126 GeV boson constitutes Higgs charged boson and W boson

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Abstract

It is suggested that, in super symmetry, the fermion and boson mass ratio is equal to 2.62218404 but not unity. Based on strong nuclear gravity and super symmetry it is suggested that: there exists a charged Higgs fermion of rest energy 103125 MeV. Its charged susy boson rest energy is 45586 MeV. The charged Higgs fermion and nuclear charge radius play a crucial role in the emission of the electron in Beta decay. The recently discovered neutral boson of rest energy 123 to 127 MeV seems to be composed of a Higgs charged boson and a W boson. Its obtained rest energy is 126 GeV.

Keywords: Classical gravitational constant, Avogadro number, super symmetry, strong nuclear gravity, Higgs charged boson, Higgs charged fermion, Beta decay, electroweak physics.

1 Integral charge (quark) super symmetry

In this paper an attempt is made to implement the modified super symmetry concepts in weak decay of neutron, sub quark physics and electroweak or Higgs physics [1]. The basic idea is that for each and every quark fermion there exists a corresponding super symmetric quark boson. Proposed quark fermion and quark boson mass ratio is $\Psi \cong 2.262218404$. Obtained top quark boson mass [2] is 80523 MeV and its assumed charge is $\pm e$. This is close to the $W^{\pm}$ mass (average with CERN UA2 data) = 80.454 $\pm$ 0.059 GeV. This may be a coincidence or there is some mystery behind the charged weak boson! In this way if one is able to predict the existence of (quark) bosons, there is no need to assume that any two quark fermions couples together to form a meson. Note that till today no experiment reported the existence of a fractional charge. Thus it can be interpreted that nature allows only integral charges. Hence it can be assumed that quark fermions and quark bosons possess unit charge. This is the beginning of integral charge quark super symmetry.

Due to strong interaction there is a chance of coupling any two quark bosons. If any two oppositely charged quark bosons couples together then a neutral quark boson can be generated. It may be called as a neutral meson. Due to strong interaction by any chance if any quark boson couples with any quark fermion then a neutral baryon or baryon with $\pm 2e$ can be generated. This idea is very similar to the photon absorption by electron. When a weakly interacting electron is able to absorb a boson, in strong interaction it is certainly possible. More over if a baryon couples with two or three quark bosons then the baryon mass increases and charge also changes. Here also if the system follows the principle 'unlike charges attracts each other' in most of the cases baryon charge changes from $\pm e$ to neutral and neutral to $\pm e$.

1.1 The beginning of strong nuclear gravity

1. For any one elementary particle of mass m_0, the magnitude of the gravitational constant is G_C only. As the number of particles increases to Avogadro's number (N), the magnitude of the gravitational constant

approaches $N.G_C$. The mass of the system approaches $N.m_0$. This idea leads to "nuclear strong gravity" [3-6].

2. Based on strong gravity, similar to the 'Schwarzschild radius', the size of the system is $R_N \cong \frac{2(NG_C)(Nm_0)}{c^2}$. The volume of one particle is equal to the total volume divided by Avogadro's number $= \frac{4\pi}{3N}R_N^3$.

3. Similar to the classical force limit $\frac{c^4}{G_C}$, [7, 8] force required to bind N particles is $\frac{c^4}{(NG_C)}$. Force required to bind one particle is $\frac{1}{N} \cdot \frac{c^4}{(NG_C)} \cong \frac{c^4}{N^2 G_C}$. This idea may be given a chance.

1.2 The atomic gravitational constant

In a grand unified scheme it can be suggested that [9-11]

$$\frac{\text{Effective atomic gravitational constant}}{\text{Classical gravitational constant}} \cong \frac{G_A}{G_C} \cong \frac{N^2 G_C}{G_C} \cong N^2 \tag{1}$$

$$\sqrt{\frac{e^2}{4\pi\varepsilon_0 G_A}} \cong 3.087291597 \times 10^{-33} \text{ Kg} \tag{2}$$

$$\frac{c^4}{G_A} \cong 3.337152088 \times 10^{-4} \text{ newton} \tag{3}$$

$$\sqrt{\frac{e^2 c^4}{4\pi\varepsilon_0 G_A}} \cong \sqrt{\frac{e^2}{4\pi\varepsilon_0} \cdot \frac{c^4}{G_A}} \cong 1.731843735 \times 10^{-3} \text{ MeV} \tag{4}$$

