (positron and antiproton) are born from photons and are annihilate to form photons. In addition, they have differing only in sign of charge. Therefore, they should have a similar structure and a single mechanism of birth from the ether, which is described by the system of equations (1). Transition in the system (1) to a stationary spherical system of coordinates and consideration only those solutions of the resulting system of equations, in which a component  $V_\theta$  of the velocity vector  $\vec{u} = (V_r, V_\theta, V_\varphi) = (V, 0, W)$  of propagation of ether perturbations along the radius  $r$  and the angles  $(\theta, \varphi)$  is zero, leads to a system of equations of elementary particles:

$$\begin{aligned} \frac{\partial \rho}{\partial t} + \frac{1}{r^2} \frac{\partial(r^2 \rho V)}{\partial r} + \frac{1}{r \sin \theta} \frac{\partial(\rho W)}{\partial \varphi} &= 0, \\ \frac{\partial(\rho V)}{\partial t} + V \frac{\partial(\rho V)}{\partial r} + \frac{W}{r \sin \theta} \frac{\partial(\rho V)}{\partial \varphi} &= 0, \quad (\vec{r}) \\ \frac{\partial(\rho W)}{\partial t} + V \frac{\partial(\rho W)}{\partial r} + \frac{W}{r \sin \theta} \frac{\partial(\rho W)}{\partial \varphi} &= 0, \quad (\vec{\varphi}) \end{aligned} \quad (2)$$

In parentheses after lines of equations of the system (2) the unit coordinate vectors are shown in which directions the vectors of corresponding rows are directed.

Let us find the solutions of the system of equations (2), which have for small  $r$  all the known properties of the basic elementary particles. These solutions will be sought in the form of waves propagating along angle  $\varphi$  around the axis  $z$  with constant angular velocity  $\omega = c/r_0$  under the influence of small oscillations of the ether density:  $W = \omega r \sin \theta$ ,  $\rho(r, \theta, \varphi, t) = \rho_0(1 + g(r, \theta, \varphi, t))$ ,  $|g| \ll 1$ . We assume that the radial component  $v(r, \theta, \varphi, t)$  of the velocity of propagation of ether density perturbations is also small for small  $r$ . In this formulation, each elementary particle is a ball of radius  $r_0$  (Fig.1), within which along each parallel (circle of radius  $r \sin \theta$ ,  $r \leq r_0$ ) as a result of small radial oscillations of the ether density the waves propagate with constant angular velocity (frequency)  $\omega = c/r_0$ , performing a full crawl of the parallel along the angle  $0 \leq \varphi \leq 2\pi$  at the same time  $T = 2\pi r \sin \theta / W = 2\pi / \omega$ . And the linear velocity of these waves increases linearly with increasing radius, reaching its maximum value (the speed of light  $c$ ) on the equator of the ball at  $r = r_0$ ,  $\sin \theta = 1$  (Fig.1). Outside the particle, i.e. when  $r > r_0$  we set  $W = c \sin \theta$ .

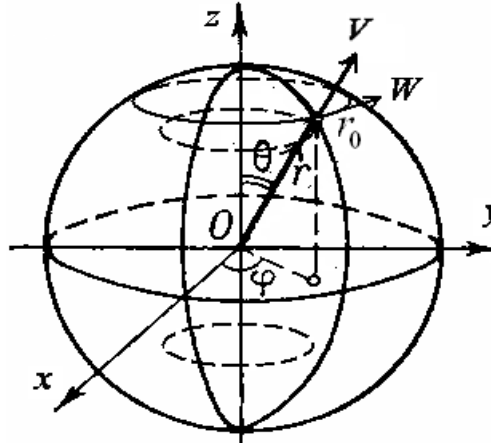


Fig.1. Schematic representation of an elementary particle.

Substituting the expected form of the solutions to the system (2) and neglecting terms of the second order and the products of small terms, in particular, strongly nonlinear second-order term  $V \partial(\rho V) / \partial r \vec{r}$ , which produces the gravitational field of the particle, we obtain a linearized system of equations

$$\begin{aligned} \frac{\partial g}{\partial t} + \frac{\partial V}{\partial r} + \frac{2V}{r} + \omega \frac{\partial g}{\partial \varphi} &= 0, \\ \frac{\partial V}{\partial t} + \omega \frac{\partial V}{\partial \varphi} &= 0, \quad (\vec{r}) \\ \frac{\partial g}{\partial t} + V / r + \omega \frac{\partial g}{\partial \varphi} &= 0. \quad (\vec{\varphi}) \end{aligned} \tag{3}$$

