THE SUPERSTRING THEORY AND THE SHAPE OF PROTONS AND ELECTRONS

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Abstract

According to "Superstring Theory", the electron and proton are made of similar tiny supersymmetric strings (Gefter, 2007; Green, Schwarz, & Witten, 2012; Schwarz, 1982; Sharma, 2010). In this paper we introduce a sample particle that is such tiny supersymmetric string or made of it and also we use scientific achievements of experiments about electron and proton specifications to verify and compare the electron and proton dimensions and masses with this sample. By using logical reasons, we reject one of the methods of measuring of electrons' radius. Finally, using simple mathematical formulas, we prove that although the electrons and protons are both spherical, but one is hollow and the other is dense

Keywords

Superstring Theory, Electron, Proton, Electron Radius, Proton Radius

1. Introduction

Superstring theory - known less formally as "string theory" - is sometimes called the Theory of Everything, because it is a unifying physics theory that reconciles the differences between quantum theory and the theory of relativity to explain the nature of all known forces and matter. According to string theory, at the most microscopic level, everything in the universe is made up of loops of vibrating strings, and apparent particle differences can be attributed to variations of vibration. An object and a force can both be broken down into atoms, which can be further broken down into electrons and protons, which can be, finally, broken down into tiny, vibrating loops of strings.

Electrons and protons, as two elementary charged particles, have always been considered by scientists and over time, the knowledge of scientists has become more complete and sometimes also completely changed. In 1909 when the electron's charge was more carefully measured by the American physicists Robert Millikan and Harvey Fletcher in their oil-drop experiment (Millikan, 1911), they never assumed that one day this particle would cause an enormous change in human's daily life. But nowadays human life without electron movement is almost meaningless.

Should note that scientists' cognition about electron at the beginning of its discovery was totally different from today's knowledge, that's why the usage of electron also had a different aspect. Scientists with different researches and experiments have achieved the physical properties of electron and proton in times, for instance as we all know, the mass of a proton is equal to $m_p = 1.6726217 \times 10^{-27}$ kg (Mohr, Newell, & Taylor, 2016; Weise, 1984), its electrical charge $q_p = 1.602 \times 10^{-19}$ c (Mohr et al., 2016) and its radius $r_p = 0.8 \times 10^{-15}$ m (Mohr et al., 2016; Mohr, Taylor, & Newell, 2008; Pohl et al., 2010). For electron, it is true that its mass is expressed $m_e = 9.109 \times 10^{-31}$ kg (Mohr et al., 2016; Mohr et al., 2008; Pohl et al., 2010) and its electrical charge amount is equal to proton (Mohr et al., 2016; Mohr et al., 2008; Pohl et al., 2010) ones, but for measuring its radius, there are two methods. The first one is classical method which measures the radius with Newtonian physics laws that the resulting amount is $r_e = 2.8179 \times 10^{-15}$ m (Haken, Brewer, & Wolf, 2012). The other one is quantum radius which is related to a single electron in a Penning trap and knows the electron radius equal to 10^{-22} m (Hans, 1988).

According to the experiments, proton and electron are spherical (Hudson et al., 2011; Mohr et al., 2016; Pohl et al., 2010), but this important issue has never been addressed. Are both electrons and protons the same solid spheres? Is it possible? Is different behavior between light agile electron and massive motionless proton relevant to their appearance

form? In this paper, with a simple logical presentation, by using the measured amount of mass and volume for proton and electron, we will discuss what the structural difference is between them?

2. Material / Method

Superstring Theory is an attempt to explain all of the particles and fundamental forces of nature in one theory by modeling them as vibrations of tiny supersymmetᵣic strings. If we assume that the smallest massive particle which constructs the whole universe is such tiny supersymmetric or consists of several tiny supersymmetric, it can be seen that electron, proton, neutron, etc. as basic subatomic particles are also composed of these particles.