$\frac{c^4}{G_A}$ can be defined as the 'characteristic weak force magnitude' and $\sqrt{\frac{e^2}{4\pi\varepsilon_0} \cdot \frac{c^4}{G_A}}$ can be defined as the 'characteristic weak energy constant'. If m_e is the rest mass of electron,

$$X_E \cong \sqrt{\frac{4\pi\varepsilon_0 G_A m_e^2}{e^2}} \cong 295.0606338 \tag{5}$$

can be called as the 'gravitational mass generator' of charged leptons. It plays a very interesring role in nuclear and particle physics.

The most important observation or definition is that the ratio of 'classical force limit' and 'weak force magnitude' is N^2. These definitions have multiple applications in nuclear and particle physics. At this moment a modern physicist cannot admit these definitions. Their view is that this large value of G_C cannot be incorporated in GTR or existing physics. This is absolutely true. Absolute lab measurements of G_C have been made on scales of about 1 cm to 1 meter only. For any experimental physicist it is a must to measure the magnitude of G_C in nuclear physics. Without measuring its value, how can one say that the same value of G_C operates in the atomic or nuclear space time curvature?

2 Higgs physics in SUSY and strong nuclear gravity

Higgs physics suggests that there exists a neutral boson. It is responsible for the origin of elementary particles mass generation. Its existence was proposed in 1964. The Higgs boson has become the most coveted prize in particle physics. Its discovery would rank among the most important scientific advances of the past 100 years and confirm how elementary particles acquire mass. Electro weak physics suggests that the nuclear weak force is mediated by the W and Z bosons.

Based on modified super symmetry and strong nuclear gravity in the previous papers, the authors suggested that there exists a Higgs charged boson. A charged Higgs boson pair generates the neutralized Z boson. It is also suggested that W is the super symmetric boson of the top quark fermion. Certainly these concepts lead to a new physics in the electroweak sector.

Based on strong nuclear gravity and SUSY [9-11], in this paper authors presented a simple relation among the charged Higgs fermion mass, electron rest mass, nuclear charge radius and neutral Z boson rest mass.

2.1 Beta decay, Higgs charged fermion and its boson

It is well established that, in Beta decay, an electron is instantaneously created from a neutron and this nuclear weak force is mediated by W and Z bosons. If a W boson is really the SUSYpartner of the top quark then the role of the W boson in weak decay seems to be nothing. Its role is taken up by the newly proposed Higgs charged boson of rest energy close to 45.6 GeV. Its rest energy is equal to half the rest energy of neutral Z boson. If N is Avogadro's number, in strong nuclear gravity it is assumed that, the magnitude of the operating or effective gravitational constant G_A in atomic and nuclear physics is N^2 times the classical gravitational constant G_C. The weak force magnitude is $\frac{c^4}{G_A}$. Semi empirically it is noticed that

$$\frac{G_A m_e}{c^2 R_0} \cong \frac{\Psi M_{Hb}}{m_e} \tag{6}$$

Here, M_{Hb} is the rest mass of the charged Higgs boson and ΨM_{Hb} is its fermionic form. $\Psi \cong 2.262218404$ is a unified fermion and the boson mass ratio. m_e is the rest mass of an electron, R_0 is the nuclear characteristic charge radius and G_A is the effective atomic gravitational constant. This is a very surprising relation. This relation is very similar to the expressions generally expressed in 'strong gravity'. Giving primary importance to the existence of a charged Higg's boson, the electron rest mass takes the following form

$$m_e \cong \sqrt{\frac{\left(\Psi M_{Hb} c^2\right) R_0}{G_A}} \tag{7}$$

$$m_e c^2 \cong \sqrt{\frac{\left(\Psi M_{Hb} c^2\right) c^4 R_0}{G_A}} \cong \sqrt{\left(\Psi M_{Hb} c^2\right) . \left(\frac{c^4}{G_A} \cdot R_0\right)} \tag{8}$$

Its beauty is that it couples all the important nuclear physical constants. No arbitrary parameters appear in this expression. The only important thing missing is the neutron. From the above relation, the mass of ΨM_{Hb} or M_{Hb} can be obtained.