#### IV. TWIRLED PHOTON

We represent by the following way the formation of particle and antiparticle from a spiral wave of photon (see. [5-7]), having a frequency  $2\omega$ . First, the photon is compressed to the form of a wave structure of periodic compressions and stretchings of ether density in the radial direction inside the sphere of radius,  $r_{ph} = c/2\omega$  moving with an angular velocity  $2\omega$  along the angle  $\varphi$  inside the ball, and the length of the equator of the sphere is equal to the Compton wavelength of the photon  $\lambda_c = 2\pi r_{ph}$ . Such a wave passes an angle  $2\pi$  during the time  $T = \pi/\omega$  for any  $r \leq r_{ph}$ . This process is described by solutions of the system of equations (3) of the form:

$$\begin{aligned} V(r, \theta, \varphi, t) &\approx \frac{V(\theta) \cos(\omega t - \varphi/2)}{r}, \quad \frac{d\varphi}{dt} = 2\omega, \\ g(r, \theta, \varphi, t) &\approx -\frac{V(\theta) \varphi \cos(\omega t - \varphi/2)}{r^2 (2\omega)}, \quad W = (2\omega) r \sin \theta. \end{aligned} \tag{4}$$

Solutions of the system of ether equations of the form (4) is a *twirled photon*. It will be shown that the charge and magnetic moment of the twirled photon is zero, and its energy is  $(2\omega)\hbar$ , where  $\hbar$  is the Planck constant. Then the period-doubling bifurcation of twirled photon occurs while maintaining its energy. As a result a twirled photon of double period is born. It is described by solutions of the system of equations (3) of the form:

$$\begin{aligned} V(r, \theta, \varphi, t) &\approx \frac{V(\theta) \cos((\omega t - \varphi)/2)}{r}, \quad \frac{d\varphi}{dt} = \omega, \\ g(r, \theta, \varphi, t) &\approx -\frac{V(\theta) \varphi \cos((\omega t - \varphi)/2)}{r^2 \omega}, \quad W = \omega r \sin \theta. \end{aligned} \tag{5}$$

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Wave of radial oscillations of the ether density of the twirled photon of double period moves along the angle  $\varphi$  with angular velocity  $\omega$  inside the sphere of radius  $r_0 = c/\omega$ . Simultaneously there are small periodic radial compressions and stretchings of the ball of twirled photon with maintaining an average density of ether in it, equal to  $\rho_0$ . Note that the period-doubling bifurcation is the first bifurcation from the universal scenario of several endless cascades of bifurcations, leading to a complication of solutions in any nonlinear system of differential equations [11]. We show that the wave of twirled photon of double period (5) can be presented with the conservation of the wave energy as the sum of the half-wave of compression and half-wave of stretching of ether density, which can be regarded as born a particle and antiparticle from photon, for example, an electron and positron or a proton and antiproton.

## V. CHARGES

We define by the traditional way density of the electric field intensity distribution  $\vec{E}$  and the density of the electric charge distribution  $\delta$  of twirled photon of double period and elementary particles produced from it (see. [5-8]):

$$\vec{E} = E \vec{r} = \frac{W}{r \sin \theta} \frac{\partial(\rho V)}{\partial \varphi} \vec{r}, \quad \delta = \frac{1}{4\pi} \text{div} \left( V \frac{\partial(\rho W)}{\partial r} \vec{\varphi} \right). \quad (6)$$

Then the density of electric charge distribution of a twirled photon of double period will be determined in the first approximation by the expression

$$\delta_0(r, \theta, \xi) = \delta_0(r, \theta, \omega t - \varphi) = \frac{\rho_0 \omega}{8\pi r^2} V(\theta) \sin((\omega t - \varphi)/2). \quad (7)$$

Charge density wave (7) can be written as the sum of two half-waves

$$\begin{aligned} \delta_+(r, \theta, \xi) &= \frac{\rho_0 \omega}{8\pi r^2} V(\theta) \sin \xi / 2, & 0 \leq \xi < 2\pi, \\ \delta_-(r, \theta, \xi) &= \frac{\rho_0 \omega}{8\pi r^2} V(\theta) \sin \xi / 2, & -2\pi \leq \xi < 0, \end{aligned}$$

carrying only positive or only negative charges. It is easy to see that the wave of positive charge corresponds to only periodic expansion of the particle compared to the average volume occupied by the twirled photon of double period, with periodic small increase in the radius of the particle. And the average density of the ether within the particle is less than its density in the unperturbed state  $\rho_0$ . Similarly, a wave of negative charge corresponds to only periodic compression of the particle compared to the average volume occupied by the twirled photon of double period, with periodic small decrease in the radius of the particle. And the average density of the ether within the particle is more than its density in the unperturbed state  $\rho_0$ . Integrating the density of the charge distribution for positive and negative half-wave inside the sphere of radius  $r_0$ , we find the charges which have particle and antiparticle, in the form of:

$$q_{\pm} = \pm \int_0^{\pi} \int_0^{2\pi} \int_0^{r_0} \frac{\rho_0 \omega V(\theta)}{8\pi r^2} \sin(\xi/2) r^2 \sin \theta \, dr d\xi d\theta = \pm \frac{\rho_0 \omega r_0 V_q}{8\pi} \int_0^{2\pi} \sin(\xi/2) d\xi = \pm \frac{\rho_0 \omega r_0 V_q}{2\pi} = \pm \frac{\rho_0 c V_q}{2\pi}; \quad V_q = \int_0^{\pi} V(\theta) \sin \theta \, d\theta. \quad (8)$$

Function  $V_e(\theta)$  and  $V_p(\theta)$  for an electron (positron) and proton (antiproton) in the formulas (7) - (8) will be sought in the form of a series expansion in the angle  $\theta$ :

$$\begin{aligned} V_e(\theta) &= V_0(a + \sin \theta + b \sin 2\theta + c_e \sin 3\theta), \\ V_p(\theta) &= V_0(a + \sin \theta - b \sin 2\theta + c_p \sin 3\theta), \end{aligned} \quad (9)$$

where the constants  $a, b, c_p, c_e$  will be defined below. The following will also be shown that the charge of the particle is determined by the first two terms of the expansion (9), the magnetic moment – by the first, second and fourth terms, while the internal energy and mass of the particle – by all four terms of the expansion. Substituting (9) into (8), we obtain the law on universality of charge

$$|q_e| = |q_p| = \frac{\rho_0 c}{2\pi} V_0 \int_0^{\pi} (a \sin \theta + \sin^2 \theta) d\theta = \frac{\rho_0 c V_0}{4} \left(1 + \frac{4a}{\pi}\right) = q. \quad (10)$$

However, the charge of any twirled photon of double period is equal to zero. In (10) dimensional constants  $V_0, \rho_0, c$  are parameters of the ether through which any other physical constant can be expressed.

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## VI. ELECTRIC FIELDS

Outside the volume of the sphere of elementary particle, i.e. when  $r > r_0$ ,  $W = c \sin \theta$ . Therefore, the density of the electric field intensity distribution outside the sphere of elementary particle is described by the expression:

$$\vec{E} = E \vec{r} = \frac{c\rho_0}{r} \frac{\partial V}{\partial \varphi} \vec{r}, \quad r > r_0.$$

Thus, the vector of the density of the electric field intensity distribution of the twirled photon of double period is the wave vector of the form:

$$\vec{E}_0(r, \theta, \varphi, t) = \frac{c\rho_0}{2r^2} V(\theta) \sin((\omega t - \varphi) / 2) \vec{r},$$

and its positive and negative half-waves are the densities of the electric field intensity distributions of an electron and a positron (or proton and antiproton), respectively. Averaging the obtained expression for each  $r > r_0$  on the surface of a sphere of radius  $r$ , we obtain expressions for the electric field intensities of elementary particles in dependence only on the distance to the center of the particle:

$$\vec{E}_0(r) = \frac{c\rho_0}{4\pi r^2} \int_0^\pi \int_0^{4\pi} \frac{V(\theta)}{2r^2} \sin(\xi / 2) r^2 \sin \theta d\xi d\theta \vec{r} = 0,$$

$$\vec{E}_\pm(r) = \pm \frac{c\rho_0}{4\pi r^2} \int_0^\pi \int_0^{2\pi} \frac{V_{e,p}(\theta)}{2r^2} \sin(\xi / 2) r^2 \sin \theta d\xi d\theta \vec{r} = \pm \frac{\rho_0 c V_q}{2\pi r^2} \vec{r} = \pm \frac{q}{r^2} \vec{r}.$$

Consequently, any twirled photon of double period is electrically neutral while maintaining a constant average density of ether inside it equal to  $\rho_0$ . The electric field of the negatively charged particle is directed towards its center, and ether is compressed slightly inside the particle as compared with its average density. The electric field of the positively charged particle is directed from its center, and ether is rarefied slightly inside the particle compared with its average density. In this regard, it would be correct to attribute a negative charge to proton, but not electron, as due to the electric field direction, negatively charged particles (small but massive protons) have the ability to attract to them positively charged particles (large but light electrons) with the consequent formation of neutrons, hydrogen atoms and other atoms of matter structures. Otherwise, antiprotons should attract positrons to them to form structures of antimatter, which is not observed in the Universe. But further, without breaking the conventional agreements, we consider that electron, antiproton have negative charges, and positron, proton have positive charges.

