Another Explanation of the Electric and Magnetic Forces

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The electric and magnetic forces would be produced by a polarization of the space.

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In a recent article [1], we have given another explanation of the force of the gravity using the Fatio-Le Sage idea with the cosmic microwave background radiation (CMBR): the force of attraction between two bodies would be produced because both bodies are pushed the one against the other by the microwaves of the CMBR. In addition, as the CMBR flux is isotropic and all the directions have the two opposed ways because of the processes of emission and absorption of thermal radiation (CMBR) in the thermal equilibrium of the universe, the microwaves of the CMBR behave like stationary waves (or standing waves) which are linearly polarized.

Therefore, we can not use electromagnetic waves (or photons) emitted by electric charges and magnetic materials (or magnetic bodies) to explain the electric and magnetic forces.

Instead of it, an electric charge would align the linearly polarized electric vector fields of the microwaves of the CMBR inducing an electric polarization of the space:

$$\left(-\vec{E}_{CMBR},+\vec{E}_{CMBR}\right) ... \left(-\vec{E}_{CMBR},+\vec{E}_{CMBR}\right) \text{ or } \left(+\vec{E}_{CMBR},-\vec{E}_{CMBR}\right) ... \left(+\vec{E}_{CMBR},-\vec{E}_{CMBR}\right) \quad (1)$$

depending on whether the electric charge is $+q$ or $-q$, respectively.

A magnetic body would align the linearly polarized magnetic vector fields of the microwaves of the CMBR inducing a magnetic polarization of the space:

$$\left(-\vec{B}_{CMBR},+\vec{B}_{CMBR}\right) ... \left(-\vec{B}_{CMBR},+\vec{B}_{CMBR}\right) \text{ and } \left(+\vec{B}_{CMBR},-\vec{B}_{CMBR}\right) ... \left(+\vec{B}_{CMBR},-\vec{B}_{CMBR}\right) \quad (2)$$

correspondingly to the magnetic poles *N* (north) and *S* (south), respectively.

From (1) and (2), we see, by construction, that the charges / poles of the same (different) sign repel (attract) each other.

The aligned linearly polarized vector fields of the microwaves of the CMBR, (1) and (2), form lines of force, then, we define the corresponding vector field, $\vec{\Phi}$, for an electric charge or a magnetic body or an electric current, as proportional, k, to the number of lines of force per unit area, N/S, per solid angle, S/r^2:

$$\vec{\Phi} = k\frac{N}{S}\frac{S}{r^2}\vec{u}_r = k\frac{N}{r^2}\vec{u}_r \tag{3}$$

Thus, for the electric vector field produced by the source electric charge, q_1, it would be

$$\vec{E}_1 = k_e\frac{N}{S}\frac{S}{r_1^2}\vec{u}_r = k_e\frac{N}{r_1^2}\vec{u}_r = \frac{1}{4\pi\varepsilon_0}\frac{q_1}{r_1^2}\vec{u}_r \tag{4}$$

ε_0 being the electric permittivity of the vacuum, with

$$k_e N = \frac{1}{4\pi\varepsilon_0}q_1 \tag{5}$$

And the electric force on a test electric charge, q_2, would be

$$\vec{F}_{e12} = q_2\vec{E}_1 = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r_{12}^2}\vec{u}_r \tag{6}$$

which is the Coulomb's electric force between two electric charges q_1 and q_2 separated by a distance r_{12}.

For the magnetic vector field, it would be the same:

$$\vec{B}_1 = -k_m\frac{N}{S}\frac{S}{r_1^2}\vec{u}_r = -k_m\frac{N}{r_1^2}\vec{u}_r = -\frac{\mu_0}{4\pi}\frac{i_1 l_1}{r_1^2}\vec{u}_r \tag{7}$$

μ_0 being the magnetic susceptibility of the vacuum, i_1 the source electric current and l_1 the conductor length, with

$$k_m N = \frac{\mu_0}{4\pi}i_1 l_1 \tag{8}$$

And the magnetic force on a test electric current, i_2, of conductor length, l_2, would be

$$\vec{F}_{m12} = i_2 l_2\vec{B}_1 = -\frac{\mu_0}{4\pi}\frac{i_1 l_1 i_2 l_2}{r_{12}^2}\vec{u}_r \tag{9}$$

which is the Biot-Savart's magnetic force between two electric currents i_1 and i_2 of conductor lengths l_1 and l_2, respectively, separated by a distance r_{12}. Two parallel conductors attract if the currents go in the same direction and repel otherwise, hence the minus sign in (9).

In summary, the electric and magnetic forces would be produced by a polarization of the space.

[1] José Francisco García Juliá, Another Explanation of the Gravity, viXra: 1311.0093 [Classical Physics].
http://vixra.org/abs/1311.0093