$$M_{Hf} c^2 \cong \frac{G_A m_e}{c^2 R_o} \cdot m_e c^2 \qquad \text{and} \tag{9}$$

$$M_{Hb} c^2 \cong \frac{M_{Hf} c^2}{\Psi} \cong \frac{1}{\Psi} \cdot \frac{G_A m_e}{c^2 R_o} \cdot m_e c^2 \tag{10}$$

Here accuracy depends on R_0. Based on strong nuclear gravity it is also noticed that

$$\hbar \cong \sqrt{\frac{G_A m_e^3 R_0}{2}} \quad \Rightarrow \quad \frac{G_A m_e}{c^2 R_o} \cong \frac{1}{2} \cdot \left(\frac{G_A m_e^2}{\hbar c}\right)^2 \tag{11}$$

$$M_{Hf}c^2 \cong \frac{1}{2} \cdot \left(\frac{G_A m_e^2}{\hbar c}\right)^2 \cdot m_e c^2 \cong 103125.417 \text{ Me}V \tag{12}$$

$$M_{Hb}c^2 \cong \frac{M_{Hf}c^2}{\Psi} \cong \frac{1}{2\Psi} \cdot \left(\frac{G_A m_e^2}{\hbar c}\right)^2 \cdot m_e c^2 \cong 45485.96854 \text{ Me}V \tag{13}$$

One very interesting observation here is if $R_0 \cong 1.21$ f$ermi$,

$$\frac{c^4}{G_A} \cdot R_0 \cong 2.52 \text{ e}V. \tag{14}$$

This energy is very close to the rest energy of a 'neutrino'. The authors are working in this new direction. **Now the most important question to be answered is : How does one justify the existence of the proposed "Higgs charged susy particle"?** The answer depends on the other applications of $(m_{Hb}c^2)^{\pm}$ and $(\Psi m_{Hb}c^2)^{\pm}$ in elementary particle physics. A $(m_{Hb}c^2)^{\pm}$ pair generates the neutral Z boson. $(m_{Hb}c^2)^{\pm}$ couples with $(\mathrm{m_W}c^2)^{\mp}$ boson to form another heavy neutral boson of rest energy 126 GeV. $(m_{Hb}c^2)^{\pm}$and $(\Psi m_{Hb}c^2)^{\pm}$ play vital roles in quark meson and quark baryon mass generation respectively. In this connection it is noticed that

$$X_S \cong \frac{1}{2} \ln\left(\frac{2m_{Hf}}{\alpha m_e}\right) \cong \ln\sqrt{\frac{1}{\alpha} \cdot \frac{2G_A m_e}{c^2 R_0}} \tag{15}$$

where $X_S \cong 8.91424 \cong \frac{1}{\alpha_s}$ is the proposed 'invesrse' of strong coupling comstant.

3 Rest mass of neutral Z boson

From the above estimation, the neutral Z boson rest energy can be obtained in the following form,

$$m_Z c^2 \cong \left(m_{Hb}c^2\right)^{\pm} + \left(m_{Hb}c^2\right)^{\mp} \cong 2m_{Hb}c^2 \cong 91171.93707 \text{ Me}V \tag{16}$$

This obtained value can be compared with the experimental rest energy of Z boson = 91187.621 MeV. This is a very accurate and simple fitting. In a grand unified program this type of fitting can be given a chance. It seems the Z boson can decay into 2 charged particles. Not only that, this idea opens a new window in elementary particle physics.

3.1 Mystery of (124 - 126) GeV Higgs boson

The Higgs boson is the signature particle of a theory published by six physicists within a few months of each other in 1964. Peter Higgs at Edinburgh University was the first to point out that the theory called for the existence of the missing particle. According to the theory, an invisible energy field fills the vacuum of space throughout the universe. When some particles move through the field they feel drag and gain weight as a result. Others, such as particles of light, or photons, feel no drag at all and remain mass-less. Without the field - or something to do its job all fundamental particles would weigh nothing and hurtle around at the speed of light. That would spell disaster for the formation of familiar atoms in the early universe and rule out life as we know it. While the field is thought to give mass to fundamental particles, including quarks and electrons (the two kinds of particles that make up atoms), it accounts for only one or two percent of the weight of an atom itself, or any everyday object. That is because most mass comes from the energy that glues quarks together inside atoms.