The expressions obtained are, in fact, a generalization of Coulomb's law. They imply that electrons are repelled with the force given by Coulomb's law, and electrons and protons are attracted with the same force. However, from these expressions does not mean that protons must repel, that is, it is likely that the Coulomb barrier does not exists in nuclei of atoms. Its role can be played inability of multiple compression of ether by several protons.

## VII. MAGNETIC MOMENTS

To calculate the magnetic moments of elementary particles we use the well-known formula

$$\vec{p}_m = \frac{1}{2} \int_{\Omega} \Delta [\vec{W} \cdot \vec{r}] d\Omega, \tag{11}$$

where electric charges with density distribution  $\Delta$  are moved within the volume  $\Omega$  at a linear rate  $\vec{w}$ . Since the density distribution  $\Delta$  of the total electric charge is given by the expression (6) without the normalizing factor  $1/4\pi$ , then the twirled photon of double period has a density distribution of the total electric charge in the form of a wave:

$$\Delta_0 = 4\pi \delta_0(r, \theta, \xi) = \frac{\rho_0 \omega}{2r^2} V(\theta) \sin((\omega t - \varphi) / 2),$$

positive and negative half-waves of which are the density distributions of the total electric charges in the balls of a positron and an electron (or a proton and antiproton). Consequently,

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$$\Delta_p = \frac{\rho_0 \omega_p}{2r^2} V_p(\theta) \sin((\omega_p t - \varphi) / 2), \quad 0 \leq \omega_p t - \varphi < 2\pi;$$

$$\Delta_e = \frac{\rho_0 \omega_e}{2r^2} V_e(\theta) \sin((\omega_e t - \varphi) / 2), \quad -2\pi \leq \omega_e t - \varphi < 0.$$

Substituting the expression for the density distributions of the total electric charges of elementary particles (protons and electrons) in the formula (11) and taking into account that the motion of charges occurs around a vertical axis, so that  $|\vec{r}| = r \sin \theta$  and the vectors  $\vec{W} = \omega r \sin \theta \vec{\varphi}$  and  $\vec{r}$  are orthogonal, we find that

$$p_{m0} = \frac{1}{2} \int_0^\pi \int_0^{2\pi} \int_0^{r_0} \Delta_0(r, \theta, \xi) \omega r \sin \theta r \sin \theta r^2 \sin \theta \, dr d\xi d\theta = 0,$$

i.e., the magnetic moment of the twirled photon of double period is zero. Further,

$$p_{mp,e} = \pm \frac{1}{2} \int_0^\pi \int_0^{2\pi} \int_0^{r_{p,e}} \frac{\rho_0 \omega_{p,e}}{2r^2} V_{p,e}(\theta) \sin(\xi / 2) \omega_{p,e} r \sin \theta r \sin \theta r^2 \sin \theta \, dr d\xi d\theta$$

$$= \pm \frac{1}{2} \int_0^\pi \int_0^{2\pi} \int_0^{r_{p,e}} \frac{\rho_0 \omega_{p,e}}{2r^2} V_{p,e}(\theta) \sin(\xi / 2) \omega_{p,e} r^4 \sin^3 \theta \, dr d\xi d\theta = \tag{12}$$

$$\pm \frac{\rho_0 \omega_{p,e}^2 r_{p,e}^3}{3} V_{mp,e} = \pm \frac{\rho_0 c^2 r_{p,e}}{3} V_{mp,e}, \quad V_{mp,e} = \int_0^\pi V_{p,e}(\theta) \sin^3 \theta \, d\theta.$$

Rewrite the magnetic moments of electron and proton through the Bohr magneton  $\mu_B$  and the nuclear magneton  $\mu_N$ . Since for any elementary particle, as it will be shown below,  $mcr_0 = mc^2/\omega = \hbar\omega/\omega = \hbar$ , the Bohr magneton and nuclear magneton can be written as

$$\mu_B = \frac{q\hbar}{2m_e} = \frac{qc r_e}{2}; \quad \mu_N = \frac{q\hbar}{2m_p} = \frac{qc r_p}{2}. \tag{13}$$

Consequently, since  $q = \rho_0 c V_q / (2\pi)$ , then the expressions for the magnetic moments of electron and proton (12) can be written in terms of the Bohr magneton and nuclear magneton as follows

$$p_{me} = -\frac{4\pi V_{me}}{3V_q} \frac{qc r_e}{2} = \beta_e \mu_B, \quad p_{mp} = \frac{4\pi V_{mp}}{3V_q} \frac{qc r_p}{2} = \beta_p \mu_N. \tag{14}$$