Now assume that electrons and protons are consists of these smallest massive particles. In other words, these particles together construct electrons and protons. Surely the difference between the construction of electron and proton is described with the numbers and positioning of these smallest massive particles. Physics considers a continuous texture for proton and we know that continuous texture means that there are an infinite number of particles next to each other. Therefore, we tend the number of particles to infinity to be associated with the monolith structure of the proton (Fig. 1).
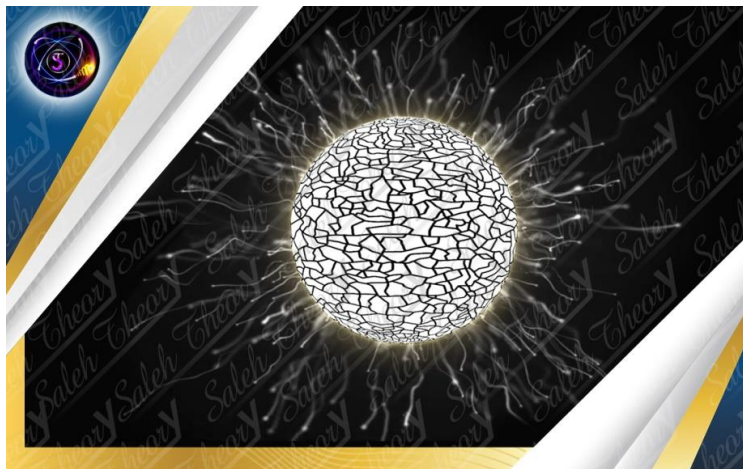

Figure 1: *Proton shape*

$$p = \lim_{n \to \infty} \sum_{i=1}^{n} A_i \qquad (1)$$

Where p is proton and A is the smallest massive particle. As a result, the formula upon the resulted mass will be equal to:

$$m_p = \lim_{n \to \infty} \sum_{i=1}^{n} m_i \qquad (2)$$

And as:

$$m_1 = m_2 = m_3 = \cdots = m_n \qquad (3)$$

Then:

$$m_p = \lim_{n \to \infty} \sum_{i=1}^{n} m_i = n\, m_a \qquad (4)$$

Where m_p is proton's mass and m_a is the smallest massive particle's mass.

But since these infinite particles have to construct the constant radius of proton, if the number tends to infinity, the radius of the smallest massive particles tends to zero and that is meaningless. Therefore, for instance, we put $n = 10^8$ to take into account the monolith structure of proton besides non-zero particles radius. So we have:

$$n = 10^8 \tag{5}$$

$$m_p = 10^8 \times m_a \tag{6}$$

Accordingly, in a proton we consider an approximate number of 10^8 pieces for this dreamy particle. Also from now on, we call these smallest massive particles "Angel Particles"

3. Calculation

With the assumption that 10^8 pieces of Angel Particle construct a proton with the mass and radius as the followings:

$$m_p = 1.6726217 \times 10^{-27} \text{ kg (Mohr et al., 2016)} \tag{7}$$

$$r_p = 0.8 \times 10^{-15} \text{ m (Mohr et al., 2016)} \tag{8}$$

By using (5), (6) and (7) the mass of Angel Particle m_a could be calculated by:

$$m_a = {m_p}/{n} = {m_p}/{10^8} \text{ kg } = 1.6726217 \times 10^{-35} \text{ kg} \tag{9}$$

Then, since the numbers of Angel Particles are too much, it could be assumed with approximation that while the proton is created by putting these particles next to each other then there is no void space in it. Therefore, if we name the radius of Angel Particles as r_a, then by using (5) and (8) we could calculate it by:

$$V_p = {4}/{3} \pi r_p{}^3 = n \times V_a = 10^8 \times V_a \tag{10}$$

$$ {4}/{3} \pi r_p{}^3 = 10^8 \times \left({4}/{3} \pi r_a{}^3\right) \tag{11}$$

$$r_a = {r_p}/{465} = {0.8 \times 10^{-15}}/{465} \text{ m} \tag{12}$$

Where, V_p is proton's volume, V_a is Angel Particle's volume, r_p is proton's radius and r_a is Angel Particle's radius.

So we have the mass and radius of the smallest massive particle, "Angel Particle".

$$r_a = 1.72 \times 10^{-18} \text{ m} \tag{13}$$

$$m_a = 1.6726217 \times 10^{-35} \text{kg} \tag{14}$$

4. Methods of calculating electron's radius

Electron mass and radius are as follow:

Mass $\qquad m_e = 9.109 \times 10^{-31}$ kg (Mohr et al., 2016) (15)

Classical radius $\qquad r_{e_c} = 2.8179 \times 10^{-15}$ m (Haken et al., 2012) $\qquad$ (16)

Quantum radius $\qquad r_{e_q} = 10^{-22}$ m (Hans, 1988) $\qquad$ (17)

Now assume that we want to construct an electron with the Angel Particles. So with proportionality mass of these two particles, by using (14) and (15) the number of Angel Particles which construct an electron is equal to:

$$l = {}^{m_e}\!/_{m_a} = 54459 \cong 55000 \qquad (18)$$

Where, L is the number of Angel Particles, m_e is electron mass and m_a is Angel Particle's mass. In this part we will review two issues:

1) In which method, the calculated radius for electrons is impossible?