To hunt for the Higgs boson [12], physicists at the LHC shift through showers of subatomic debris that spew out when protons collide in the machine at close to the speed of light. Most of the energy released in these microscopic fireballs is converted into well known particles that are identified by the colliders giant detectors. While the results are not conclusive - the hints of the particle could fade when the LHC collects more data next year - they are the strongest evidence so far that the Higgs particle is there to be found. The CMS has excluded all Higgs masses except 115-128 GeV, so between them the two experiments leave only 115-127 GeV as the most probable Higgs mass, with both teams seeing signals between 124 and 126 GeV. With the help of strong nuclear gravity and modified super symmetry concepts, authors made an attempt to understand the origin of this new boson.

It is noticed that Higgs charged boson and top quark boson couple together to form a new 'neutral' boson of rest energy 126.0 GeV. This is a very interesting observation.

$$\left(M_{Hb}c^2\right)^{\pm} + \left(m_W c^2\right)^{\mp} \cong 126.0 \;\; GeV. \tag{17}$$

The W boson pair generates a neutral boson of rest energy 161 GeV.

Conclusion

Authors showed many applications of SUSY and strong nuclear gravity. Based on the proposed concepts, the existence of the charged SUSY Higg's particle can be confirmed. Authors hope that this paper will bring the subject of 'strong nuclear gravity' into main stream research in a grand unification program. Note that human beings are part of this universal gravity. There are some natural restrictions to experiments. Seeing a black hole is highly speculative. But indirectly its significances can be well understood. In the similar way in nuclear and particle physics: any experimental setup which is being run under the influence of the proposed strong nuclear gravity, without knowing the probing particles massive origin, without knowing the massive origin of the nucleus: based on grand unified scheme one may not be able to unearth the absolute findings. Note that observer, experimental setup and the probing particle all are under the same influence of universal gravity. When searching for an experimental proof in grand/final unification scheme this fact may be considered positively for further analysis. Authors request the world science community to kindly look into these new ideas for further analysis.

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References

[1] G. Bernardi, M. Carena, and T. Junk. "Higgs bosons: theory and searches", Reviews of Particle Data Group: Hypothetical particles and Concepts, 2007, http://pdg.lbl.gov/2008/reviews/higgs-055.pdf

[2] U. V. S. Seshavatharam and S. Lakshminarayana. Super Symmetry in Strong and Weak interactions. Int.J.Mod.Phys, Vol.19, No.2, (2010), p.263-280.

[3] Salam. A. Einstein's Last Dream: The Space -Time Unification of Fundamental Forces, Physics News, Vol.12, No.2 (June 1981), p.36.

[4] Salam. A and Sivaram C. Strong Gravity Approach to QCD and Confinement. Mod. Phys. Lett. 1993, v. A8(4), 321-326.

[5] Salam. A, A.H. Chamseddine and J. Strathdee. Strong Gravity and Supersymmetry. ICTP, Trieste preprint IC/77/148 [PDF] Publ. in: Nucl. Phys. B136, 248-258 (1978).

[6] Usha Raut and K. P. Sinha. Strong Gravity and the Yukawa Field. International Journal of Theoretical Physics, Vol. 20, No. L 1981.

[7] U. V. S. Seshavatharam. Physics of Rotating and Expanding Black Hole Universe. Progress in Physics, vol. 2, April, 2010, p. 7-14.

[8] William C. Daywitt. The Planck Vacuum. Progress in Physics, vol. 1, Jan, 2009, p.20-26.

[9] U. V. S. Seshavatharam and S. Lakshminarayana, Role of Avogadro number in grand unification. Hadronic Journal. Vol-33, No 5, 2010 Oct. p513.

[10] U. V. S. Seshavatharam and S. Lakshminarayana, Atomic gravitational constant and the origin of elementary magnetic moments. Hadronic journal, Vol-33, 655- 680 (2010).

[11] U. V. S. Seshavatharam and S. Lakshminarayana, SUSY and strong nuclear gravity in (120-160) GeV mass range. Hadronic journal, Vol-34, No 3, 2011 June, p277-300

[12] ATLAS and CMS experiments present Higgs search status. CERN. 13 December 2011. Retrieved 13 December 2011.