Find the values  $\beta_e$  and  $\beta_p$  of the magnetic moments of electron and proton in terms of magnetons in the case where the functions  $V_e(\theta)$  and  $V_p(\theta)$  are given by the formulas (9). In this case,

$$V_{me} = V_0 \int_0^\pi (a + \sin \theta + b \sin 2\theta + c_e \sin 3\theta) \sin^3 \theta \, d\theta = V_0 \left( \frac{4}{3} a + \frac{3\pi}{8} - \frac{\pi}{8} c_e \right) = \frac{\pi}{8} \left( \frac{32a}{3\pi} + 3 - c_e \right) V_0,$$

$$V_{mp} = V_0 \int_0^\pi (a + \sin \theta - b \sin 2\theta + c_p \sin 3\theta) \sin^3 \theta \, d\theta = V_0 \left( \frac{4a}{3} + \frac{3\pi}{8} - \frac{\pi}{8} c_p \right) = \frac{\pi}{8} \left( \frac{32a}{3\pi} + 3 - c_p \right) V_0.$$

Consequently,

$$\beta_e = -\pi \left( \frac{32a}{9\pi} + 1 - c_e / 3 \right) / \left( \frac{4a}{\pi} + 1 \right); \quad \beta_p = \pi \left( \frac{32a}{9\pi} + 1 - c_p / 3 \right) / \left( \frac{4a}{\pi} + 1 \right). \tag{15}$$

Note that the magnetic moment of the electron is not the sum of the two halves of the orbital and spin magnetic moments. Magnetic moment of electron, as well as magnetic moment of proton, is determined solely by the movement of waves of perturbations of ether density inside the sphere of the particle around its axis.

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VIII. INTERNAL ENERGY AND MASS

Under the internal energy of any elementary particle we will mean the total work done by the forces of internal field of a particle over all charges distributed within the volume of the particle. Since  $\omega dt = d\varphi$ , then the work  $dA$  done by the forces  $\vec{F}$  of internal field in the moment  $dt$  over the charges distributed with the density  $\Lambda$  in the element of area  $r \sin \theta d\theta dr$  and moving with the linear velocity  $\vec{W}$ , is equal to the work on moving these charges in the angle  $d\varphi/\omega$  or in the volume  $r^2 \sin \theta dr d\varphi d\theta/\omega$ . Consequently,

$$dA = \Lambda(\vec{F} \cdot \vec{W})r^2 \sin \theta dr d\varphi d\theta / \omega \tag{16}$$

Under the forces  $\vec{F}$  of the internal field is to be understood all the force member of the third equation of the system (2), and under the density of all the charges - the divergence of this force member. That is,  $\vec{F} = F\vec{\varphi}$ , where for a twirled photon

$$F = -\frac{\partial(\rho W)}{\partial t} \approx -\rho_0 2\omega r \sin \theta \frac{\partial g}{\partial t} = -\rho_0 \omega \sin \theta \frac{V(\theta)}{r} \varphi \sin(\omega t - \varphi/2),$$

$$\Lambda = \text{div} \vec{F} = \frac{1}{r \sin \theta} \frac{\partial F}{\partial \varphi} \approx -\rho_0 \omega \frac{V(\theta)}{r^2} \frac{\partial \varphi \sin(\omega t - \varphi/2)}{\partial \varphi}.$$

We will find a work of the internal forces over the charges of twirled photon at any moment, integrating (16) on the volume of a twirled photon considering the collinearity of the vectors  $\vec{F}$  and  $\vec{W}$ :

$$A_{ph}(t) = \int_0^\pi \int_0^{2\pi r_{ph}} \int_0^{2\pi} \Lambda F(2\omega) r \sin \theta r^2 \sin \theta dr d\varphi d\theta / (2\omega) = \frac{1}{2} \int_0^\pi \int_0^{2\pi r_{ph}} \int_0^{2\pi} \rho_0^2 \omega^2 V^2(\theta) \frac{\partial}{\partial \varphi} (\varphi \sin(\omega t - \varphi/2))^2 \sin^3 \theta dr d\varphi d\theta = 2\rho_0^2 \omega^2 \pi^2 r_{ph} \sin^2(\omega t) \int_0^\pi V^2(\theta) \sin^3 \theta d\theta.$$

Averaging the resulting expression for the period  $2\pi/\omega$  and taking into account that  $(2\omega)r_{ph}=c$ , we obtain the value of the internal energy of a twirled photon in the form

$$\varepsilon_{ph} = \pi^2 \rho_0^2 c V_\varepsilon (2\omega_{ph}) / 4 = \hbar(2\omega), \quad V_\varepsilon = \int_0^\pi V^2(\theta) \sin^3 \theta d\theta, \quad \hbar = \pi^2 \rho_0^2 c V_\varepsilon / 4. \tag{17}$$

