Tensioning of the Electromagnetic Superstring

Professor Vladimir Leonov

We have a sign-alternating superstring composed of quantons inside quantized space-time. Quanton includes four quarks: two electrical ±e and two magnetic ±g. Quarks have attractive forces according to Coulomb's law. The diameter of the quanton is Leon's length. The quantons have a tight packing inside the superstring. We can calculate the attractive forces between the quantons inside the superstring. A thin superstring composed of quantons can alone hold the Earth in orbit around the Sun. The quantized space-time has tremendous elasticity and tensioning.
Keywords: sign-alternating superstring, quanton, quark, elasticity, tensioning.

In the first approximation, the order of forces in 10^{23} N determines the colossal tensioning of the electromagnetic string made of quantons (Fig. 1). To determine the tensioning of the string, it is necessary to take into account the effect of charges of elastic quantons. Taking into account the ambiguous orientation of the electrical and magnetic axes of the quantons, the exact solution of this task is associated with considerable mathematical difficulties. However, the statistically average-out answer can be obtained by elementary methods, taking into account the mean angle 45° of the slope of electrical and magnetic axes of the quantons in the direction of any electromagnetic string, penetrating the quantized space-time (Fig. 1) [1].

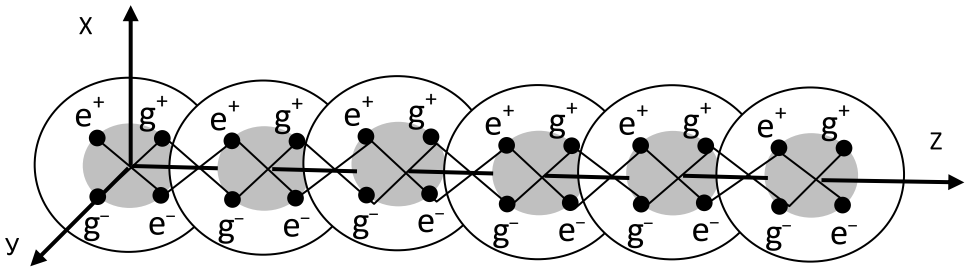

Fig. 1. The electromagnetic string made of quantons.

The problem is greatly simplified if we consider separately the magnetic and electrical alternating superstrings. In the theory of Superunification, the electrical and magnetic superstrings represent an infinite chain of alternating electrical and magnetic charges placed in a line with the alternation of polarity. A section of the chain of the alternating charges represents the electrical (a) and magnetic (b) string (Fig. 2). The electromagnetic superstring in the theory of Superunification is an infinite chain consisting of quantons which interact with each other by the attraction forces resulting in tensioning of the superstring. A section of the chain made of quantons represents an electromagnetic string (Fig. 1).

Figure 2 shows the calculation scheme of the forces of electrical $\mathbf{F}_e$ and magnetic $\mathbf{F}_g$ potentials, acting on the elementary charge-quark e and g inside the electrical (a) and magnetic (b) superstrings. Figure 2 is an analogue of Fig. 1 on the condition of the same distance between the charges, equal to half the quanton diameter $½L_{q0} = 0.37 \cdot 10^{-25}$ m.

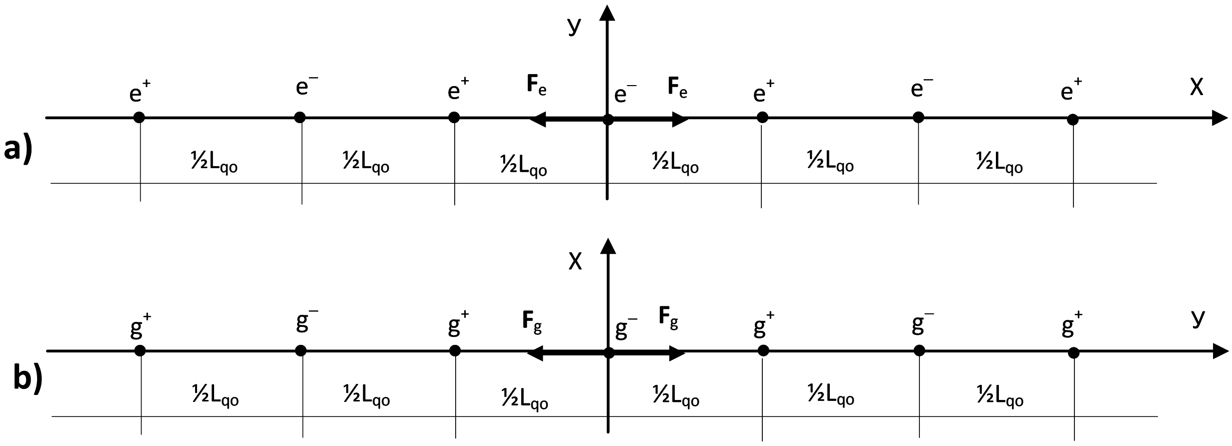

Fig. 2. Calculation of the tensioning of alternating electrical (a) and magnetic (b) superstrings.

