Fundamental J. Modern Physics, Vol. 1, Issue 1, 2011, Pages 33-40
Published online: September 12, 2011

THE CREATED GIANT CHARGE

EMAD ELDIEB

Theoretical Physics
Quena University
Egypt
e-mail: eeldieb@yahoo.com

Abstract

In this paper, we go further with the theory of the giant atom like system published in 2009 by the author to construct, in a practical method, a giant charged body. The giant atom like system has proved by many evidences the historical existence of the giant atom, so the created giant charge does not search in these evidences but only searches in how to construct practically the giant charge. The introduction of the giant atom is to consider the classic estimation of the orbital length of a planet by using known orbital speed is a trivial solution. The nontrivial solution in the knowledge of the giant atom is to estimate by atomic equations the orbital speed independent on the orbital length. All the skeleton of the giant atom physics has been built on only one proposal. The giant charge would also give the physical meaning of this proposal.

1. Introduction

The giant atom like system is built on a proposal saying that non arbitrary factors are introduced to reduce electrostatic energy and uncertain momentum inside the giant charge. This electric reducing factor was named by the author of the giant atom like system as $c_0 = 10^{-24}$, while the reducing factor of uncertain momentum was named as $p_0 = m/r_0$ (where m is the rest mass of a neutron and r_0 is its radius) $= 1.7 \times 10^{-27} \big/ 1.7 \times 10^{-18} = 10^{-9}$.

Keywords and phrases: giant atom, giant charge, charged photon.

Received March 22, 2011

In this paper, we will construct, by equations, a giant charged body without using the reducing factors.

2. Discussion

The giant charge is a homogeneous compact sphere, obeys the shell theorem of electrostatic and gravitational potential, and the required condition for its presence is in the form [1]

$$(m.n)\,.\,m.g/r \geq (e.p)e.c_0/4\pi\varepsilon_0 r\,, \tag{1}$$

where g is the gravitational constant, p is number of protons $= 2.3 \times 10^{33}$, e is the charge in Coulomb, n is number of neutrons $= 5.2 \times 10^{45}$, c_0 is the proposed reducing factor $= 10^{-24}$, and $r = r_0 n^{1/3}$ such that $r_0 = 10^{-16}$ meter. Such r_0 gives, from uncertainty, speed fluctuation v_u equal to speed of light c. The last equation of electrostatic potential without c_0 gives v (of the last shell) much more than c which is forbidden by relativity, so the giant charge deals such dilemma by introducing the factors p_0 and c_0. The giant proton by the gravitational binding energy takes the form [1]

$$(m.n)(m.\,n/p)g/r \geq e.p.e.c_0/4\pi\varepsilon_0 r\,,$$

where n/p (as estimated in the giant atom like system) is the ratio between neutrons and protons $= 2.3 \times 10^{12}$. This means that the giant charge is preserved by gravity under umbrella of the two factors c_0 and n/p, whose product reduces the electric potential by about 10^{36} times. The left side of the giant electron of the above equation takes the form

$$(m_e n)(m_e n/p)g/r \to n'/p = 1.1 \times 10^{12} \times 1844. \tag{2}$$

The neutron like mass inside the giant charge obeys the most probable value in the form $r_0\{m(c.p_0)\} = \hbar p_0$

$$(2 \times 10^{-16})(1.7 \times 10^{-27})\{(3 \times 10^8)p_0\} = \{(10^{-34})p_0\}, \tag{3}$$

which gives

$$v_u = (3 \times 10^8)p_0 = 0.3\,\text{m/s}\,. \tag{4}$$

Now to construct a practical giant charge from normal physics laws (without reducing factors), we propose that we have to preserve the same n/p and the same v_u. So if we excluded the effect of gravitational potential from the last equation and imagined that the electric potential is preserved by a spherical container which acts as potential barrier, then the electric potential of the last layer would obey

$$e.p.e/4\pi\varepsilon_0.r\,. \tag{5}$$

The second condition which has to be preserved could be concluded from the following discussion:

Because of c_0 is a main character for the electrostatic potential of the giant charge which is introduced only to avoid *v* to reach *c*, so we can estimate the least possible number of protons which creates the above dilemma by putting *v* equal to *c* in the next system

$$e^2 p^{2/3}/4\pi\varepsilon_\varepsilon r_0 (n/p)^{1/3} = m(3\times 10^8)^2. \tag{6}$$

The left side represents the total electric potential inside a sphere divided by the number of protons. This form for more than a physical reason is not right. Now we would search to express, by a similar form, the particle itself in high electric potential when be surrounded and preserved by an imaginary stiff container or preserved by another central attractive potential. The following form talks about the particle, not the sphere, so it conserves the angular momentum as $\hbar$ when $r_0 = 10^{-16}$ m.

$$0.6e^2 p^{5/3}/4\pi\xi_0 r_0 (n/p)^{1/3} = p(mv^2)_{v\to c}. \tag{7}$$

We can consider this equation as a solution for the following system:

$$v = f\{E(r)\}, \tag{7.1}$$

$$\{E(r)\}_{r=0} = 0, \tag{7.2}$$

where $E(r)$ is the electric potential.

$\delta E(r)/\delta r = k$, where *k* is a constant, and *r* is the distance from centre of the sphere to a defined point of the space of this sphere. These equations say that although the particles are distributed homogenously yet the electric potential is a function (*r*) obeying the divergence and shell theory, and hence the factor 0.6 compels itself in equation (7). Equations (7.1) and (7.2) say that the particles are positioned in a continuous differential r and consequently with differential E and v such that the mean value of the speed of all the particles is equal to c. Equation (7) differs also from equation (6) in that the particle here is preserving its inertial physical parameters (so, the total radius $= n^{1/3}r_0$) and each particle (not the whole body) has electromagnetic wave equal that of Compton wave → speed of light which creates the dilemma. The dilemma would disappear in the following container but would appear again when the contents of the container transformed inertially by linear transformation into the giant charge yet the giant charge can overcome this dilemma. We can estimate from above the number of protons which creates the dilemma as $p^{2/3} = 1.6\times10^6 \rightarrow P = 2\times10^9$. Consequently $n = 4.56\times10^{21}$. Now in our laboratory charges container, the most probable in-between distance (r_0) could be estimated from the uncertainty equation by conserving $v_u = 0.3\,\mathrm{m/s}$ as follows:

$$r_0 = 10^{-34}/(1.7\times10^{-27}\times0.3) \approx 2\times10^{-7}\,\mathrm{m}. \tag{8}$$

Putting $n = 4.6\times10^{21}$, the radius of our laboratory giant charged body has radius equal

$$2\times10^{-7}\times(4.6\times10^{21})^{1/3} \approx 3.3\mathrm{m}. \tag{9}$$

Now our laboratory giant charged body is formed of a partially evacuated container with 6.6m diameter which can prison the kinetic energy of 2×10^9 protons. Inside this sphere there are also 4.6×10^{21} neutrons with in-between distances equal $2\times10^{-7}\,\mathrm{m}$ (density of medium vacuum). This, by conserving its above mentioned n/p and v_u, can do inertial transformation to a giant charge but preserved by gravity and the reducing factors, and having radius equal

$$\left\{10^{-16}\times(4.6\times10^{21})^{1/3}\right\} = 1.6\times10^{-9}\,\mathrm{m}. \tag{10}$$

This is the smallest possible giant charge.

Conservation of energy between the mother laboratory container (E_c) and the produced giant charge (E_g) could be studied from two points; the first is the fluctuating energy of the uncertainty relation which is conserved from equations (4) and (8). The second is the electric energy which is also conserved as follows:

$E_c = 0.6e^2p^2/4\pi\xi_0 R$ (where R is the radius of the container $= 3.3\text{m}$). Hence $E_c \approx 1.5 \times 10^{-10}$ joule $\approx$ the rest energy of a neutron. $E_g = 0.6e^2p^2c_0/4\pi\xi_0 r$ (where $r = 10^{-16}n^{1/3} = 1.6 \times 10^{-9}\text{m}$). $E_g << E_c$. $E_c \approx E_g +$ one neutron.

