SHORT COMMENTARY

String like elementary particles based on photon

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Zhen-hua Mei. String like elementary particles based on photon. J Mod App. Phys. 2022; 5(2):1-4.

ABSTRACT

Based on the theory of B. Feng's photon based manifold and the principle of constant speed of light, the radius of photon based manifold is calculated. The result rationality is verified by its application in predicting the elementary matter particles of electron and proton radius and masses which have confirmed previously by other method.

Key Words: *Time-space manifold; Elementary particle physics; Vacuum; Riemannian space; 5D*

INTRODUCTION

The concept of radius of photon based manifold is proposed in literature. It plays an important role in our B. Feng's theory system. However, the value of the radii has not been given therein and is still unknown up to the present day. Well then, it will be studied in this paper [1].

Deduction

According to my previous literature, the second order vacuum is spinning in the first order vacuum around the time axis; however, for a matter elementary particle, its intrinsic spin frequency (s) is always constant, whether the direction of the second order vacuum spin is toward or opposite to it [2]. It was derived out of a hypothesis, and expressed as:

$$s = 469.39\ \text{MeV}/h \qquad (1)$$

Where, s expresses the spin frequency, h the Planck constant. It can be resulted as,

$$s = 469.39\text{Mev}/h$$
$$= \frac{469.39\times 1.6021766208\times 10^{-13}}{6.626069934\times 10^{-34}}$$
$$= 1.134979998\times 10^{23}\,\text{s}^{-1}$$

As the wavelength corresponds to 2π circumference, and due to the principle of the constant speed of light, we have relation as,

$$2\pi R_0 s = c$$

Because the energy part of 469.39 MeV in (1) is in 3-dimensional, so the spin frequency (s) means in 3-dimensional, and the radius of photon based manifold $\mathcal{R}_0$ is then a 3-dimensional physical quantity. The strict form of the relation ought to be written as form as,

$$2\pi R_{0,3\text{D}} s_{3\text{D}} = c \qquad (2)$$

where, $R_{0,3\text{D}}$ expresses the radius of a photon based manifold in 3-dimensional, c the speed of light, and following (n) the natural

number, and n = 1, 2, 3, 4, ...∞.

$$R_{0,3\text{D}} = \frac{c}{2\pi s_{3\text{D}}}$$
$$= \frac{2.99792458\times 10^{8}}{2\pi\times 1.134979998\times 10^{23}}$$
$$= 4.20390242\times 10^{-16}\,\text{m}$$

Application and Verification: Radius of Matter Elementary Particle

In literature, for any matter elementary particle, the radius (r) must be less than the photon's, and the radius must be satisfied 2 times off. The formula can be expressed as $r = \mathcal{R}_0/2n$ [1]. Because the manifolds of photon are a 4-dimensional, the formula ought to be described strictly with subscript symbols, such as form as [1],

$$r_{3\text{D}} = \frac{R_{0,4\text{D}}}{2^n} \qquad (3)$$

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Received:- 01 March, 2022, Manuscript No. M- PULJMAP-22-4390; Editor assigned:- 03 March, 2022, Pre-QC No. PULJMAP-22-4390; Reviewed:- 19 March,2022, QC No. PULJMAP-22-4390(Q); Revised:- 22 March, 2022, Manuscript No. PULJMAP-22-4390(R); Published:- 28 March, 2022, DOI: 10.37532.2022.5.2

Because we have relation as,

$$\mathcal{R}_{0,4D} = 3\sqrt{2}\pi k_2 \mathcal{R}_{0,3D} \qquad (4)$$

Replace (3) with (4), we have,

$$r_{3D} = \frac{\mathcal{R}_{0,3D} \times 3\sqrt{2}\pi k_2}{2^n} \qquad (5)$$

$$= \frac{4.20390242 \times 10^{-16}}{2^n} \times 3\sqrt{2}\pi \times 0.9854075625$$

$$= \frac{5.521469059 \times 10^{-15}}{2^n}$$

The next question is that, how about the number (n) chooses for a matter elementary particle in equation (5)

