The Coulomb's law in the theory of a dark matter.

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Introduction

Einstein spent the last 30 years of his life searching for the possibility of combining fundamental interactions (gravity and electromagnetism at that time) within the framework of the general theory of relativity (GRT). In his research, Einstein believed that all the fundamental interactions are derived from a single unified field, the carrier of which is four-dimensional space-time. Einstein succeeded in representing the nature of gravity as a curvature of four-dimensional space-time. Однако, объединить гравитацию с электромагнетизмом с помощью этих идей он не сумел. Modern physicists continue the try to build an even more grandiose theory that must unite four fundamental interactions, including gravitational forces, inertial forces, nuclear forces, electromagnetism and electroweak forces.

In his works on the creation of the theory of dark matter of the cosmos (placed in ResearchGate, in General Science Journals and on the site www.buragosg.narod.ru), we propose our model of such a Unified field. This theory has allowed us to reveal the physical nature of gravitational forces, inertial forces, nuclear forces and energy, to understand deeper many mysterious astronomical phenomena. From these positions, we have offered a deeper understanding of the laws of the propagation of light in the cosmic space between stars for billions of years. This made it possible to show that Hubble's law does not have to be connected with Doppler's law and the idea of expanding the universe, as well as with the Big Bang. We believe that it is the dark matter of the cosmos that is the One Field that unites all of the listed fundamental interactions.

The theory of the dark matter of the cosmos developed by us is based on the assumption that there are two types of matter in the universe. One of them is ordinary baryonic matter, and the other, the so-called dark matter, is the primary matter. The presence of such matter in the universe receives in science more and more the complete evidence. However, until now it is believed that these two substances do not interact with each other. In contrast to these views, we assume that dark matter between stars, planets and other objects of the universe is in the gaseous state and actively interacts with baryonic matter. The atoms of baryonic matter continuously absorb dark matter, increasing their mass. As a result, near all baryonic bodies, including stars and massive planets, radial currents of f dark matter are directed toward their centers. In addition, near the stars and planets, there are vortices of dark matter.

In this article (and subsequent articles) within the framework of our theory, we propose our own vision of the nature of electromagnetism on the basis of previously discovered laws of interaction of dark matter with elementary particles of baryonic matter. We begin with the law of Coulomb.

The Coulomb's law. The spin of the electron

The Coulomb law determines the modulus of the electrostatic interaction between point electrostatic charges (elementary charges) and is written in the form

$$F=\frac{q_1 q_2}{4\pi\varepsilon\varepsilon_o r^2}=\frac{2{,}1\cdot 10^{-28}}{r^2}\ [\mathrm{N}] \qquad (1)$$

Here, q is the magnitude of the electrostatic charge. The various electric charges are attracted to each other, but the identical electrical charges repels. For the vacuum ε=1 -is the relative dielectric constant. $\varepsilon_o=8{,}85\cdot10^{-12}$ [fps] is the electrostatic constant. The electrostatic charges have spherical symmetry. The force F is directed along a straight line connecting the centers of charges. During electrification the electrostatic charge can pass from one body to another. As a result, one of them takes a positive charge, and the other takes the negative electrostatic charge.

It is believed that some elementary particles of matter carry an electric charge. The electron has a negative charge, and the positron and the proton are positive. Modulo these charges are the same and equal to the value $e=1{,}60219\cdot10^{-19}$ [Cl]. The forces of electrostatic interaction hold the electron in orbit around the nucleus of the atom in the planetary model of Rutherford. (For reference, 1ph/m = 1kl/Nm).

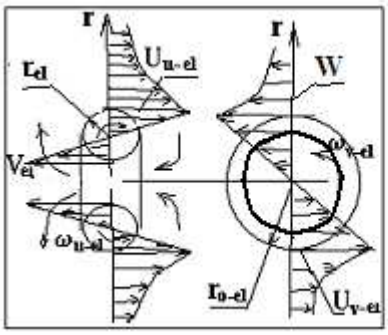

Fig.1

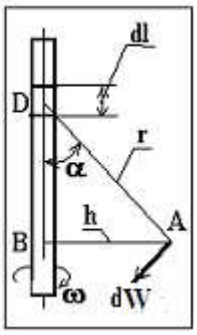

Fig.2

In the theory of the dark matter of the cosmos [1,2,3,4,5,12], the electron is a circular a vortex with a radius r_{o-el} (Fig.1). The radius of the section of the vortex ring is $r_{el}=\frac{r_{o-el}}{200}=0{,}005\cdot r_{o-el}$. Inside the vortex ring, gaseous dark matter moves in circumferential and annular directions at velocities

