The Abstract

A Single Model for Various Shapes of the Proton. Experiments have indicated that the proton may be shaped as a sphere, an oblate spheroid, a peanut, a dumbbell, an hourglass, or a torus. A model is presented that satisfies each of the above. The model also provides an estimate of the mass ratio of the proton to the electron.

$$(4\pi)\left(4\pi - \frac{1}{\pi}\right)\left(4\pi - \frac{2}{\pi}\right) = 1836.15 \tag{1}$$

If we assume that the electron is a perfect ball with radius equal to one ($r_e = 1$) and density equal to one ($\rho_e = 1$), the model becomes a ball of radius $(4\pi - \pi^{-1})$ with a sector or non-overlapping sectors removed. The total curved surface area of the removed sector(s) is $4\pi^{-1}$.

A Proton Geometry: It is not unusual to assume that an electron is a perfect sphere with a uniform density. Moreover, for convenience, let its radius be one ($r_e = 1$) and its density be one $(\rho_e) = 1$ as well. Let V_e denote the volume of the electron. The volume of the electron will be $(4\pi/3)$.

The model consists of a ball with radius $(4\pi - \pi^{-1})$ minus sector(s) with total curved surface area equal to $(4\pi^{-1})$. The volume of the model (V_p) becomes

$$V_p = \frac{4\pi}{3}\left(4\pi - \frac{1}{\pi}\right)^3 - \frac{4\pi}{3} \cdot \frac{1}{\pi^2}\left(4\pi - \frac{1}{\pi}\right)$$

The ratio of the volume of the model to the volume of the electron is

$$\frac{V_p}{V_e} = (4\pi)\left(4\pi - \frac{1}{\pi}\right)\left(4\pi - \frac{2}{\pi}\right) = 1836.15 \tag{2}$$

One figure that contains everything is a ball (solid sphere) of radius $(4\pi - \pi^{-1})$ and two embedded sectors whose curved spherical caps have total surface area $4\pi^{-1}$. If the sector(s) were completely empty, then the estimate of the mass ratio of the proton to the electron is given in Equation (1) and calculated by $(4\pi - \pi^{-1})^3 - \pi^{-2} \cdot (4\pi - \pi^{-1})$.

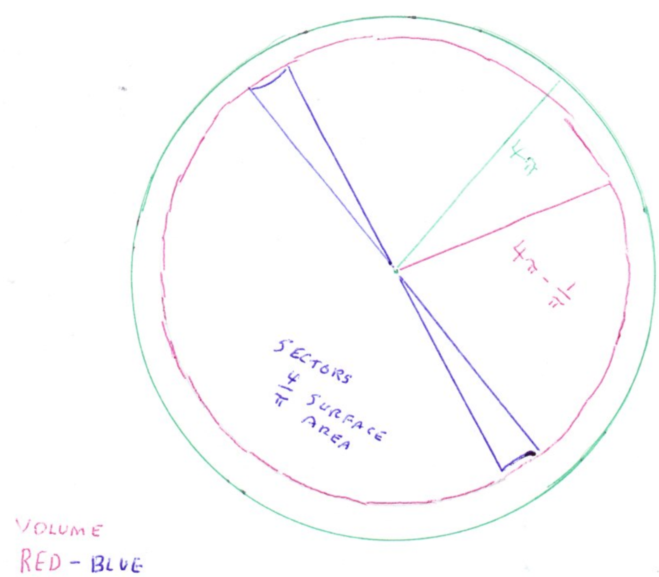

Figure 1: A Proton Model

The Gedanken Experiment: Suppose we were able to construct a device that emitted a plane of neutrinos and another device that could adequately determine the neutrino velocity. Of course no such devices exist. Align the proton with the spherical sectors along an axis perpendicular to the neutrino plane. Since the velocity of a neutrino traveling directly through the sectors is not diminished, it would appear to resemble a donut (from velocity differences).

Now align the ball with the sectors parallel to the neutrino plane. It would appear to be an oblate spheroid. Other alignment gives the dumbbell or hourglass. Skewed along the neutrino plane, and one gets the "peanut." Surely some imagination is needed; however, the basic model is clear.

It is hard to believe that such a simple construction could yield such results. Most of Quantum Mechanics is far more complicated and less intuitive.

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