According to our previous work, the energy between electron (m_e), proton (m_p) and photon based manifold (Ms, and Ms = sh = 469.39 MeV) has relation as [2],

$$m_e + m_p = 2M_s \qquad (6)$$

Because relation:

$$mr = \frac{1}{64\sqrt{2}\pi k_1 k_2}\frac{h}{c}$$

Equation (6) can be expressed in radius form, and they must with subscript of 3D symbols. We have [3],

$$\frac{1}{r_{e,3D}} + \frac{1}{r_{p,3D}} = \left(\frac{1}{64\sqrt{2}\pi k_1 k_2}\frac{h}{c}\right)^{-1} \times \frac{2sh}{c^2} = 64\sqrt{2}\pi k_1 k_2 \frac{c}{h} \times \frac{2h}{c^2}\frac{c}{2\pi\mathcal{R}_{0,3D}} = 2 \times 64\sqrt{2}\pi k_1 k_2 \frac{1}{\mathcal{R}_{0,3D}}$$

$$(2^{n_1} + 2^{n_2})\frac{1}{3\sqrt{2}\pi k_2 R_{0,3D}} = 2 \times 64\sqrt{2}\pi k_1 k_2 \frac{1}{R_{0,3D}}$$

$$(2^{n_1} + 2^{n_2}) = 3\sqrt{2}\pi k_2 \mathcal{R}_{0,3D} \times 2 \times 64\sqrt{2}\pi k_1 k_2 \frac{1}{\mathcal{R}_{0,3D}}$$

$$(2^{n_1} + 2^{n_2}) = 2 \times \frac{64}{3} k_1 \times (3\sqrt{2}\pi k_2)^2 \qquad (7)$$

Simultaneous equations (5) and (7), as n must be and ask to be deferent integer, we can solve the equations. It results that if and only if n = 2 and 13 respectively, the equations are satisfied, and vice versa. The solutions (n = 2 and 13) correspond to r_{3D} = 1.380367265 $\times 10^{-15}$ m, and 6.740074535 $\times 10^{-19}$ m respectively. They are nearly the radii of electron and proton, but they are not exactly equal to their previous calculation results [3]. That is because the space is not a regular Euclidean one but Riemann's. Then the 16-regular polytopes of 5-dimensional is not a regular again but deformed. Therefore, the 2 times relationship of radius is then deformed by factor k_3. For simplifying, we rewrite the number 2 as $\tilde{2}$, and choose k_3= 0.990072353, we have,

$$\tilde{2} = 2k_3 = 2 \times 0.990072353 = 1.980144706$$

Replace 2 with $\tilde{2}$, (5) becomes,

$$r_{3D} = \frac{\mathcal{R}_{0,3D} \times 3\sqrt{2}\pi k_2}{\tilde{2}^n}$$

$$= \frac{5.521469059 \times 10^{-15}}{\tilde{2}^n} \qquad (8)$$

This time, when n = 2 (for electron), we obtained,

$$r_{e,3D} = \frac{5.521469059 \times 10^{-15}}{\tilde{2}^2}$$

$$= \frac{5.521469059 \times 10^{-15}}{1.980144706^2}$$

$$= 1.40819 \times 10^{-15}\,\text{m}$$

And when n = 13 (for proton), we obtained,

$$r_{p,3D} = \frac{5.521469059 \times 10^{-15}}{\tilde{2}^{13}}$$

$$= \frac{5.521469059 \times 10^{-15}}{1.980144706^{13}}$$

$$= 7.67352 \times 10^{-19}\ \text{m}$$

They are the accurate value of electron and proton radius which we have predicted before [3]. The errors are less than 0.05%. After the inserting of k_3, the relation in (7) can be rewritten as,

$$\tilde{2}^2 + \tilde{2}^{13} = 2 \times \frac{64}{3} k_1 \times (3\sqrt{2}\pi k_2)^2 \qquad (9)$$

Where, $\frac{64}{3}k_1$ and $3\sqrt{2}\pi k_2$ are the spatial conversion factors of five and four dimensions respectively.

$$\textit{Mass ratio} = \frac{r_{3D,\,\text{electron}}}{r_{3D,\,\text{proton}}} = \frac{\mathcal{R}_{0,\,3D} \times 3\sqrt{2}\pi k_2 / \tilde{2}^2}{\mathcal{R}_{0,\,3D} \times 3\sqrt{2}\pi k_2 / \tilde{2}^{13}} = \frac{\tilde{2}^{13}}{\tilde{2}^2} = \tilde{2}^{11} = 1835.1 \qquad (10)$$

It is very close to the actual value of 1836.1257. According to above mass and radius relation which expressed above, the mass of electron and proton can then be obtained by calculation to be 0.51128 MeV and 938.27 MeV respectively [3].

