Determination of Proton and Neutron Radii

Chun-Xuan. Jiang

P.O.Box 3924, Beijing 100854, P.R.China

Jiangchunxuan@vip.sohu.com

In note we calculate Proton and Neutron radii[1]

The Newtonian gravitation formula has the following form .

$$F=-G\frac{M_1M_2}{R^2} \qquad (1)$$

We assume[1]

$$G=K_0\rho_1\rho_2 \qquad (2)$$

Where ρ_1 and ρ_2 denote the densities of both M_1 and M_2 separately. Using the Cavendish experiment we determine K_0. In (2) $G=6.7\times10^{-8}$ cm^3/g sec^2 and the density of lead $\rho_1=\rho_2=11.37g/cm^3$. From (2) we have

$$K_0=5.2\times10^{-10}\ \text{cm}^9/\text{g}^3\ \text{sec}^2 \qquad (3)$$

Thus, K_0 is new gravitational constant.

By using (2) we determine the proton radius γ_p. From (2) we have

$$\gamma_p=\left(\frac{9K_0m_p^2}{16\pi^2G_s}\right)^{1/6} \qquad (4)$$

In the nucleus the strong interaction prevails. We have [2].

$$\frac{\text{strong interaction}}{\text{gravitational interaction}}=\frac{G_s}{G}=10^{38} \qquad (5)$$

where $G_s=6.7\times10^{30}$ cm^3/g sec^2. We know the proton mass $m_p=1.67\times10^{-24}$ g. From (4) we obtain the proton radius

$$\gamma_p=1.5\times10^{-15}\ \text{cm} = 1.5\ \text{jn} \qquad (6)$$

In the same way we have the neutron radius

$$\gamma_n=1.5\times10^{-15}\ \text{cm} = 1.5\ \text{jn} \qquad (7)$$

Pohl,et al obtain the size of proton 3 jn[3].

References

. [1] Jiang,Chun-Xuan.Determination of proton and neutron radii,Apeiron,3,Nr.3-4,126(1996).

[2] Elementary Particle Physics Pancl et al., Elententary Particle Physics (Physics Throught the 1990s) National Academy Press, 1986.

[3] Pohl,R.et al,The size of the proton,Nature 466,213-217(2010)