The tension of the electrical superstring (Fig. 2a) is determined by the pair of electrical forces $\mathbf{F}_e$ acting from the left and right on a test charge, placed in the origin of the coordinates. To calculate force $\mathbf{F}_e$, we determine the strength $\mathbf{E}_e$ of the electrical field in the region of the coordinates which is generated by the charges with alternating signs to the right of the origin of the coordinates along the axis *X* to infinity. In accordance with the principle of superposition of the fields, strength $\mathbf{E}_e$ is determined by the sum of the fields acting in the region of the coordinates to the right of every charge in only half the superstring. We obtain an infinite series, whose sum is known:

$$\mathbf{E}_e = \frac{\mathbf{1}_x}{4\pi\varepsilon_o}\frac{e}{(0{,}5L_{qo})^2}\left(1-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdot\cdot\right)=\frac{\mathbf{1}_x}{\pi\varepsilon_o}\frac{e}{L_{qo}^2}\left(\frac{\pi^2}{12}\right)=\frac{\pi}{12\varepsilon_o}\frac{e}{L_{qo}^2}\mathbf{1}_x \qquad (1)$$

where ε_o is the electric constant, e is elemental electric charge, $½L_{q0} = 0.37\cdot 10^{-25}$ m.

From (1) we determine the force $\mathbf{F}_e$. Taking into account the fact that the charge is subjected to the effect of the pair of the forces $\pm\mathbf{F}_e$ from the left and right, we introduce the concept of the alternating unit vector $\pm\mathbf{1}_x$, which balances the effect of the pair of the forces $\pm\mathbf{F}_e$ on the charge in the superstring (Fig. 2a):

$$\mathbf{F}_e = \pm e\mathbf{E}_e = \pm\mathbf{1}_x\frac{\pi}{12\varepsilon_o}\frac{e^2}{L_{qo}^2} = \pm 1{,}4\cdot 10^{23}\,\mathrm{N} \qquad (2)$$

The same procedure is used to determine the tensioning forces $\pm\mathbf{F}_g$, acting on the magnetic charge g in the magnetic superstring (Fig. 2b):

$$\mathbf{F}_g = \pm\mu_o g\mathbf{H}_g = \pm\mathbf{1}_y\frac{\pi\mu_o}{12}\frac{g^2}{L_{qo}^2} = \pm 1{,}4\cdot 10^{23}\,\mathrm{N} \qquad (3)$$

The forces $\pm\mathbf{F}_e$ and $\pm\mathbf{F}_g$ were obtained for ideal superstrings and the directions of the axes *X* and *Y* do not coincide. In the electromagnetic superstring (Fig. 1) the electrical and magnetic superstrings are combined into a single system.

Taking into account the statistical scatter of the orientations of the quantum axes, were used previously to determine the average angle of inclination of the axes, which was equal to 45°, including in the direction *Z*, i.e. $\alpha_z = 45°$.

