# New excited levels of the bottom and anti bottom mesons in integral charge quark SUSY

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April 17, 2012

**Abstract:** Considering the 'molar electron mass' an attempt is made study the 4 interactions in a unified manner. Charged leptons, nucleons and (integral charge) quark masses were fitted in a unified scheme. Based on the modified SUSY, Higgs charged fermion, its boson and the quark baryon and quark meson masses were fitted. Finally an attempt is made to fit and predict the new excited levels of the bottom and anti bottom mesons.

**Keywords:** Unification; Avogadro number; Integral charge quark SUSY; Quark fermion; Quark boson; Quark baryon; Quark meson; Classical force limit; Weak force magnitude; Higgs fermion; Higgs boson; Bottom and anti-bottom mesons; Size of proton;

## 1 Introduction

On 21 December 2011 a new meson of rest energy 10.530±0.005 GeV was detected in CERN - LHC and the ATLAS detector. This new meson, known as $\chi_b$ $(3p)$, consists of two parts - an elementary particle known as a 'beauty' quark and its opposite antiquark, which are bound together by a 'strong force' [1]. Its existence was predicted in our published paper [2] : page-278, table-16, last row, last column. Before going further, authors request the interested readers to please go through the two published papers [2] and [3]. This paper is a combined and unified version of the published papers [2,3] and proceedings of the DAE symposium on nuclear physics 2011, India [4,5]. Please note that in our previous paper [2] it was suggested that: $W$ boson is the super symmetric boson of the top quark fermion and the charged Higgs boson pair generates the neutralized $Z$ boson. It was also suggested that [3,5] Higgs charged boson and $W$ boson couples together to form a neutral boson of rest energy 126 GeV. Its existence was detected and is under open discussion [6,7]. Another interesting idea is: $W$ boson pair generates a neutral boson of rest energy 161 GeV. This is our prediction and needs to be verified.

## 2 Basic ideas in 'modified' quark super symmetry

Till today there is no reason for the question: why there exists 6 individual quarks? Till today no experiment reported a free fractional charge quark. Authors humble opinion is nuclear charge (either positive or negative) constitutes 6 different flavours and each flavour holds certain mass. Charged flavour can be called as a quark. It is neither a fermion nor a boson. A fermion is a container for different charges, a charge is a container for different flavours and each flavour is a container for certain matter. If charged matter rests in a fermionic container it is a fermion and if charged matter rests in a bosonic container it is a boson. The fundamental questions to be answered are : what is a charge? why and how opposite charges attracts each other? why and how there exists a fermion? and why and how there exists a boson? Here interesting thing is that if 6 flavours are existing with 6 different masses then a single charge can have one or two or more flavours simultaneously. Since charge is a common property, mass of the multiple flavour charge seems to be the geometric mean of the mass of each flavour. If charge with flavour is called as a quark then charge with multi flavours can be called as a hybrid quark. Hybrid quark generates a multi flavour baryon. It is a property of the strong interaction space - time - charge. This is just like different tastes or different smells of matter. Important consequence of this idea is that- for generating a baryon there is no need to couple 3 fractional charge quarks.