2) Based on the correct calculated radius method, how should these particles be placed?

We have two methods of calculating electron's radius. The first one is quantum radius which related to a single electron in a Penning trap and knows the electron radius equal to 10^{-22} m (Hans, 1988). And the other one is classical method which measures the radius with Newtonian physics laws (Haken et al., 2012).

4.1. Quantum method

Assume that all 55,000 Angle Particles are compressed together and have constructed a continuous texture for electron. With this assumption and (13) and (18) the minimum radius for electron is equal to:

$$V_{e_1} = {}^{4}\!/_{3}\,\pi\, r_{e_1}{}^3 = l \times V_a \qquad (18)$$

$$V_a = {}^{4}\!/_{3}\,\pi\, r_a{}^3 \qquad (19)$$

$${}^{4}\!/_{3}\,\pi\, r_{e_1}{}^3 = l \times ({}^{4}\!/_{3}\,\pi\, r_a{}^3) \qquad (20)$$

$$r_{e_1}{}^3 = l \times r_a{}^3 = 55000 \times r_a{}^3 \qquad (21)$$

$$r_{e_1} = 6.55 \times 10^{-18} \text{ m} \qquad (22)$$

$$r_{e_1} \gg 10^{-22} \text{ m} \qquad (23)$$

Because of the compression of Angel Particles next to each other, the calculated radius for electron in this method is as minima as possible. But this radius is approximately 1000 times larger than its quantum value ($10^{-22}\, m$). So calculating the radius of electron by the quantum method is not correct.

In other words, in the case of Angel Particles squeezed together, it is also approximately 10^3 times larger than the radius calculated by the quantum method, which indicates that the quantum computation method is incorrect.

4.2. Classical Method

If the electron with classical radius composed of 55000 similar Angel Particles, now we will review the positioning of those on three ways: continuous texture, scattered and hollow spherical shell.

4.2.1. Continuous Texture

Since we know the radius of the Angle Particle and the classical radius of the electron, by using (14) and (16) we have:

$$V_e = t \times V_a \qquad (24)$$

$$^4/_3\, \pi\, r_{e_c}{}^3 = t \times (^4/_3\, \pi\, r_a{}^3) \qquad (25)$$

$$t = r_{e_c}{}^3 / r_a{}^3 \qquad (26)$$

$$t = 4.4 \times 10^9 \qquad (27)$$

It means that at least 4.4×10^9 Angel Particles are needed to create a continuous texture for electron with radius of $r_e = 2.8179 \times 10^{-15}\, m$, which, according to the following calculations, (14) and (27), generates a huge mass for electron:

$$m_t = t \times m_a = (4.4 \times 10^9) \times 1.6726217 \times 10^{-35}\, \text{kg} \qquad (28)$$

$$m_t = 7.36 \times 10^{-26}\, \text{kg} \qquad (29)$$

$$m_e = 9.109 \times 10^{-31}\, kg \text{ (Mohr et al., 2016)} \qquad (30)$$

It means, about 100,000 times heavier than calculated amount of the electron mass in laboratory. Or:

$$m_t \approx 10^5 m_e \qquad (31)$$

So it is impossible that the electron have continuous texture and be compressed like proton. Now we examine the possible cases of placing 55,000 Angel Particles and creation of an electron.

4.2.2. Scattered

In this part we check the possibility of Angel particles spaced apart and distributed throughout the sphere to make an electron".