For twirled photon of double period we will obtain

$$F = -\frac{\partial(\rho W)}{\partial t} \approx -\rho_0 \omega r \sin \theta \frac{\partial g}{\partial t} = -\rho_0 \omega \sin \theta \frac{V(\theta)}{2r} \varphi \sin((\omega t - \varphi)/2),$$

$$\Lambda = \text{div} \vec{F} = \frac{1}{r \sin \theta} \frac{\partial F}{\partial \varphi} \approx -\rho_0 \omega \frac{V(\theta)}{2r^2} \frac{\partial \varphi \sin((\omega t - \varphi)/2)}{\partial \varphi}.$$

The overall work of the internal forces over the charges of twirled photon of double period at any moment we will find as twice the integral (16) over the volume of the particle:

$$A_0(t) = 2 \int_0^\pi \int_0^{2\pi r_0} \int_0^{2\pi} \Lambda F \omega r \sin \theta r^2 \sin \theta dr d\varphi d\theta / \omega = \frac{1}{4} \int_0^\pi \int_0^{2\pi r_0} \int_0^{2\pi} \rho_0^2 \omega^2 V^2(\theta) \frac{\partial}{\partial \varphi} (\varphi \sin((\omega t - \varphi)/2))^2 \sin^3 \theta dr d\varphi d\theta = \rho_0^2 \omega^2 \pi^2 r_0 \sin^2(\omega t/2) \int_0^\pi V^2(\theta) \sin^3 \theta d\theta.$$

Averaging the resulting expression for the period  $2\pi/\omega$  and taking into account that  $\omega r_0 = c$ , we will find that the value of the internal energy of the twirled photon of double period is equal to the internal energy of the twirled photon

$$\varepsilon_0 = \pi^2 \rho_0^2 c V_\varepsilon \omega / 2 = 2\hbar\omega = \hbar(2\omega) = \varepsilon_{ph}.$$

For an electron, proton, positron and antiproton we will obtain the energy values equal to half of the energy values of their parent photons

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$$A_{e,p}(t) = \int_0^\pi \int_0^{2\pi r_{e,p}} \int_0^\pi \Lambda_{e,p} F_{e,p} \omega_{e,p} r \sin \theta r^2 \sin \theta dr d\varphi d\theta / \omega_{e,p} = \frac{1}{8} \int_0^\pi \int_0^{2\pi r_{e,p}} \int_0^\pi \rho_0^2 \omega_{e,p}^2 V_{e,p}^2(\theta) \frac{\partial}{\partial \varphi} (\varphi \sin((\omega_{e,p} t - \varphi)/2))^2 \sin^3 \theta dr d\varphi d\theta = \frac{1}{2} \rho_0^2 \omega_{e,p}^2 \pi^2 r_{e,p} \sin^2(\omega_{e,p} t/2) \int_0^\pi V_{e,p}^2(\theta) \sin^3 \theta d\theta$$

Averaging the resulting expressions, respectively, for the periods  $2\pi/\omega_{e,p}$  and considering that  $\omega_{e,p} r_{e,p} = c$ , we will obtain the values of the internal energy of the electron and the proton (positron and antiproton) in the form:

$$\varepsilon_e = \pi^2 \rho_0^2 c V_{e,e} \omega_e / 4, \quad \varepsilon_p = \pi^2 \rho_0^2 c V_{e,p} \omega_p / 4, \quad V_{e,e,p} = \int_0^\pi V_{e,p}^2(\theta) \sin^3 \theta d\theta. \quad (18)$$

We now calculate the values  $V_{e,e}$  and  $V_{e,p}$  for functions  $V_e(\theta)$  and  $V_p(\theta)$  of electron and proton, defined by the formulas (9):

$$V_{e,e,p} = \int_0^\pi V_0^2 (a + \sin \theta \pm b \sin 2\theta + c_{e,p} \sin 3\theta)^2 \sin^3 \theta d\theta = V_0^2 \left( \frac{4a^2}{3} + \frac{3a\pi}{4} + \frac{16}{15} + \frac{64}{105} b^2 - \left( \frac{32}{35} + \frac{a\pi}{4} \right) c_{e,p} + \frac{208}{315} c_{e,p}^2 \right).$$

From the existence of the Planck constant  $\hbar$ , such that in (17) and (18),  $\varepsilon_{ph} = \hbar(2\omega)$ ,  $\varepsilon_e = \hbar\omega_e$ ,  $\varepsilon_p = \hbar\omega_p$ , it follows that  $V_{e,e} = V_{e,p} = V_e = V_0^2 d = const$ , where  $d$  is a dimensionless constant. Then it becomes possible to correctly determine one of the basic fundamental physical constants - the Planck constant through the parameters of the ether:

$$\hbar = \pi^2 \rho_0^2 c V_e / 4 = \pi^2 \rho_0^2 c V_0^2 d / 4. \quad (19)$$

Then the values of constants  $c_e, c_p$  must be roots of the quadratic equation

$$\frac{4a^2}{3} + \frac{3a\pi}{4} + \frac{16}{15} + \frac{64}{105} b^2 - \left( \frac{32}{35} + \frac{a\pi}{4} \right) c + \frac{208}{315} c^2 - d = 0. \quad (20)$$