DISCUSSIONS

Equation (5) and (8) show us that the mass or radius value of proton and electron is depends upon the constant elementary particle's intrinsic spin frequency s or photon based manifold $\mathcal{R}_{0,4D}$ (or simplified as $\mathcal{R}_0$). However, in (9) and (10) we see that their ratio is certain despite of $\mathcal{R}_0$; it only depends upon a pure geometric property of 5-dimentaional space. Different $\mathcal{R}_0$ value means different vacuum character and different universe; however, every different universe would have the same proton and electron mass ratio, and then the same atoms properties. Considering the important progress, we have achieved in this paper, it is clear up that there are only four independent physical constants in the universe; the four we choice are the in vacuum speed of light c, the vacuum permeability μ_0 the Planck constant h or h, and the radius of photon based manifold $\mathcal{R}_0$. The four constants are independent and determined everything in the universe. Every other constant can be deduced from these four. The average vacuums spin frequency of $\bar{\bar{\nu}}_0$ is not again independent constant from the point of view in this paper. The $\mathcal{R}_0$ determined s, and a certain s determined certain $\bar{\bar{\nu}}_0$, and vice versa. And because of relation $c^2 = (\varepsilon_0\mu_0)^{-1}$, the vacuum dielectric constant ε_0 is not an again independent physical constant. As for the electric charge q, the fine structure constant α^{-1} [4], the gravitational constant G,

and the mass of electron and proton are all not independent constant again and have all been deduced in our theory system. In our B. Feng's theory system, we introduced three coefficients k_1, k_2 and k_3. Although they are nearly 1 and looks like fitting factors, still you may feel dissatisfied with these three inserting, think it would show the theory's defect or incompleteness or imprecise at first sight. Nevertheless, is just the existence of the three fitting factors that shows the theory's true reliability! Because as you know, our space is proved a Riemann's, the appearing of the three fitting factor reflects the curvature of space-time (you may regard them as bending factors). Otherwise, without these fitting factors, from Euclidean space, if we established our theory and still deduced a series of very accurate results in a non-Euclidean space (a real Riemannian space) that would be a really irregular thing. The three coefficients (k) are not basic independent physical constant also, because of their unit less. Energy is a relative motion. The elementary matter particle's intrinsic

spin frequency s and the average vacuum spin frequency ${}_0\nu$ and as well as their energy form expression Ms etc. are the expressions of second order vacuum properties that relative to the first vacuum. As the background value of the secondary vacuum, they cannot be observed or detected [3]. Or to say that they exist in imaging state and cannot presented as real energy existence in universe. And they are not the dark matter or dark energy also, that cannot be misunderstood.

String or supper string theory was said to be an ultimate theory in the universe, although as a useless theory, its equation cannot be solved, and it cannot draw any conclusion to predict and verify some things in the universe. Facing such an embarrassing situation, surprisingly, still many theoretical physicists insist on their idea of string, why? Maybe there's something reasonable in it.
If you prefer or like to use the conception of "string", it looks like that, there is a string like or loop quantum something works and results the 2 times reduction relation in formula (1)! You may think the above mentioned photon based manifold to be just the string, a closed string (loop quantum). The string length is then to be $2\pi R_{0,4D}$ and equals to 3.469241327 × 10-14 m. Different radii or rest masses of elementary matter particles can be considered as different results of the vibration waves of the string. Obviously, for a stationary wave of the string, the different wave length must satisfy 2 times reduction in law mathematically. This may be the answer for those faithful of the string, I guess.

In this way, you may have reason to like the idea of string; you may have reason to say that we have found the string; moreover, the result of string is easier to be understood than topological ones. However, it must be pointed out that the string here is not a material or immaterial reality, but a trail in space. We cannot consider an elementary particle to be composed of different strings. The string is just a theoretically conception, but not the smallest unit of matter. On the other hand, we are glad to see that we find a reasonable explanation for the string, and give it a good way out and comfort. This understanding is of great significance to the development of physics.

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