Electromagnetic Symmetry of the Universe

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Our universe has an electromagnetic symmetry and electrical asymmetry. These physical phenomena are described in detail in the theory of Superunification [1, 3]. I want to draw your attention once again to the fact that quantized space-time has an electromagnetic structure and it has electromagnetic symmetry. This symmetry manifests itself as the complete equivalence of the electric and magnetic forces acting between the quarks inside the quanton. Quanton consists of four quarks: two electrical and two magnetic. Quanton is a particle of the field that serves as a carrier of electromagnetism inside quantized space-time. Electromagnetic symmetry is observed experimentally in the electromagnetic wave in vacuum at equivalence its electrical and magnetic components.

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The symmetry of electricity and magnetism inside a quanton is due to its structure, which includes two electrical ±1e and two magnetic ±1g quarks (Fig. 1, 2) [1–7]. Quanton is a symmetrical geometric figure. Quarks are installed on the tops of a symmetric tetrahedron inside the quanton.

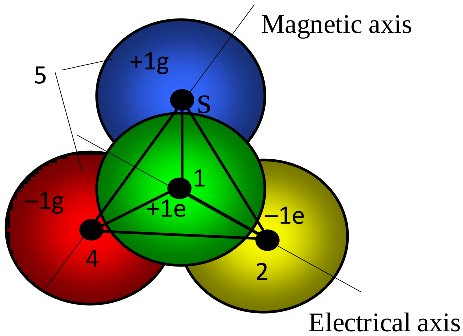

Fig. 1. The electromagnetic quadrupole (top view).

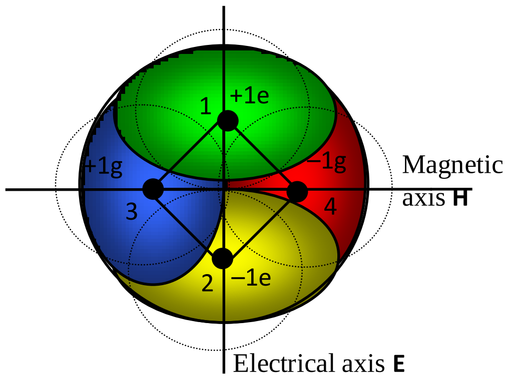

Fig. 2. The quanton in projection (rotated in space).

The electromagnetic polarization of the quanton leads us to the Maxwell equations for the electromagnetic field in vacuum. We write the Maxwell equations for the vacuum, expressing the density of the electrical $\mathbf{j}_e$ and magnetic $\mathbf{j}_g$ bias currents in the passage of a flat electromagnetic wave through the space-time by the time dependence t of the strength of the electrical **E** and magnetic **H** fields in the form of the system [4]:

$$\begin{cases} \mathbf{j}_e = \mathrm{rot}\mathbf{H} = \varepsilon_o \dfrac{\partial \mathbf{E}}{\partial t} \\ \mathbf{j}_g = \dfrac{1}{\mu_o}\mathrm{rot}\mathbf{E} = -\dfrac{\partial \mathbf{H}}{\partial t} \end{cases} \qquad (1)$$

where μ_0 is the magnetic constant, ε_0 is the electrical constant.

The system (1) reflects the symmetry of electricity and magnetism in the quantized space-time. The equations (1) are presented in the form published by the outstanding English physicist and mathematician Heaviside who introduced into Maxwell equations additional magnetic bias currents, determined by magnetic charges, giving the equations the completed symmetrical form.

The uniqueness of the Maxwell equations (1) for vacuum is manifested in the complete symmetry between electricity and magnetism. To understand the reasons for this symmetry, we analyze the Coulomb forces inside a quanton (Fig. 2). The fact is that the Coulomb law is a precursor of the Maxwell equations and the most extensively verified fundamental law.

The symmetry of electricity and magnetism inside a quanton (Fig. 2) may be demonstrated as follows. Into the Coulomb law we introduce, separately for electrical and magnetic charges, the equation (2) at the distance between the charges determined by the side of the tetrahedron equal to 0.5 L_{qo}:

$$g = C_o e = 4{,}8 \cdot 10^{-11}\,\text{Am (Leon)} \tag{2}$$

Consequently, Coulomb forces F_e and F_g as the attraction forces inside the quanton for the electrical charges and for magnetic charges, respectively, should be equal, i.e. $F_e = F_g$.