In this case, 55000 angel particles have scattered in a sphere with classical electron radius. Let's calculate, how much is the amount of free space between two next particles?

$$r_a = 1.72 \times 10^{-18}\, \text{m} \qquad (32)$$

$$r_e = 2.8179 \times 10^{-15}\, \text{m} \qquad (33)$$

$$V_f = V_e - (l \times V_a) = V_e - (55000 \times V_a) = {}^4/_3\, \pi\, r_{e_c}{}^3 - \left(55000 \times {}^4/_3\, \pi\, r_a{}^3\right) \qquad (34)$$

$$V_f = 9.38878 \times 10^{-44}\, \text{m}^3 \qquad (35)$$

Where, V_f is the empty volume in electron sphere. Now let's see, is this empty space several times greater than an Angel Particle in volume?

$$u = V_f/V_a = \frac{9.38878 \times 10^{-44}}{1.1717 \times 10^{-48}} = 80,130 \tag{36}$$

It means that the empty space is about 80,000 times greater than the volume of a particle. In this case, the minimum distance between the two particles is about 80,000 times greater than an Angle Particle's volume.

Existence of a very large gap between two Angel Particles, so that they do not affect each other, and the absence of such a structures in nature from the other side, eliminates the possibility of positioning the Angel Particles, in such a way that all particles are spread out and scattered in a sphere named electron. So, scattering Angel Particles in volume of electron sphere is impossible.

4.2.3. Hollow spherical shell

The only possible case is the hollow spherical shell form of the electron, it means 55,000 Angel Particles all must be located on a spherical shell and will create a hollow sphere. In this case, by using (13), (16) and (18) the distance between two consecutive Angel Particles is as follow:

$$p_e = 4\pi r_e^2 = 9.97334 \times 10^{-29} \text{ m}^2 \tag{37}$$

$$p_a = 4\pi r_a^2 = 3.717 \times 10^{-35} \text{ m}^2 \tag{38}$$

$$l \times p_a = 55000 \times 3.717 \times 10^{-35} = 2.0447 \times 10^{-30} \text{ m}^2 \tag{39}$$

$$p_e \approx 50 \times (l \times p_a) \tag{40}$$

where, p_e is the electron surface area and p_a is the occupied area by an Angel Particle. That is, the electron-forming particles necessarily have located on the surface of a shell. In other words, the electron is a hollow spherical shell with particles placed on its surface (fig. 2).
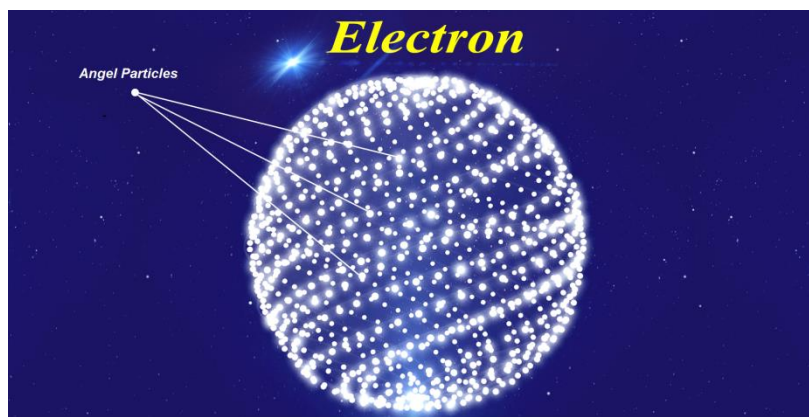

Figure 2: *Electron shape*

5. Result

We found that a proton is a continuous texture and an electron is a hollow spherical shell, which corresponds to the experimental results of electron mobility and the constancy of protons.

6. Conclusion

According to *Superstring Theory*, the whole world is made up of small energy packages with at least 11 dimensions of motion(Sharma, 2010). Therefore, electrons, protons, and neutrons should also be made of these small energy packages. So in this paper, we defined a particle named Angel Particle, which is the smallest massive unit and the entire universe is made up of it. This massive particle is made up of one or a few packages of energy. We then reconstructed the protons based on these particles and considered the number of particles used in it to be physical infinity (10^8). With this method, we calculated the mass and radius of Angel Particles. Then we reconstruct the electron and found that the electron had to be made of 55,000 Angle Particles, depending on the ratio of the electron mass to the Angel Particle. Then we drove the Angel Particles to the electron to make the electron, and we found that even if all the Angel Particles that comprise the electrons are squeezed together, the radius of created sphere is 1000 times larger than the electron quantum radius. We came to conclusion that this method of calculating the electron radius is not correct. Then we went to the classical radius of the electron. But only if this radius formed with 55,000 Angel Particles, these particles would be placed on a hollow spherical shell. In future we should approach to neutron structure and explain that why neutron has no net charged.

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