The proton Charge radius of muonic-hydrogen

Abstract: from Einstein's theory of general relativity we can calculate the proton radius of muonic-hydrogen.

Introduction. From equation Einstein's theory of general relativity, for one particle n of mass M_n, $a = \frac{8\pi}{v_{light}^2} \frac{M_n}{4\pi} G$ 1)

then we obtain :

$$V = \frac{1}{8\pi} a 4\pi c^2 = a' 4\pi c^2 = G M_n (1sec)^2 = \frac{V_G}{M_G (1sec)} M_n (1sec) = J_G M_n \qquad 1^{(1)})$$

$$G = \frac{Nm^2}{Kg^2} = \frac{m^3}{Kg (sec)^2} \qquad J_G = \frac{V_G}{M_G} \qquad v_{light} = \frac{C\,meters}{1sec}$$

From $1^{(1)})$ we obtain: $\frac{V_G}{M_G (1sec)} M_n (1sec) = \frac{4}{3}\pi |r^3| (meters) = V$ 1a)

If in 1a) we exchange the volume by mass, such as $|J_G'| = |J_G|$, we obtain:

$$J_G' V_n = \frac{M_G}{V_G (1sec)} V_n (1sec) = M \qquad 1b)$$

From $\frac{J_G' V_n}{(1sec)}$ (the mass M for unit of time), we can to interpret $\left(\frac{J_G' V_n}{1sec}\right)(1 sec)$

like flux of mass for every unit of time elapse.

Because the 1a) analogous to the 1b) then the $1^{(1)})$ or 1a) is the flux of volume $4\pi c^2 a'$, to cross the surface $4\pi c^2$ for every unit of time elapse.

The flux of mass or volume for every unit of time elapse is constant in the time and we can to represent it geometrically.

We exams geometrically $4\pi c^2 a' (\text{meters})^3$.
Be given in the space 4D a orthogonal quarter of unit vectors $\hat{i}, \hat{j}, \hat{k}, \hat{w}$, such as the $O\hat{i}\hat{j}\hat{k}\hat{w}$ individualise the Cartesian axes System $Ox_1x_2x_3x_4$.
In the plane Ox_2x_3 we trace two circumference γ_1 , γ_2 of origin O and radius respectively $r_1 = r'$, $r_2 = r' + a'$.
Let $[\pi (c+a')^2 - \pi c^2]\hat{i} = \vec{b}$ be the area of surface σ.
Let O' be any point of surface σ origin of vector $\vec{d}$ parallel to x_1 axes;
then in the $Ox_1x_2x_3$ must be $V_\gamma = \vec{b} \cdot \vec{d}$ because is $\vec{b} // \vec{d}$.

We image to place for each point of surface σ a vector equal to vector $\vec{d}$ and if we image to rotate the vectors simultaneously of 90°, then the vector $\vec{b}$ must rotate of 90° simultaneously along all the direction in the $Ox_1x_2x_3$ and after this rotation $\vec{b}$ will must be simultaneously perpendicular to axes X_1, X_2, X_3!
Then only possible rotation for $\vec{b}$ in this case is the rotation of 90° along the X_4 axis.
Because $\vec{b} // \vec{d}$ after this rotation the volume V_γ is in the $Ox_2x_3x_4$.
Then we can write $4\pi c^2 (\text{meters})^2 \, a' (\text{meters}) = \vec{b} \cdot \vec{d} = V_\sigma \quad 1^{(4)})$
$\vec{b} = 4\pi c^2 \hat{w}$, $\vec{d} = a' \hat{w}$.

$\vec{b'}$ is a vector perpendicular to the spherical surface $4\pi c^2$ and $\vec{b'} // \vec{d'}$
For $(1^{(1)})$, $(1^{(3)})$, $(1^{(4)})$, the volume $4\pi c^2 a'$ must be subtract from the original volume in the $Ox_1x_2x_3$ because V_σ' is rotate of 90° along the x_4 axis, and after this rotation V_σ' is in the $Ox_2x_3x_4$.
The cause of this decrease of initial volume $V_\sigma^i = \frac{4}{3}\pi(c+a')^3$ is the particle n through its mass Mn.
For Mn = 1 we obtain $4\pi c^2 a' = |J_G|$; i. e. J_G is the volume density for unit of mass of the $V_\sigma^i = \frac{4}{3}\pi(c+a')^3$.
Then $V_\sigma^f = V_\sigma^i - V_\sigma'$ $\qquad (1^{(5)})$

If in $(1^{(1)})$ we replace J_G by $J_P = \dfrac{V_P}{M_P}$ and M_n by M_μ

M_μ is muon mass, V_P is proton volume and M_P is proton mass.
Then for $(1^{(5)})$ we obtain: $V_P^f = V_P^i - J_P M_\mu$ $\qquad (1^{(6)})$
To calculate the value of proton radius in the muonic-hydrogen we have replaced the electron by muon; then, the value of proton radius must reduce because $M_\mu >> M_e$;
M_e is the electron mass.
$M_P = 1{,}672621898 \cdot 10^{-27}$ Kg, $M_\mu = 1{,}8835315 \cdot 10^{-28}$ Kg, $r_P = 0{,}8751$ m
$V_P = 2.8071244 \cdot 10^{-45} m^3$, $J_P M_\mu = 3{,}16108934 \cdot 10^{-46}$, $V_P^i = V_P$.
$V_P - J_P M_\mu = 2{,}49101566 \cdot 10^{-45}$ then, $r_P^f = \left(\frac{3}{4\pi} V_P^f\right)^{\frac{1}{3}} = 0{,}840935 \cdot 10^{-15}$ m .
To obtain $(1^{(6)})$ we have replace in the $(1^{(5)})$ the value of Gravitational Constant $G = J_G/(1\text{sec})^2$ by $G_P = J_P/(1\text{sec})^2$.

Trough this replacement, we can to conceive the particle n as if it were contained into a space with volume density J_G , whereas the muon into a space of volume density $J_P >> J_G$.
We make use of concept of ether, to understand the reason of this decrease in the proton radius, when we change electron by muon.

Why did Michelson-Morley's experiment not detect the ether?
In the reference frame Oxyz of ether J, a particle n of mass M_n and volume V_n is in motion to velocity v_n.
We can note that volume V_n is not the volume of particle n, but is a portion of volume take by particle n in he ether J.

For Einstein's theory of special relativity we obtain:
$V'_n = V_n \left(1- \frac{v_n^2}{c^2}\right)^{1/2}$
Because the motion of particle n is relative, then in the reference frame O'x'y'z' of particle n (O' origin of particle n), the ether is in motion to velocity - v_n, so relatively to ether J the volume $V_{particle}$ of particle n must be $V'_p = V_p \Gamma$ (the value of the volume V_p is unknow).
Instead for the mass of particle n we obtain $M'_n = M_n \Gamma$.
Then
a) the volume (mass) density of particle n don't is function of its motion relative to reference frame of ether J
b) because the motion of particle n is relative, we can imagine the ether in motion relative to reference frame of particle n; then for a) the value of ether don't is function of its motion relative to particle n.

Giampaolo Piscedda

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giampaolo.piscedda@ yahoo.it