The least possible speed plays a role in putting a finite limit for the largest giant orbiting charge as follows:

This largest one is that of the giant electron $\{n^/ /p = 1.1(10^{12})1844\}$ of the last distant planet [1] $(D = 10)$. So the huge electron (one electron plus number of neutrons equal n/p) of this orbiting giant electron has mass equal $\{(1.7 \times 10^{-27})1.9 \times 10^{16}\}$ kilogram, $r_0 = 10^{-16}$ meter, and consequently, fluctuating speed v_u from uncertainty as follows:

$$v_u = 10^{-34}\Big/\Big\{\Big(1.7 \times 10^{-27}\Big)1.8 \times 10^{16}\Big\}10^{-16} \approx 5 \times 10^{-8} \text{ m/s} \tag{11}$$

which is the least possible fluctuating speed as estimated by the giant atom like system (such that the density of vacuum is about one hydrogen atom mass per cubic meter, this gives, from uncertainty, the above mentioned lowest possible speed offered by vacuum).

It is important to notice that the giant charge physics is expression on

- Speeds never exceed *c*.

- Vacuum never offers speed less than 5×10^{-8} m/s, as in equation (11). This would give, for a neutron mass, $\delta E = 1.7 \times 10^{-27} \times 25 \times 10^{-16} = 4.3 \times 10^{-42}$ J, [1].

- It is very important to avoid misunderstanding and notice that the reducing factors are introduced only to avoid speeds to reach *c*. This dealing appears well when we compare between uncertainty of the neutrons of the giant charge and that of the container. Stressing on this point, we have to notice that these reducing factors are never used with the equations of the laboratory charges container (as in equation (8)) and never used also with equation of the huge charge (as in equation (11)).

We can summarize the physics of both the giant charge and the giant atom on one proposal saying that the reduced Plank's constant is multiplied by the factor (m_0/x_0) to produce a minor constant as follows: γ photon of the electric force inside the giant charge is a massless particle, has constant speed equal to *c*, so it would obey $\{(\delta m c_0)c^2\}\delta t = \hbar.c_0$, where c and δt are not affected, and $\delta m = hf/c^2$. The massive particles have variable nonconstant speed, so it would obey $\{m(\delta v.p_0)^2\}\delta t/p_0 = \hbar.p_0$, $(\delta v.p_0)\delta t/p_0 = \delta r$, where $\delta r =$ Compton wave length and δv is the uncertain speed of the massive particles.

3. The Physical Meaning of the Factor c_0

This factor guarantees that $v < c$ inside the giant charge. The electrostatic energy inside the giant charge would be divided by r/m, where *m* is the equivalent mass of the energy of the first shell of the electron orbiting a proton $= \delta E/c^2$ and *r* is the radius of this shell. So

$$c_0 = \delta m/r = 5 \times 10^{-35}/5.3 \times 10^{-11} = 10^{-24}. \tag{12}$$

We treat this factor, when introduced on the electric energy, as a concrete number but its physical meaning appears from the following discussion:

$$\delta E_0 = \delta E c_0. \tag{13}$$

But, the reducing factor c_0 is introduced only when the electric potential offers the particles speed equal to *c*, so in the giant proton $\rightarrow \delta E = m_n c^2$.

$$\delta m = \delta E/c^2 = 5 \times 10^{-18}/(3 \times 10^8)^2 \approx 5 \times 10^{-35}$$

$$= m_e \times 5 \times 10^{-5} = 5 \times 10^{-5} \times (m_n/1844) = m_n \times 3 \times 10^{-8},$$

where m_e and m_n are the rest masses of the electron and of the neutron, respectively.

$$\delta E_0 = \{m_n c^2\}\{m_n \times 3 \times 10^{-8}\}/r = (m_n)^2(10^{17} \times 3 \times 10^{-8})/r. \tag{14}$$

From above, we can notice that equation (14) takes the form of the gravitational energy but differs in the constant. We can rewrite this equation after factorization of the constant and then substitution by the corresponding value of m_n and value of *n*. Then

$$\delta E_0 = 0.6 m_n (m_n \times n) 6.6 \times 10^{-11}/R, \tag{15}$$

where R is the radius of the giant proton and $n = 4.6 \times 10^{21}$. This means that equation (13) is the typical form of equation (15) of the gravitational energy.

