Communicated Addendum: Simplified Method to Calculate the Radius of Particles

Fernandes, José Luís Pereira Rebelo, Eng.

Independent researcher since 2005, Engineer Graduated from the University of Porto

E-mail: rebelofernandes@sapo.pt

ADDENDUM TO PAPER

The following is offered as an update and addendum to the paper originally published as:

Fernandes, J.L.P.R. 2022. "Simplified Method to Calculate the Radius of Particles". *Pacific Journal of Science and Technology*. 23(1):5-10.

https://www.akamai.university/uploads/1/2/7/7/127725089/pjst23_1_5.pdf

The referenced article that was published in May 2022 and was originated from the result of the experiment carried out at the Paul Scherrer Institute (PSI) in Villigen, Switzerland, by an international team of 32 researchers, which showed that its radius is equal to: 8.4184 x 10^{-16} meters, 4% less than 8.768 x 10^{-16} meters obtained by QED (Quantum Electrodynamics Theory). The same team continued to investigate and published on January 24, 2023 a more rigorous measurement which was made and published in the journal *Science* in which the proton radius was measured with a little more precision than the previous one: 8.4087 x 10^{-16} meters, 3.7% smaller.

This update does not change the theoretical content of the published article.

This new value for the proton radius uniquely changes the constants found for both approaches.

1. In the evaluation in the field of theoretical physics, the alteration of the primordial radius of matter originates, and thus also the modules of contraction of mass potential energy.

THE PRIMORDIAL RADIUS OF MASS, r_o

Using this new information, that possible to measure directly the radius of the proton we can calculate the primordial radius r_o of mass:

r_{proton}= 8.4087 x 10^{-16} m

m_{proton}= 1.6726231 x 10^{-27} Kg

From (25.1) and taking into account the proton mass and radius:

$$r_o^2 = \frac{m\,r}{\rho_u} \qquad (27.1)$$

$$r_o = \sqrt{\frac{m\,r}{\rho_u}} \qquad (28.1)$$

$$r_o = 4{,}593861710E\text{-}35 \text{ m} \qquad (29.1)$$

This is the value of the primordial radius of the mass.

THE TENSILE MODULUS OF POTENTIAL ENERGY OF MASS

$$K_e = \frac{3}{r_n^2}$$

$$K_e = 1{,}421560737E{+}69 \qquad (30.1)$$

The simplified modulus, Ke:

$$k_s = \frac{1}{r_0^2} \qquad (31.1)$$

$$k_s = 4{,}738535790E{+}68 \text{ m}^{-2} \qquad (32.1)$$

2. In the field of quantum mechanics, there is an alteration in the proportionality factor in relation to the radius of the particle that generates the wavelength of energy in matter.

THE VALUE OF Y

Taking into account the proton mass and radius, we can develop numerically, the present theory. Then, where, h is Planck constant.

$$\gamma = \frac{h}{m\,r\,C} \qquad \textbf{(14.2)}$$

$$\gamma = 1{,}57147791 \approx \frac{\pi}{2} \qquad \textbf{(15.2)}$$

SPECULATING

Perhaps the correct value for γ is the value of $\frac{\pi}{2}$.

$$\gamma = \frac{\pi}{2}$$

$$r = 8{,}412348634\text{E-}16 \text{ m} \qquad \textbf{(19.2)}$$

REMINDER

Through this article, we saw how the universal density of potential energy interferes with the size of all particles, as it interferes with its mass. We believe that this analysis will be important to the future development of physics.

GENERALIZING FOR ALL COMMON PARTICLES

The calculation of the particle's radius from its mass or energy can be applied to all common particles.

Table 1: The Common Particles Radius as a Function of their Mass and their Energy.

Particle	Mass (Kg)	Energy (eV)	Radius (m)
Neutron	1.6749×10^{-27}	939565379	8.39727×10^{-16}
Proton	1.6726×10^{-27}	938272047	8.40870×10^{-16}
Electron	9.1094×10^{-31}	510999	1.54397×10^{-12}

VALUES FOR GENERAL PARTICLES RADIUS

The calculation of the particle's radius from its mass or energy can be applied to all particles.

Table 2: General Particle Radius, as a Function of their Mass and their Frequency.

Frequency of the particle	Mass of particles (Kg)	Radius of the particle (m)
1,0000E+14	7,37E-37	1,90836E-06
1,0000E+15	7,37E-36	1,90836E-07
1,0000E+16	7,37E-35	1,90836E-08
1,0000E+17	7,37E-34	1,90836E-09
1,0000E+18	7,37E-33	1,90836E-10
1,0000E+19	7,37E-32	1,90836E-11
1,0000E+20	7,37E-31	1,90836E-12
1,0000E+21	7,37E-30	1,90836E-13
1,0000E+22	7,37E-29	1,90836E-14
1,0000E+23	7,37E-28	1,90836E-15
1,0000E+24	7,37E-27	1,90836E-16
1,0000E+25	7,37E-26	1,90836E-17
1,0000E+26	7,37E-25	1,90836E-18
1,0000E+27	7,37E-24	1,90836E-19
1,0000E+28	7,37E-23	1,90836E-20
1,0000E+29	7,37E-22	1,90836E-21
1,0000E+30	7,37E-21	1,90836E-22

THE SAME VALUES ADOPT:

$$h = 6.62606896 \text{ x}10^{-34} \text{ Kg}^{1} \,.\, \text{m}^{2} \,.\text{s}^{-1}$$

$$C = 299\ 792\ 458 \text{ m/s}$$

$$G = 6.67428 \text{ x}10^{-11} \text{ m}^{3} \,.\text{Kg}^{-1} \,.\, \text{s}^{-2}$$

Pacific Journal of Science and Technology