$U_{u\text{-}el}=\omega_{u\text{-}el}\,r$, где $0\le r\le 0{,}005\cdot r_{o-el}$ (2)

$U_{v\text{-}el}=\omega_{v\text{-}el}\,r$, где $0\le r\le r_{o-el}$ (3)

Like any whirlwind, a vortexelectron induces a field of velocities around itself in a dark gas (in gaseous dark matter). In order to be clearer, let us consider the velocity field around a rectilinear vortex, described by the Biot-Savart law (Fig. 2)

$$dW=\frac{\Gamma\cdot Sin\alpha\cdot dl}{4\pi\cdot r^2} \quad (4)$$

Here, Γ is the velocity circulation equal to the strength of a rectilinear vortex. We represent the vortexelectron as an element of a rectilinear vortex of width dl. With respect to the vortexelectron then as dl, we take the width (diameter) of the cross section of the vortex ring $\Delta l=2r_{el}=\frac{2r_{o-el}}{200}=0{,}01\cdot r_{o-el}$. The velocity dW is now the rate induced by the vortexelectron $dW\rightarrow W$ at point A. It lies in a plane perpendicular to the axis of the vortex element dl and is directed towards the rotation of the vortex. r is the distance between the point A and the axis of the vortex element in question. α- is the angle between the axis of the vortex element dl and the radius r. The circulation Γ of a rectilinear vortex in the Biot-Savart formula will now be a circulation of the velocity calculated along the perimeter of the vortex

ring electron $\Gamma \to \Gamma_{el}$. In this case, the circumferential velocity around the axis of symmetry of the vortex ring of an electron in the surrounding field of a dark gas in the plane of the vortex ring is expressed by the formula

$$W=\frac{0,01}{4\pi}\cdot\frac{\Gamma_{el}r_{o-el}}{r^2}=0,0008\cdot\frac{\Gamma_{el}r_{o-el}}{r^2} \quad (5)$$

Here, Γ_{el} is the circulation of the velocity calculated along the perimeter of the vortex ring of the electron. It is written by the formula

$$\Gamma_{el}=2\pi r_{o\text{-}el}\,U_{v\text{-}el}=2\pi\omega_{v\text{-}el}r^2_{o\text{-}el} \quad (6)$$

The circumferential velocity U_{v-el} is the velocity at the outer boundary of the vortex ring $U_{v-el}=\omega_{v-el}\cdot r_{o-el}$. Taking into account formulas (5) and (6), the velocity W takes the form

$$W=\frac{0,01}{4\pi}\cdot\frac{\Gamma_{el}r_{o-el}}{\cdot r^2}=0,005\cdot\frac{\omega_{v-el}r^3_{o-el}}{r^2} \quad (7)$$

If another vortex electron or vortex positron is located in the field of the peripheral velocities near the vortexelectron, the Magnus effect arises, according to which a transverse force acts on the vortex in the flow of a liquid or gas flowing onto it. It was opened by the German scientist G. G. Magnus (N. G. Magnus) in 1852. The transverse force is always directed from that side of the rotating vortex, on which the direction of rotation and direction of flow are opposite, and to the side on which these directions coincide (Fig. 3).