1. There exists nature friendly integral charge quark fermions.
2. For every integral charge quark fermion there exists a corresponding integral charge quark boson. Quark fermion and quark boson mass ratio is close to 2.2627.
3. There exists integral charged massive quark fermi-gluons and integral charged massive quark boso-gluons. (Fermi-gluon means massive gluons having fermion behaviour and boso-gluon means massive gluons having boson behaviour. Quark femi-gluon can be called as the 'quark baryon' and quark boso-gluon can be called as 'quark meson').
4. Quark fermi-gluon or quark baryon masses can be expressed as $Q_F c^2 \cong 0.2314 \left[M_{Hf}^2 \times Q_f\right]^{\frac{1}{3}} c^2$ and Quark boso-gluon or quark meson masses can be expressed as $Q_M c^2 \cong 0.2314 \left[M_{Hb}^2 \times Q_b\right]^{\frac{1}{3}} c^2$ where $Q_f$ and $Q_b$ are the rest masses of quark fermion and quark boson respectively and $M_{Hf}$ and $M_{Hb}$ are the Higgs charged fermion and Higgs charged boson respectively.
5. $Q_{ef} \cong Q_f - Q_b \cong \left(1 - \frac{1}{\Psi}\right) Q_f$ acts as the effective quark fermion. Effective quark baryon mass can be expressed as $Q_E c^2 \cong 0.2314 \left[M_{Hf}^2 \times Q_{ef}\right]^{\frac{1}{3}} c^2$. These effective quark baryons play a vital role in fitting the unstable baryon masses. Quark meson masses play a vital role in fitting the unstable meson masses.
6. **Only oppositely charged quark mesons couples together to form a neutral meson. No two quark fermions couples together to form a meson**.
7. '**Integral charge light quark bosons**' in one or two numbers couples with the ground or excited **effective quark baryons** and generates **doublets and triplets**. This is just like 'absorption of photons by the electron'.
8. Fine rotational levels of any ground state energy $m_x c^2$ can be expressed as, if n =1,2,3..., and $I = n(n+1)$, $\left(mc^2\right)_I \cong [I]^{\frac{1}{4}} m_x c^2$ and $\left(mc^2\right)_{I/2} \cong \left[\frac{I}{2}\right]^{\frac{1}{4}} m_x c^2$. Super fine rotational levels can be obtained as $\left(mc^2\right)_I \cong [I]^{\frac{1}{12}} m_x c^2$ and $\left(mc^2\right)_{I/2} \cong \left[\frac{I}{2}\right]^{\frac{1}{12}} m_x c^2$.

## 3 Key assumptions in unification

### Assumption-1

Nucleon behaves as if it constitutes molar electron mass. (Or) Molar electron mass ($N.m_e$) plays a crucial role in nuclear and particle physics.

**Assumption-2**

The key conceptual link that connects the gravitational and non-gravitational forces is - the classical force limit

$$F_C \cong \left(\frac{c^4}{G}\right) \cong 1.21026 \times 10^{44} \text{ newton} \tag{1}$$

It can be considered as the upper limit of the string tension. In its inverse form it appears in Einstein's theory of gravitation as $\frac{8\pi G}{c^4}$. It has multiple applications in Black hole physics and Planck scale physics [4]. It has to be measured either from the experiments or from the cosmic and astronomical observations.

**Assumption-3**

Ratio of 'classical force limit $= F_C$' and 'weak force magnitude $= F_W$, ' is $N^2$ where $N$ is a large number close to the Avogadro number.

$$\frac{F_C}{F_W} \cong N^2 \cong \frac{\text{upper limit of classical force}}{\text{nuclear weak force magnitude}} \tag{2}$$

Thus the proposed weak force magnitude is $F_W \cong \frac{c^4}{N^2 G} \cong 3.33715 \times 10^{-4}$ newton and can be considered as the characteristic nuclear weak string tension. It can be measured in the particle accelerators.

**Assumption-4**

In modified quark SUSY, if $Q_f$ is the mass of quark fermion and $Q_b$ is the mass of quark boson, then

$$\frac{Q_f}{Q_b} \cong \Psi \cong 2.262706 \tag{3}$$

and $\left(1 - \frac{1}{\Psi}\right) Q_f$ represents the effective fermion mass. The number $\Psi$ can be fitted with the following empirical relation $\Psi^2 \ln\left(1 + \sin^2\theta_W\right) \cong 1$

## 3.1 The lepton-quark mass generator

With its earlier defined magnitude [2] and in the recently published paper [3] it was defined that

$$X_E \cong \sqrt{\frac{4\pi\epsilon_0 \left(N^2 G\right) m_e^2}{e^2}} \cong 295.0606338 \tag{4}$$

where $N$ is the Avogadro number, $G$ is the gravitational constant and $m_e$ is the rest mass of electron. It can be called as the lepton-quark-nucleon mass generator. It plays a very interesting role in nuclear and particle physics. Using this number leptons, quarks and nucleon rest masses can be fitted [2]. It can be expressed as

$$X_E \cong \sqrt{\frac{4\pi\epsilon_0 G \left(N m_e\right)^2}{e^2}} \cong 295.0606338 \tag{5}$$