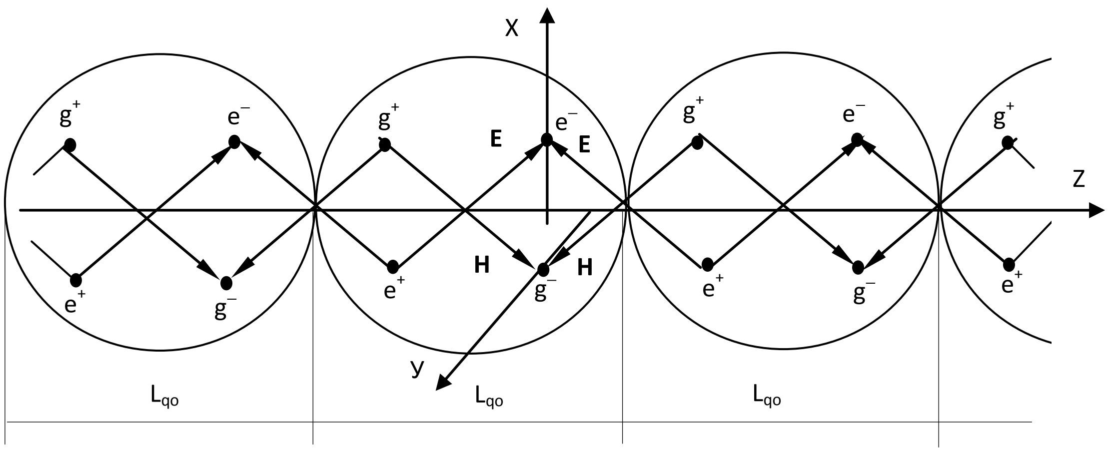

Fig. 3. Scheme of the statistically averaged-out electromagnetic superstring

Figure 3 shows the flat scheme of the statistically averaged-out electromagnetic superstring in the direction *Z*. Actually, the superstring has the volume and chirality and twisted in relation to the *Z* axis. This is determined by the tetrahedral arrangement of the charges in the quantum which prevents arrangement in the single plane.

In the flat model (Fig. 3), the electrical charges of the quantons are situated in the plane XZ, and the magnetic charges in the plane YZ. The region of the coordinates for the axes X and Y is displaced by the displacement of the electrical and magnetic axes in the quanton. Attention should be given to the fact that the projection of the strength E_z of the electrical field on the axis Z is determined by the difference of the vectors **E**, compensating the electrical field in the direction Z. The projections of the strength E_x of the electrical field on the axis X are determined by the sum of the vectors **E**.

This also relates to the magnetic component. The projections of the strength H_z of the magnetic field on the Z axis are determined by the difference of the vectors **H**, compensating the magnetic field in the direction *Z*. The projections of the strength H_y of the magnetic field on the axis *Y* are determined by the sum of the vectors **H**. For this reason, the electrical and magnetic components of the strength of the field in the electromagnetic wave are transverse and situated in the plane normal to the direction of propagation of the wave along the electromagnetic superstring.

We determine the projections of the forces $\pm\mathbf{F}_e$ and $\pm\mathbf{F}_g$ on the *Z* axis and determine the total force $\pm\mathbf{F}_z$ of tensioning the electromagnetic superstring in the direction Z for the unit alternating vector $\pm\mathbf{1}_z$:

$$\mathbf{F}_z = \pm\mathbf{1}_z(F_e + F_g)\cos\alpha_z = \pm\mathbf{1}_z \frac{\pi}{12L_{qo}^2}\left(\frac{e^2}{\varepsilon_o} + \mu_o g^2\right) = \pm 2\cdot 10^{23}\,\mathrm{N} \qquad (4)$$

The value of the tensioning force $\pm\mathbf{F}_z$ (4) of the electromagnetic superstring is regarded as the calculated value. We determine the tension $\pm\mathbf{T}_z$ of the electromagnetic superstring as the force $\pm\mathbf{F}_z$ per cross-section S_q of the quantum since the cross-section of the quanton determines the cross-section of the electromagnetic superstring (Fig. 1):

$$\pm\mathbf{T}_z = \frac{\pm\mathbf{F}_z}{S_q} = 4\frac{\pm\mathbf{F}_z}{\pi L_{qo}^2} = \frac{\pm\mathbf{1}_z}{3L_{qo}^4}\left(\frac{e^2}{\varepsilon_o} + \mu_o g^2\right) = \pm 4{,}65\cdot 10^{73}\ \frac{H}{м^2} \tag{5}$$

The alternating tension vector $\pm\mathbf{T}_z$ characterizes vacuum as an elastic quantized medium with the discreteness equal to the quanton diameter. Attention should be given to the fact that in the region of the quantum ultra-microworld all the vacuum parameters are characterized by very small dimensions and extremely high forces (4) and tensioning of the medium (5). It may be shown that vacuum is a virtually incompressible substance and any fluctuations of vacuum to be associated with colossal external forces. The quantized space-time has tremendous elasticity and tensioning [1, 2].

References:

[1] V. S. Leonov. Quantum Energetics. Volume 1. Theory of Superunification. Cambridge International Science Publishing, 2010, 745 pgs.

[2] Vladimir Leonov. Electromagnetic Nature and Structure of Cosmic Vacuum. viXra:1910.0287 *submitted on 2019-10-16 16.*