These results encourage us to suggest that the virtual particles carrying δE_0 inside the giant charge may be positively or negatively charged → electric energy or, may be neutral → gravitational energy.

Now a system formed of an electron orbiting a proton with a most probable $\delta E = 4.3 \times 10^{-18}\,\mathrm{J}$ would still obey the uncertainty relation and so would give the least probable $\delta E = 4.3 \times 10^{-42}\,\mathrm{J}$ which is the least possible energy offered by vacuum.

From equation (13), $\delta E_0 = \delta E \times c_0$. This means that physics of probability does not forbid physics of the giant charge. The second one goes ahead with the least probable energy to make it the most probable value. *This means that the giant charge physics is expression on this probability of the least energy. This is another physical meaning of* c_0.

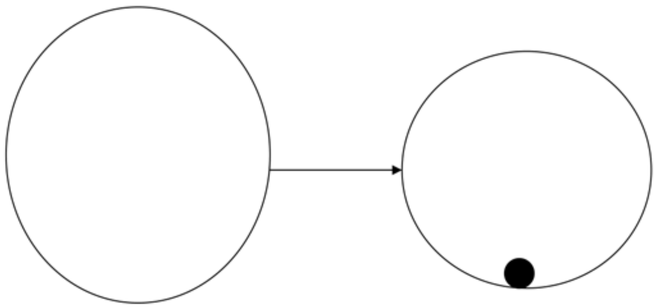
4. The Charged Photon

Recent experiments discovered a small charge on the photons emitted from the far galaxies. These experiments showed that photon may carry different charges with upper bound equal $e^- = 10^{-46} e$, [2, 3]. Recent researches showed that conservation of charges necessities existence of a twin electron e^- and e, [4]. The physics of the giant atom like system can suggest an explanation for this phenomenon as follows:

The right side of equation (1) is equivalent to $(e\sqrt{c_0})p(e\sqrt{c_0})/4\pi\varepsilon_0 r$. This form gives a physical meaning for partition of the value of the charge to be equivalent to $10^{-12} e$. A second factor is the result from distribution of the charge over n/p. So the total divisor on a electromagnetic mediator

$$(e) \to (10^{12})(10^{24})^{1/2} \to 10^{24}.$$

All the above means that the giant charge physics as extension for the giant atom physics finds the solution for the low energetic systems. Such manipulation uses the reducing factors as a proposal. This proposal was proved by about 20 documents which have been found by the quantitative analysis of many parameters of the solar system [1]. These reducing factors give the system with the lowest possible speed offered by vacuum. This paper, as extension for the giant atom like system, not only adds new documents from the solar system (the grandmother of the giant atom) but also and mainly suggests a practical manipulation to construct a giant charge as in the figure. By the proposed minor (Plank) constant, we can use atomic laws to construct theoretically the giant atoms and construct practically the giant charge. The solar system gives the documents of success of this idea.



The left sphere is evacuated sphere with density about 10^{20} particles per cubic meter, contains about 2×10^9 protons and about 4.6×10^{21} neutrons. The container wall preserves the contents and resists the electric potential. The dark small sphere is the giant charge which results directly from the left sphere.

References

[1] E. Eldieb, The giant atom like system, Advanced Studies in Theoretical Physics 3(1-4) (2009).

[2] Brett Altschul, Bound on photon charge from phase coherence of extragalactic radiation, Physics Rev. Letter 98 (2007), 261801.

[3] V. V. Kobychev and S. B. Popov, Constraints on photon charge from observations of extragalactic sources, Astronomy Letters 31(3) (2005), 147-151.

[4] L. B. Okun, Photon: history, mass, charge, Acta Physica Polonica B 37 (2006), 565-573.