We use the reversed procedure. We write the Coulomb law inside the quanton for electrical charges and for magnetic charges on the condition of the equality of force electrical and magnetic components $F_e = F_g$ and the equality of the distances r_{oe} and r_{og} between the electrical and magnetic charges, respectively:

$$r_{eo} = r_{go} = 0{,}5L_{qo} = 0{,}37 \cdot 10^{-25}\,\text{m} \tag{3}$$

$$\begin{cases} F_e = \dfrac{1}{4\pi\varepsilon_o}\dfrac{e^2}{r_{eo}^2} = 1{,}6 \cdot 10^{23}\,\text{N} \\ F_e = F_g \\ F_g = \dfrac{\mu_o}{4\pi}\dfrac{g^2}{r_{go}^2} = 1{,}6 \cdot 10^{23}\,\text{N} \end{cases} \tag{4}$$

Next, we equate the electric and magnetic forces (4) inside the quanton:

$$\frac{1}{4\pi\varepsilon_o}\frac{e^2}{r_{eo}^2} = \frac{\mu_o}{4\pi}\frac{g^2}{r_{go}^2} \tag{5}$$

The solution of the system (4, 5) is obtained under the condition $\varepsilon_0\mu_0 C_0^2=1$:

$$g = \sqrt{\frac{1}{\varepsilon_o\mu_o}}\; e = C_o e \tag{6}$$

It may be seen that only when the parameters of the electrical and magnetic components inside the quanton are equal, in particular for the Coulomb forces (4), the relationship (6) between the values of the elementary magnetic and electrical charges corresponds to the previously determined relationship (2). Shorter distances between the charges inside the quanton determine colossal attraction forces (4) which characterize the quantized space-time by colossal elasticity.

Thus, the electromagnetic symmetry of the quanton determines the relationships (2) and (6) and also the correspondence of these relationships to the Maxwell equations (1) and the Coulomb law (4).

In fact, the forces (4) inside the quanton are colossal in magnitude and comparable with the attraction forces of the Earth to the Sun. These forces determine the colossal elasticity of the quantized space-time in the theory of the theory of Superunification which investigates the structure of vacuum. In particular, when examining the domain of the ultra-microworld of the quanton, the theory of Superunification has had to face the colossal forces attention and energy concentration.

We verify the energy symmetry of the quantum, analyzing the energy of electrical W_e and magnetic W_g components of the charges interacting inside the quanton under the condition (9):

$$\begin{cases} W_e = \dfrac{1}{4\pi\varepsilon_o}\dfrac{e^2}{r_{eo}} = 0{,}62\cdot 10^{-2}\,\mathrm{J} \\ W_g = \dfrac{\mu_o}{4\pi}\dfrac{g^2}{r_{go}} = 0{,}62\cdot 10^{-2}\,\mathrm{J} \end{cases} \tag{7}$$

As indicated by (12), the energies of interaction of the electrical charges and the magnetic charges inside the quanton are equal to each other, as are also the Coulomb forces (10). This property of the quantum determines the total electromagnetic symmetry of the quantized space-time.

Next, we equate the electric and magnetic energy (7) inside the quanton:

$$\frac{1}{4\pi\varepsilon_o}\frac{e^2}{r_{eo}} = \frac{\mu_o}{4\pi}\frac{g^2}{r_{go}} \tag{8}$$

The solution of the system (7, 8) is obtained under the condition $\varepsilon_0\mu_0 C_0^2=1$ and it is also equal to formula (2):

$$g = C_o e \tag{9}$$

Formulas (2), (6) and (9) are equivalent, although obtained by different methods.

Thus, the introduction into physics of the space-time quantum (quanton) enables us to understand the principle of electromagnetic symmetry and also penetrate into the depth of electromagnetic processes on the level of the fundamental length 10^{-25} m. Prior to the development of the theory of Superunification, physics did not have these unique procedural possibilities.

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