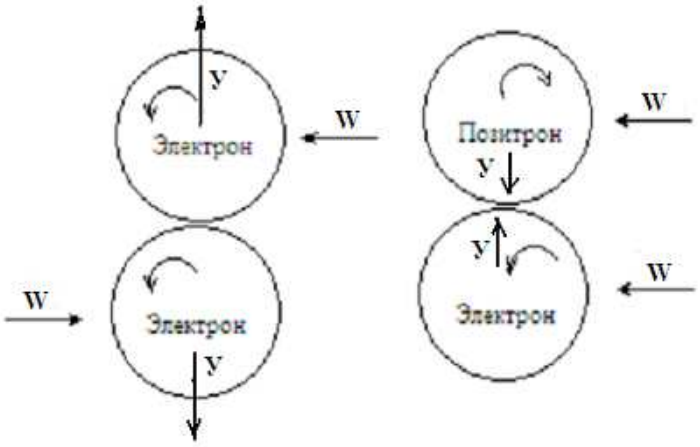

Fig.3

According to Zhukovsky's theorem on normal force, on the each vortex electron will be acted upon by a repulsive force directed along the line connecting their centers. The module of this force is equal to the product of the density and velocity of the incoming flow (the flow of gaseous dark matter) to the circulation of the velocity, calculated along the perimeter of the streamlined body (along the outer perimeter of the vortex electron) and on the sweep of the streamlined body (the width of the vortex ring of the electron). If in place of the second electron there is a positron with the opposite direction of rotation of jets of gaseous dark matter in the vortex ring, the direction of the force will change to the opposite. The changing the direction of rotation in the positron in comparison with the electron will not affect the velocity circulation module

$$|\Gamma_{el}|=|\Gamma_{poz}|, \quad (8)$$

With this in mind, we apply Zhukovsky's theorem to determining the modulus of the force acting on each elementary vortex particle interacting with each other. is blown by a stream W

$$У = \rho_e \cdot W \cdot \Gamma_{el} \cdot \Delta l = \rho_{e\cdot} \cdot \frac{10^{-4} \cdot \Gamma_{el} \cdot \Gamma_{el} \cdot r_{o-el}^2}{4\pi \cdot r^2} =$$
$$= \rho_e \cdot 0{,}005 \cdot \frac{\omega_{v-el} \cdot r_{o-el}^3}{r^2} \cdot 2\pi \cdot \omega_{v-el} \cdot r_{o-el}^2 \cdot 0{,}01 \cdot r_{o-el} = 0{,}373 \cdot 10^6 \cdot \frac{\omega_{v-el}^2 r_{o-el}^6}{r^2} \quad (9)$$

The value of the density of gaseous dark matter is ρ_e=1,19·10^9 kg / m3. It was obtained in [1, 2, 3] from the analysis of the law of universal gravitation of I. Newton with reference to the star of the white dwarf Wolf-457 and the Moon. We believe that the force determined by Zhukovsky's theorem is equal to the force determined by the Coulomb law ($У = F$). Consequently, we can equate the right-hand sides of expressions (1) and (9)

$$0{,}37 \cdot 10^6 \cdot \frac{\omega_{v-el}^2 r_{o-el}^6}{r^2} = \frac{2{,}1 \cdot 10^{-28}}{r^2} \quad (10)$$

Expression (10) contains two unknown quantities-ω_{v-el} u r_{o-el}. To determine these quantities, let us turn to the concept of the spin of an electron. Recall that according to the theory of dark matter [4,5], the electron is a vortex, in which a thin thread of liquid dark matter passes. It is surrounded by a circular vortex of gaseous dark matter and continuously absorbs this dark gas , like the nucleus of an atom. This ring (vortexelectron) is ejected from the hydrogen atom (and any other atom of baryonic matter) under strong excitation of the atom (for example, as a result of a strong collision with another elementary particle). Outside the atom, the electron retains its ring shape and a large angular velocity ω_{v-el}.

We believe that each electron has a constant mechanical moment of momentum. The mechanical moment of an electron is called the spin. (The concept of spin was introduced in 1925 by J. Uhlenbeck and S. Goudsmit, who, in interpreting the experimental data on the splitting of a beam of silver atoms in a magnetic field, assumed that the electron can be regarded as a revolving disk with its projection on the field direction equal to $\pm\frac{1}{2}h$). According to [13], the spin of an electron L_{eB} or another elementary particle is the angular momentum of an electron or another elementary particle M_{el}, due to its quantum nature. The projection of the spin on the direction of induction "B" of the external magnetic field can take only two values-positive and negative. The spin module can be written in the following form.

$$L_{eB} = \frac{\hbar}{2} = \frac{h}{4\pi} = 0{,}525 \cdot 10^{-34} \text{ Дж·с}, \quad (11)$$

where h=6,626·10^{-34}[J·s]=б,54·10^{-27}[erg·s] - is the Planck constant; The momentum of the mass of the vortex electron by toroidal shape will be

$$M_{el} = m_{el} U_{v-el} \cdot r_{o-el} = m_{el} \omega_{v-el} r_{o-el}^2, \quad (12)$$

where the electron mass is $m_{el} = 9{,}11 \cdot 10^{-31}$ [kg], the circumferential velocity at the outer edge of the vortex electron $U_{v-el} = \omega_{v-el} \cdot r_{o-el}$.