It follows from (20) that

$$c_e + c_p = \frac{315}{208} \left( \frac{32}{35} + \frac{a\pi}{4} \right) \quad (21)$$

Another fundamental physical constant of microcosm along with the Planck constant is the dimensionless fine structure constant  $\alpha = q^2 / \hbar c$ . Substituting in the last formula the values of the universal charge and Planck constant defined above through the parameters of ether, we will obtain that

$$\alpha = \frac{q^2}{\hbar c} = \frac{\rho_0^2 c^2 V_0^2 (4a/\pi + 1)^2}{16\pi^2 \rho_0^2 c V_0^2 d c / 4} = \frac{(4a/\pi + 1)^2}{4\pi^2 d}. \quad (22)$$

As it can be seen from (18), the internal energy of elementary particle is proportional to the angular velocity of the wave (double frequency of oscillations) of perturbations of ether density inside the particle, and the coefficient of proportionality is the Planck constant. In addition, if we enter a mass of elementary particle according to the formula  $m = \pi^2 \rho_0^2 V_e \omega / 4c = \hbar \omega / c^2$ , then we immediately obtain

$$\varepsilon_e = \hbar \omega_e = m_e c^2, \quad \varepsilon_p = \hbar \omega_p = m_p c^2, \quad \varepsilon_{ph,e,p} = \hbar(2\omega_{e,p}) = 2m_{e,p} c^2. \quad (23)$$

It can be concluded that the presence of mass in any elementary particle is a consequence of the change (compression or stretching) of density of perturbed ether inside the particle with respect to its density  $\rho_0$  in the unperturbed state, but not the result of a meeting of the particle with some mythical Higgs boson. Therefore a twirled photon has energy, but does not have a mass. It also has zero charge and magnetic moment. It also follows from (23) that the perimeter of the equator of sphere of an elementary particle ( $2\pi r_{e,p}$ ) is equal to its Compton wavelength ( $2\pi \hbar / m_{e,p} c$ ), and the radius of the elementary particle coincides with its Compton radius. That is, the radius of the ball of electron is about 1836 times larger than the radius of the ball of proton. Formulas (23) also explain the well-known experimental fact that the production of a pair of elementary particles requires the photon energy, not less than the twice energy of each of the produced particle. There is also a reasonable explanation for the annihilation of a pair of elementary particles (for example, electron-positron) when their connection leads to birth the massless twirled photon of double period which has the twice energy, and then it generates two spiral waves of two photons with equal energies and frequencies, moving in the ether of the constant density  $\rho_0$  in opposite directions and with opposite spins.



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## IX. QUADRUPLE MOMENT OF PROTON

As is known, the experimental value of the quadruple moment of proton is zero. Let us calculate its theoretical value, based on the above presented ethereal model of proton:

$$Q_p = \frac{1}{q} \int_0^\pi \int_0^{2\pi r_p} \int_0^r (3r^2 \cos^2 \theta - r^2) \frac{\rho_0 \omega V_p(\theta)}{8\pi r^2} \sin(\xi/2) r^2 \sin \theta \, dr d\xi d\theta = \frac{\rho_0 \omega}{2\pi q} \int_0^{r_p} r^2 \left[ \int_0^\pi 3 \cos^2 \theta V_p(\theta) \sin(\theta) d\theta - \int_0^\pi V_p(\theta) \sin(\theta) d\theta \right] dr.$$

And since

$$\int_0^\pi V_p(\theta) \sin(\theta) d\theta = V_q = V_0(2a + \pi/2), \quad \int_0^\pi 3 \cos^2 \theta V_p(\theta) \sin \theta d\theta = V_0(2a + 3\pi/8 + 3c_p \pi/8),$$

then the equality  $Q_p=0$  allows us to determine the constant  $c_p=1/3$ .

