Proton Structure: Experimental Approach.

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By analogy with vortical model of electron proposed in [1] a model of proton is constructed. Proton is also considered as a vortical torus, but its equatorial angular velocity in 1863 times less and its meridional angular velocity in 3672 times more.

On the basis of equations of gravidynamic field proposed in [1] a model of electron was proposed. In accord with it mass creating electron constitutes a torus and performs 2 rotations: in equatorial and meridional planes of torus.
Angular velocity of equatorial rotation is:

$$\omega_e = 8.1 \cdot 10^{20} \text{ rad/s} \qquad (1)$$

which coincides with De-Broglie frequency for electron in rest and radius of the grater circumference describing torus is:

$$r_e = 3.8 \cdot 10^{-13}\ m \qquad (2)$$

which coincides with Compton wave length for electron.
Electron's mass is:

$$m_e = 9.1 \cdot 10^{-31}\ kg$$

which also coincides with electron mass found experimentally.
Radius of the fewer circumference creating torus is twice less:

$$\rho_e = 1.9 \cdot 10^{-13}\ m \qquad (3)$$

and angular velocity of meridional rotation is twice bigger:

$$\Omega_e = 16.2 \cdot 10^{20}\ \ rad/s \qquad (4)$$

Electron's charge:

$$\bar{e} = m_e \cdot \frac{\bar{\omega}_e \times \bar{\Omega}_e}{|\Omega_e|} = 7.3 \cdot 10^{-10}\ kg/s \qquad (5)$$

Electron's charge is modulo constant vector directed along radius of the greater circumference creating torus. It has 2 values: $\pm|\bar{e}|$ (along or against radius from the center of circumference). This sign depends on the sign of the screw created by $\bar{\omega}_e$ *and* $\bar{\Omega}_e$ (it is left or right).

Although $\bar{\Omega}_e$ is angular velocity it is polar vector in contrast to pseudo-vector $\bar{\omega}_e$. This means that charge is a polar vector, which nevertheless may be described with the help of scalar.

One correlation in additional should be mentioned:

$$\Omega_e \cdot r_e = \omega_e \cdot \rho_e = c \qquad (6)$$

where c is light velocity in free ether. This means that particles drawing torus move with light velocity as is meridional as in equatorial planes. In contrast to electron model nowadays I have no theoretical reasoning for proton model. Therefore it is constructed by analogy with electron on the basis of experimental facts.

Let as take Compton wave length for proton as radius of the greater circumference creating torus:

$$r_p = 2.1 \cdot 10^{16}\ m \qquad (7)$$

One can see that r_p is accurately 1836 times less than electron radius. Electric charges of proton and electron are modulo equal. This means that equatorial angular velocity of proton is:

$$\omega_p = \frac{\omega_e}{1836} = 4.41 \cdot 10^{17}\ rad/s \qquad (8)$$

Thus equatorial velocity of particle drawing proton surface:

$$v_p = r_p \cdot \omega_p = 92.6\ m/s \tag{9}$$

Electron's energy in rest consists of two equal parts: kinetic energies of meridional and equatorial curls:

$$\frac{1}{2} \cdot m_e \cdot \left[(\omega_e \cdot r_e)^2 + (\Omega_e \cdot \rho_e)^2 \right] = \frac{1}{2} \cdot m_e \cdot \left(c^2 + c^2 \right) = m_e \cdot c^2 = 8.2 \cdot 10^{-14}\ kg \cdot \mathrm{m}^2 / s^2 \tag{10}$$

Energy of proton's equatorial rotation is:

$$\frac{1}{2} \cdot m_p \cdot v_p = 7.29 \cdot 10^{-24}\ kg \cdot m^2 / s^2 \tag{11}$$

Let us find radius and angular velocity of proton's meridional rotation. Experiment shows that energy of proton in rest is:

$$m_p \cdot c^2 \approx 1.53 \cdot 10^{-10}\ kg \cdot m^2 / s^2 \tag{12}$$

Energy of equatorial rotation (11) is disregardlessly small in comparison with (12). Therefore we shall neglect it below and assume that whole energy of proton is concentrated in its meridional rotation, i. e. :

$$\frac{1}{2} \cdot m_p \cdot \Omega_p^2 \cdot \rho_p^2 = m_p \cdot c^2 \tag{13}$$

Ω_p *and* ρ_p are unknown variables here. They define angular velocity of proton's meridional rotation and radius of its lesser circumference.
Electron's spin was defined as impulse momentum of its meridional rotation:

$$m_e \cdot \left[\overline{\rho}_e \times \left(\overline{\Omega}_e \times \overline{\rho}_e \right) \right] = m_e \cdot \rho_e^2 \cdot \overline{\Omega}_e = \frac{1}{2} \cdot \hbar \tag{14}$$

This means that spin is modulo constant polar vector directed along lesser circumference tangent, i. e. along angular velocity $\overline{\Omega}_e$. Experiment shows that proton's spin is also equal to $\frac{1}{2}\cdot\hbar$. This gives us second equation to find Ω_p *and* ρ_p:

$$m_p \cdot \overline{\Omega}_p \cdot \rho_p{}^2 = \frac{1}{2}\cdot\hbar \qquad (15)$$

(13) and (15) yield:

$$\Omega_p = 6.1\cdot 10^{24}\ rad/s\ ,\ \rho_p = 6.93\cdot 10^{-17}\ m \qquad (16)$$

Tangential velocity of meridional rotation:

$$U_p = \Omega_p \cdot \rho_p = 4.2\cdot 10^{8}\ m/s \qquad (17)$$

It is higher than sound velocity in free ether. It was shown in [1] that sound (light) velocity in ether is:

$$c^2 = \frac{1}{\varepsilon_0 \cdot \mu_0}$$

where ε_0 and μ_0 are mass density and compressibility of free ether. It was also shown that:

$$\varepsilon_0 = 1.87\cdot 10^{8}\ kg/m^3 \qquad (18)$$

and

$$\mu_0 = 5.9\cdot 10^{-26}\ m\cdot s^2/kg \qquad (19)$$

In ether terms product of density and compressibility of ether in the vicinity of proton is less than in free ether. This is one of important distinctions of proton from electron.

References

[1] J. G. Klyushin. Electro – and gravidynamics. Proceedings of NPA conference, University of Connecticut, 2003.
Additional information: www.physical-congress.spb.ru