Taking into account expressions (11) and (12), the electron spin is written down

$$L_{eB} = \frac{h}{4\pi} = m_{el} \omega_{el} r_{o-el}^2 = 0{,}525 \cdot 10^{-34} \text{ [J·s]}, \quad (13)$$

We equate the right-hand sides of (12) and (13). We Let us substitute the mass of an electron and, as a result, we get

$$0{,}525 \cdot 10^{-34} = 9{,}11 \cdot 10^{-31} \omega_{v-el} r_{o-el}^2 \qquad (14)$$

The equations (10) and (14) constitute a system for determining unknown quantities ω_{v-el} and r_{o-el}. From (14) we express the angular velocity of a vortex electron

$$\omega_{v-el} = \frac{0{,}525 \cdot 10^{-34}}{9{,}11 \cdot 10^{-31\cdot} \cdot r_{o-el}^2} = \frac{0{,}576 \cdot 10^{-4}}{r_{o-el}^2} \qquad (15)$$

We substitute expression (15) in (10) and solve it with respect to r_{o-el}

$$r_{o-el} = 1{,}7 \cdot 10^{-12} \text{ m} \qquad (16)$$

We substitute (16) into (15), we obtain the value ω_{v-el}

$$\omega_{v-el} = 0{,}2 \cdot 10^{20} \text{ c}^{-1} \qquad (17)$$

The obtained parameters of the vortexelectron made it possible to calculate the average density of the vortex electron ring. It is equal to $\rho = 0{,}927 \cdot 10^8$ [kg/m^3]. This value confirms our assumption that according to the theory of dark matter [4,5], the electron is a vortex within which there is a thin thread of liquid dark matter with neutron liquid density of 10^{18} [kg/m^3]. The remaining volume of the ring vortex electron is occupied by a gaseous vortex.Since the radius of the vortex electron ring is much larger than the radius of the nucleus of the atom (hydrogen), the ring of vortex electron surrounds the nucleus of the atom inside the atom, occupying its entire orbit and rotating at angular velocity ω_{v-el}. Therefore, the experimenters can not detect the position of the electron in orbit.

It is very important to note that we have obtained the force of interaction between elementary particles the same as it is determined by Coulomb's law. But we did not endow these particles with electric charges. The result is obtained without any additional assumptions. This force was obtained, as by herself it were, on the basis of the models of the atom and elementary particles adopted earlier in this theory [1,2,3,4,5,12] and world constants such as the density of gaseous dark matter ρ_e=1,19·10^9 [kg/m^3] [1,2,3]. Let me remind you that the density of gaseous dark matter was determined when analyzing the forces of attraction between the bodies of the Universe, that is, in a completely different field of physics. **This speaks of the unified nature of the forces of universal gravitation, intra-atomic forces and electric forces due to the internal structure of the atom and elementary particles.**

The values of r_{o-el} u ω_{v-el} allow us to calculate the circumferential velocity at the outer boundary of the vortex electron

$$U_{v-el} = r_{o-el} \cdot \omega_{v-el} = 0{,}34 \cdot 10^8 \text{ [m/s]} \qquad (18)$$

The circumferential velocity at the outer boundary of the vortex electron is close to the speed of light in the void, but does not exceed it and therefore does not conflict with the theory of relativity.

Therefore, it can be assumed that the vortex electron has its own mechanical moment of the amount of the movement. It is known that the postulates that the electron has its own mechanical and magnetic moments turned out to be very fruitful. At the same time, we can note the important role of rotational motions of elementary particles in the phenomena of electrostatics and the properties of elementary particles.