## X. COMPARISON WITH EXPERIMENTAL DATA

Let us find the numerical values of the constants in the above proposed ethereal models of electron and proton and compare the numerical values of their characteristics obtained by formulas of ether, with the experimental data. Let  $\gamma = 4a/\pi$ . Then, by substituting the value  $c_p=1/3$  in the formula for the magnetic moment of proton (15), that was found from the vanishing of its quadruple moment, we immediately obtain

$$\beta_p = \pi \left( \frac{8\gamma}{9} + 1 - 1/9 \right) / (\gamma + 1) = \frac{8\pi}{9} = 2.79253.$$

This value of the magnetic moment of proton found from the ether theory less than on 0.01% differs from its experimental value  $\beta_p \approx 2.7928$ . Further, let  $\gamma = 0.2$  and hence  $a = \pi/20$  in the formulas (9). Then we obtain from (21) and (15) of the ether theory the value of the magnetic moment of electron

$$\beta_e = -\pi \left( \frac{8\gamma}{9} + 1 - \left( \frac{18}{13} + \frac{315}{208} \frac{\pi^2}{16} \gamma - \frac{1}{3} \right) / 3 \right) / (\gamma + 1) = -2.00295,$$

which less than on 0.04% differs from its experimental value  $\beta_e \approx -2.0023$  ([13]). Further, let  $d = 5$  in the formula (20). Then we obtain from the formula (22) of the ether theory the value of the fine structure constant

$$\alpha = \frac{(1+\gamma)^2}{4\pi^2 d} = \frac{1.44}{20\pi^2} = 0.00729514,$$

which also less than on 0.04% differs from its experimental value  $\alpha = 0.00729735$ . Thus, the values of the fine structure constant and the magnetic moments of proton and electron, which are obtained from the formulas of the considered above ether theory are different from their experimentally determined values less than on 0.04%. The last constant  $b$  in (9), we find from (20) at  $d = 5$ ,  $c = c_p = 1/3$ ,  $a = \pi/20$ . We obtain  $b \approx 2.5$ .

## XI. CONCLUSION

In this paper, based on the ether equations derived on the basis of common sense and the laws of classical mechanics, ethereal mathematical models of the electron and proton are constructed, the reasonable definitions and the formulas for their charges, energy, mass and magnetic moments are given. Their numerical values are almost exactly coincide with the experimental so-called "anomalous" values of the magnetic moments. Representations of the Planck constant and the fine structure constant are obtained through the parameters of the ether, and the value of the fine structure constant calculated according to the formulas of the ether theory, is almost exactly equal to its experimental value. Theoretically grounded and validated by the formulas of the ether theory: the law of the charge universality of elementary particles, the mechanism of birth of particles and antiparticles from the photon of the twice energy and the mechanism of the particles annihilation.

The results of the work are one of the parts of the mathematical theory of ether, which is developed in the company "New Inflow" (Moscow, Russia) in the framework of projects financed by the company, and in close cooperation with the directions of theoretical and experimental studies, numerical modeling of physical processes. Some other parts of the theory have been published in [5-10,12]. The following parts of the theory will be published in the nearest future.

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## REFERENCES

- [1] Feynman, R.P., Leighton, R.B., and Sands, M., "The Feynman lectures of physics", Addison-Wesley P.C. Inc., London, 1963.
- [2] Tipler, P.A., Llewellyn, R.A., "Modern Physics", Freeman, New York, 1999.
- [3] Das, A., Ferbel, T., "Introduction to Nuclear and Particle Physics", Wiley, New York, 1994.
- [4] Mills, L., "The grand unified theory of classical physics", Blacklight Power Inc., vol.1-3, 2010.
- [5] Magnitskii, N.A., "To electrodynamics of physical vacuum", Complex systems, vol.1(1), pp. 83-91, 2011. (in Russian)
- [6] Magnitskii, N.A., "Mathematical Theory of Physical Vacuum", Comm. Nonlin. Sci. and Numer. Simul., Elsevier, 16, pp.2438-2444, 2011.
- [7] Magnitskii, N.A., "Theory of elementary particles based on Newtonian mechanics". In "Quantum Mechanics/Book 1"- InTech, , pp.107-126, 2012.
- [8] Magnitskii, N.A., "Physical vacuum and electromagnetic laws", Complex systems, vol.1(2), pp. 80-96, 2012. (in Russian)
- [9] Magnitskii, N.A., "Ethereal model of the hydrogen atom", Complex systems, vol. 3(4), pp. 78-86, 2012. (in Russian)
- [10] Magnitskii, N.A., "Ether equations - a classical alternative to the Schrödinger equation", IJLRST, vol.1(3), pp. 229-233, 2012.
- [11] Magnitskii, N.A., "Theory of dynamical chaos". LENAND, 2011. (in Russian)
- [12] Zaitsev, F.S., Magnitskii, N.A., "On the dimensions of variables and some properties of the system of physical vacuum (ether) equations", Complex systems, vol.2(3), pp. 93-97, 2012. (in Russian)
- [13] Drell, S.D., Zachariasen F., "Electromagnetic Structure of Nucleons", Oxford University Press, 1961

## BIOGRAPHY

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