Weak coupling angle was defined as

$$\frac{m_u c^2}{m_d c^2} \cong \sin\theta_W \cong \frac{1}{X_E \alpha} \cong 0.464433353 \tag{6}$$

where $m_u$ is the rest mass of up quark, $m_d$ is the rest mass of down quark and $\sin\theta_W$ is the weak coupling angle. In the modified SUSY, the fermion and boson mass ratio $\Psi$ can be fitted in the following way.

$$\Psi^2 \ln\left(1 + \sin^2\theta_W\right) \cong 1 \tag{7}$$

Thus $\Psi \cong 2.262706$. If $m_f$ is the mass of fermion and $m_b$ is the mass of its corresponding boson then

$$m_b \cong \frac{m_f}{\Psi} \tag{8}$$

With this idea super symmetry can be observed in the strong interactions [2] and can also be observed in the electroweak interactions [3].

| n | Obt. Lep. energy (MeV) | Exp. Lep. energy (MeV) |
|---|---|---|
| 0 | Defined | 0.510998910(13) |
| 1 | 105.951 | 105.6583668(38) |
| 2 | 1777.384 | 1776.99(29) |

Table 1: Fitting of charged lepton rest masses.

### 3.2 To fit the muon and tau rest masses

Using $X_E$ charged muon and tau masses [3] were fitted in the following way.

$$m_l c^2 \approx \frac{2}{3}\left[a_c^3 + \left(n^2 X_E\right)^n a_a^3\right]^{\frac{1}{3}} \tag{9}$$

where $a_c$ and $a_a$ are the coulombic and asymmetric energy coefficients of the semi empirical mass formula and $n = 0, 1, 2$. This is an approximate relation. Qualitatively this expression is connected with $\beta$ decay. Accuracy can be improved with the following relation [8].

$$\text{If } \mathrm{E_W} \cong \sqrt{\frac{\mathrm{e^2 F_W}}{4\pi\epsilon_0}} \cong 1.731843735 \times 10^{-3}\ \text{MeV} \tag{10}$$

$$m_l c^2 \cong \left[X_E^3 + \left(n^2 X_E\right)^n \sqrt{N}\right]^{\frac{1}{3}}\ E_W \tag{11}$$

where $n = 0, 1, 2$.

If it is true that weak decay is due to weak nuclear force, then $\left(\frac{1}{N^2}\right)\frac{c^4}{G} \cong F_W$ can be considered as the characteristic weak force magnitude. Please refer the published papers for the mystery of electro weak bosons and the Higgs boson [2,3]. Please see table-1.

### 3.3 To correlate the electron, muon, proton and the charged pion rest masses

From the above table-1, if $m_\mu c^2 \cong 105.95$ MeV, surprisingly it is noticed that,

$$m_p c^2 \cong \frac{1}{\alpha} \cdot \left(\sqrt{m_\mu m_e} - m_e\right) \cong 938.29\ \text{MeV} \tag{12}$$

Based on the proposed SUSY, it is also noticed that

$$\left(m_\pi c^2\right)^{\pm} \cong \frac{1}{\Psi} \cdot \sqrt{m_\mu m_p} \cong 139.34\ \text{MeV} \tag{13}$$

These two obtained mass units can be compared with the proton and the charged pion rest masses respectively. In a unified scheme these interesting observations can not be ignored.