We note in passing that the idea of a spin as about the moment of the amount of the movement of an electron of spherical shape with parameters: mass $m_o = 9{,}1 \cdot 10^{-31}[kg]$, radius $r_o = r_{el} = 10^{-15}[m]$, contradicts the theory of relativity. This is explained the fact that the velocities with which the points on the diameter of the balloon rotate about its axis exceed the speed of light in a vacuum $C=3 \cdot 10^8$ [m/s]. Indeed, the moment of the amount of the movement of a homogeneous sphere is known. It is written by the formula $M_o = \frac{2}{5} \omega \cdot r_{el}^2 \cdot m_o = L_{eB} = \frac{h}{4\pi}$. From where $\omega = 0{,}145 \cdot 10^{27}$ [s^{-1}]. The circumferential velocity of points on the surface of an electron turned out to be higher than the speed of light $U = r_o \cdot \omega = 1{,}45 \cdot 10^{11}$ [m/s] >>C. In this regard, scientists (relativists) realized that "the rotation of an electron around an axis passing through the center of a sphere" can not be understood literally". As a result, they were forced to abandon the concept of the mechanical nature of the spin.

We could be stopped on this. We found out that the Coulomb law, obtained experimentally for electrostatic forces, is in fact due to the action of pressure forces in gaseous dark matter on elementary particles of matter when they approach each other. Частицы имеют вихревую структуру. **The direction of rotation of jets of gaseous dark matter inside the vortex rings of elementary particles determines whether these forces repel or attract particles, that is, in conventional terminology they carry a positive or negative electrical charge.**

However, questions remain. After all, none of the considered vortex gas models of elementary particles does not meet the condition of spherical symmetry. In this case, we are in doubt about the validity of the statement that the electron has a spherical shape and, by virtue of this, it meets the condition of spherical symmetry. The electron is so small that it can not be seen and we can not be unconditionally convinced of its spherical shape. If the vortex electron has the form of a torus, then it is possible that it always moves perpendicular to its axis of symmetry. When approaching another vortexelectron or another elementary particle, the interaction of the vortices surrounding them unfolds the vortex electrons in such a way that their symmetry axes become parallel and their vortex rings are in the same plane. In this case, the analysis of forces between the same-named and unlike charges performed by us turns out to be real.

The gaseous dark matter inside each of the vortex rings constituting elementary spherical charges rotates around the symmetry axes of their rings. Let's assume that the negative charge corresponds to the counterclockwise rotation, and the positive charge corresponds to a clockwise rotation if you look at the charge from the outside. This is a conditional division. It would be possible to adopt the directly opposite rule. Nevertheless, it is clear that two charges that are the same in the direction of rotation in the rings will be repelled, and two charges with a differently directed rotation will attract.

Thus, if we electrified two identical light balls suspended on thin filaments, then the force acting on each of them, in this case will be equal to the sum of the elementary forces acting on each elementary vortex ring on their surface. Such equally electrified balls will be repulsed. The balls will disperse all the further, than they had been electrified stronger. It is known that in practice, to determine the degree of electrification, special electroscope - devices are used. For example, Fig. 4 shows an electroscope in which two thin aluminum sheets are attached to the wire B and with the ball A at the upper end.

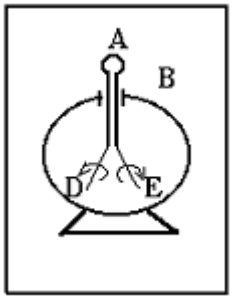

Fig.4

When the electric charge is transmitted to the wire "B", the elementary vortex rings of gaseous dark matter inside the aluminum leaves unfold in such a way that their symmetry axes are directed along the petals and the axial rotation of gaseous dark matter in the vortex rings is the same. As a result, as noted earlier, repulsion forces arise. By the amount removal of petals from each other , one can judge the degree of electrification reported by it.

It can be assumed that in uncharged bodies there are always charges of opposite signs or, which is the same thing, there are the elementary rings of gaseous dark matter with opposite direction of rotation of jets of dark matter along the vortex rings. Their number is such that their action completely compensates each other. In the process of electrification, the rotation of gaseous dark matter in the elementary rings of one sign begins to predominate. This determines the sign and degree of electrification of bodies.

