Neutron Construction

J.G. Klyushin
University of Civil Aviation, Pilotov str., 38, St. Petersburg, RUSSIA
e-mail: science@shaping.org

In papers [1] and [2] vortical models of electron and proton as a torus were proposed. Torus mass performs two movements: in equatorial and meridional planes. Equatorial rotation defines electric charge and meridional rotation its spin. If vectors of angular velocities in equatorial and meridional planes constitute right triple the particle possesses charge of one sign if they constitute left triple- the opposite one.

In paper [3] concept of magnetic moment of electron and proton and its connection with idea of magnetic charge in generalized Maxwell equations [4] was investigated. This paper tries to clarify sense of all those concepts for neutron.

1. Model of the Electron

The bigger circumference radius for electron:

$$r_e = 3.84\times10^{-13}\text{m}\ , \tag{1.1}$$

coincides with Compton wave length of electron. The lesser circumference radius is:

$$\rho_e = \tfrac{1}{2}r_e = 1.92\times10^{-13}\text{m}\ . \tag{1.2}$$

The angular velocity of equatorial rotation for electron in rest is:

$$\omega_e = \frac{m_e c^2}{\hbar} = 7.8\times10^{20}\,\text{rad/s}\ , \tag{1.3}$$

where m_e is electron mass:

$$m_e = 0.91\times10^{-30}\text{kg}\ . \tag{1.4}$$

In paper [1], this value of mass was theoretically found. One can see that it coincides with experimental value.

The angular velocity of the lesser circumference is:

$$\Omega_e = 2\omega_e = 1.56\times10^{21}\text{rad/s} \tag{1.5}$$

Let us remark, that

$$R_e\omega_e = \rho_e\Omega_e = c\ , \tag{1.6}$$

where c is light speed in free ether.

The following formula defining electric charge was proposed in [1].

$$\mathbf{e} = m_e\frac{\vec{\omega}_e\times\vec{\mathbf{\Omega}}_e}{\Omega_e}\ , \tag{1.7}$$

$$e = m_e\omega_e = 7.1\times10^{-10}\text{kg/s}\ . \tag{1.8}$$

Electron charge is modulo constant pseudovector directed along the bigger circumference radius inside or outside. We can describe electric charge with the help of scalar ascribing to it signs plus or minus according to the vector product in (1.7): it defines right or left triple.

The electron spin is:

$$\mathbf{s} = \vec{\rho}_e\times(\vec{\mathbf{\Omega}}_e\times\vec{\rho}_e) = \vec{\mathbf{\Omega}}_e\rho_e^2 = \tfrac{1}{2}\hbar\ . \tag{1.9}$$

The spin mechanical meaning is the impulse moment of the lesser circumference of the torus; *i.e.*, it is a pseudovector directed along angular velocity of the lesser circumference.

The following assertions are slightly refined data from paper [2] where the torus model of proton is proposed.

The angular rotation velocity of equatorial proton torus plane defining its electric charge is

$$\omega_p = \omega_e/1836 = 4.248\times10^{17}\,\text{rad/s}\ . \tag{1.10}$$

The bigger circumference radius is:

$$r_p = r_e/1836 = 2.1\times10^{-16}\text{m}\ . \tag{1.11}$$

The lesser circumference radius is:

$$\rho_p = 6.93\times10^{-17}\text{m}\ . \tag{1.12}$$

Thus ρ_p is not twice as in electron, but approximately three times less than r_p.

The lesser circumference angular velocity is:

$$\Omega_p = 6.1\times10^{24}\,\text{rad/s}\ , \tag{1.13}$$

Thus lesser circumference rotation velocity $\rho_p\Omega_p$ is $\sqrt{2}$ times bigger than light velocity in free ether c.

2. External Characteristic of the Neutron

We preserve here image of torus for long-lived particles and apply it to the construction of the neutron. The neutron is not charged, *i.e.* its torus and at least its surface do not perform equatorial rotation. We know from hydrodynamics that for torus stability, it must performs equatorial as meridional rotation. This means that the neutron is less stable in compassion with proton and electron. The kinetic energy of the electron is composed in equal parts from meridional and equatorial rotation. The proton performs equatorial rotation, but its kinetic energy is

negligibly small because of its small radius and the angular velocity of the lesser circumference. We have a similar situation with the neutron. The kinetic energy of the neutron is completely defined by its meridional rotation:

$$m_n c^2 = 1.5075 \times 10^{-10} \text{kgm}^2/\text{s}^2 \tag{2.1}$$

For comparison, the proton energy is:

$$m_p c^2 = 1.5057 \times 10^{-10} \text{kgm}^2/\text{s}^2 \tag{2.2}$$

Thus the whole neutron energy is induced by its meridional rotation. If Ω_n and ρ_n are the small circumference angular velocity and radius, then the following equality holds:

$$\tfrac{1}{2} m_n \Omega_n^2 \rho_n^2 = m_n c^2 \tag{2.3}$$

Ω_n and ρ_n are unknown variables here.

The known value of neutron spin is used for the second equation:

$$m_n \Omega_n \rho_n^2 = \tfrac{1}{2}\hbar \tag{2.4}$$

(2.3) and (2.4) yield

$$\rho_n = 7.39 \times 10^{-17} \text{m} \tag{2.5}$$

This is a little bigger than for the proton (1.12).

Correspondingly, the angular velocity of meridional rotation

$$\Omega_n = 5.7 \times 10^{24} \text{rad/s} \tag{2.6}$$

is less than (1.13).

A special paper will be devoted to the neutron magnetic moment. Here we can only say that it is constructed just in the same way as for electron and proton [3].

3. Internal Structure of the Neutron

The following experimental facts supply us with a basis for a qualitative hypothesis with respect to the neutron internal construction.

1) The proton is able to seize the electron and become a neutron. For all this, the neutron mass turns out to be bigger than the sum mass of the proton and electron.

2) The neutron is stable only inside nucleus. It decomposes rather quickly when free.

3) The internal regions of the neutron are not electrically neutral. The neutron 'core' is charged positively and its outlying districts are charged negatively.

This all leads us to the following qualitative model. When the small but massive proton turns to be inside the big torus of the electron, it draw in its mass into a layer of radius

$$\Delta r = (7.39 - 6.93) \times 10^{-17} \text{m} = 0.46 \times 10^{-17} \text{m} \tag{3.1}$$

Theoretically two constructions are possible here.

1) The equatorial rotation of the proton and compressed electron occurs in the same direction; *i.e.*, the angular velocity vectors are co-directed. This means that their spins must be anti-parallel.

2) The Angular velocities' vectors are anti-parallel. In this case their spins must be co-directed.

In any case there should appear two possible forces between the proton and the compressed electron. One force is induced by anti-parallel rotation. This force attracts them. The second force is born by parallel rotation. It repulses them. In other terms there is a problem of stability for such a construction. It is unstable without certain 'hoops' on the neutron torus.

The additional mass of the neutron is equal to 1.5 electron masses, which neutron takes from nucleons when it is created serves as such hoops. Adjacent proton maintains works of the hoops in nucleus. Just these hoops defined neutron external characteristics found above. The loops stop working without adjacent proton and are eradicated as an antineutrino when free neutron is broken into proton and electron.

Experiment should help us to distinguish between the two models: the spins of the proton and the electron born by decomposed neutron are either parallel or anti-parallel.

References

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