Comparing the expressions of the Coulomb law for elementary charges obtained in electrostatics (1) and in the theory of dark matter (9), we find **the relationship between the elementary charge q_{el}=e and the spatial circulation of the vortex electron** $\Gamma^*_{el} = \Gamma_{el} \cdot \Delta l = 0{,}01 \cdot \Gamma_{el} \cdot r_{o-el}$

$$e=q_{el}=\sqrt{\varepsilon_o \varepsilon \cdot \rho_e} \cdot \Gamma^*_{el} \qquad (19)$$

The logic of further reasoning can be the same as in electrostatics [13]. Since the flow of gaseous dark matter outside the vortex rings of the electron, positron and proton is potential, the resulting voltage near the various electrically charged bodies can be found using the superposition method. That is, we can to find the resulting solution as the sum of the voltages created by point charges.

It would be possible to repeat all the conclusions of electrostatics, using instead of charges q their expressions through the spatial circulation of velocity and obtain formulas for the strengths of electric fields near charged planes, cylindrical and spherical surfaces, and a number of others. Obviously, this is not necessary, since the meaning of our research lies elsewhere. **We want to reveal and substantiate the nature of electrostatic phenomena on the basis of the interaction of local vortex structures of gaseous dark matter with the gaseous dark matter surrounding them. We want to show the unity of such seemingly dissimilar phenomena as universal gravitation, inertia, nuclear energy, the dualism of corpuscular and the wave properties of elementary particles, electromagnetic phenomena and the propagation of light. All these phenomena, in our opinion, are different facets of the properties and currents of gaseous dark matter. In this same row there are the many mysterious cosmic phenomena discovered by astronomy, but without a reasonable explanation for today.**

Bibliographic list

1. Burago Sergey Georgievich - Основополагающая роль темной материи во Вселенной; Researchgate, articl, April 2014;

2. Burago Sergey Georgievich - Gravity dark matter and dark energy balance; The General Science Journal 2014, April, Paper ISSN 1916-5382, pp.20 and Researchgate, articl, Mart 2015

3. Burago Sergey Georgievich – О межзвездной темной материи и темной энергии Вселенной Researchgate, articl, April 2017;

4. Burago Sergey Georgievich – О строении и свойствах элементарных частиц в свете представлений о темной материи. The General Science Journal, published: April 4, /Research Papers-Quantum Theory / Particle Physics/Download/6008, Feb 2015

5. Burago Sergey Georgievich - About a structure and properties of elementary particles in the representations about a dark matter. The General Science Journal, published: April 4, /Research Papers-Quantum Theory / Particle Physics/Download/6007 Feb 2015

6. Burago Sergey Georgievich - О дуализме корпускулярных и волновых свойств элементарных частиц. The General Science Journal, published: March 10, 2015, /Research Papers-Quantum Theory / Particle Physics/Download/5979

7. Burago Sergey Georgievich - About a dualism of corpuscular and of wave properties of elementary particles. The General Science Journal, published: March 10, 2015, /Research Papers-Quantum Theory / Particle Physics/Download/5978

8. Burago Sergey Georgievich –Черные дыры во Вселенной, заполненной темной газообразной материей. The General Science Journal 2015, February 2 and Researchgate, Feb 2015 and European Life Science Journal Feb 2015/

9. Burago Sergey Georgievich –The Black holes in the universe, filled by the gaseous dark matter. The General Science Journal , February 2, 2015 and /Research Papers-Astrophysics/Download/5909 February 2015

10. Burago Sergey Georgievich - The whirlwinds of a dark matter near the centers of the galaxies, the stars and the planets.The General Science Journal, Published: December 23, 2015 and /Research Papers-Cosmology/Download/6307

11. Burago Sergey Georgievich – Вихри темной материи около центров галактик, звезд и планет. The General Science, Published: December 23, 2015 and /Research Papers-Cosmology/Download/6308, Dec 2015

12. Burago Sergey Georgievich - Космические объекты в океане межзвездной темной материи. Основы теории. Элементарные частицы. Распространение света. Астрофизика. О «Большом взрыве» Части1,2,3,4,5. Book, Researchgate, Oct 2016

13. Фриш С.Э., Тиморева А.В., Курс общей физики. Т1,2,3-М.:Физматгиз,1961.