### 3.4 Nucleons, up & down quarks and the strong coupling constant

It our earlier published papers [2,3] it was also defined that

$$\frac{m_u c^2}{m_e c^2} \cong e^{X_E \alpha} \tag{14}$$

where $m_u$ is the up quark rest mass and $m_d$ is the down quark rest mass respectively. In our earlier papers, suggested up quark mass is 4.4 MeV and down quark mass is 9.48 MeV. With these magnitudes it is noticed that,

$$\left(m_n - m_p\right) c^2 \cong \ln\left(\frac{\sqrt{m_u m_d}}{m_e}\right) \cdot m_e c^2 \tag{15}$$

Here lhs =1.2933 MeV and rhs= 1.2963 MeV.It is also noticed that

$$\left(\frac{\sqrt{m_u m_d}}{m_e}\right) \cong \frac{1}{2}\sqrt{\frac{G\,(N.m_e)^2}{\hbar c}} \cong 12.60271 \tag{16}$$

With reference to the strong coupling constant $\alpha_s$ - it is also noticed that,

$$\left(\frac{1}{\alpha}+\frac{1}{\alpha_s}\right)\sqrt{m_u m_d}\;c^2 \cong 940 \text{ MeV} \tag{17}$$

$$\frac{\sqrt{m_u m_d}\;c^2}{(m_n - m_p)\;c^2} \cong \ln\left(\frac{1}{\alpha}+\frac{1}{\alpha_s}\right) \tag{18}$$

## 4 Integral charge quark fermions and their SUSY bosons

In the previous papers authors suggested that up, strange and bottom quarks are in geometric series. Similarly down, charm and top quarks are in another geometric series. Obtained quark fermion masses can be compared with the current estimates [8]. Up and down fermion masses can be given as

$$u_f c^2 \cong e^{\alpha X_E} \;\times m_e c^2 \cong 4.4 \text{ MeV} \tag{19}$$

where $X_E \cong \sqrt{\frac{4\pi\varepsilon_0 G(N.m_e)^2}{e^2}} \cong 295.0606338$ and $\alpha$ is the fine structure ratio.

$$d_f c^2 \cong \alpha X_E \;\times u_f c^2 \cong 9.4755 \;\text{ MeV} \tag{20}$$

Here, $m_e c^2$= rest energy of electron, $\alpha$= fine structure ratio , $X_E$ = proposed lepton mass generator. It is very interesting to note that

$$\frac{\text{Down fermion mass}}{\text{Up fermion mass}} \cong \frac{d_f}{u_f} \cong \alpha X_E \cong \frac{1}{\sin\theta_W} \tag{21}$$

In this way $\sin\theta_W$ can be related with up and down quark mass ratio. Proposed USB geometric ratio is

$$g_U \cong \left[\alpha X_E\,\frac{\alpha X_E + 1}{\alpha X_E - 1}\right]^2 \cong 34.66294 \tag{22}$$

If DCT series is the second generation series, its geometric ratio is

$$g_D \cong \left[2\alpha X_E\,\frac{\alpha X_E + 1}{\alpha X_E - 1}\right]^2 \cong 138.651754 \tag{23}$$

And

$$\frac{g_D}{g_U} \cong \frac{\text{DCT geometric ratio}}{\text{USB geometric ratio}} \cong 4. \tag{24}$$

$$\text{Quark boson mass } = Q_b \cong \frac{\text{Quark fermion mass}}{\Psi} \cong \frac{Q_f}{\Psi} \tag{25}$$

Please see the following table-2 for the obtained quark 'fermion' and 'boson' masses. The observed baryon and meson charge-mass spectrum can be generated from these mass units. **Strange quark boson pair generates the neutral pion of rest energy 134.83 MeV**. Obtained top quark boson rest energy is 80505 MeV and is very close to the observed W boson rest energy 80.450 ± 0.058 GeV and 80.392 ± 0.039 GeV. Please refer M. Yao et al [8] recommended PDG data. Really this is a great coincidence and support for the proposed new idea of "fermion-boson" unification scheme. This strongly supports super symmetry with small modifications.

| **Quark** | $Q_f$ **(MeV)** | $Q_b$**(MeV)** |
|---|---|---|
| Up | 4.401 | 1.945 |
| Down | 9.4755 | 4.188 |
| Strange | 152.5427 | 67.416 |
| Charm | 1313.796 | 580.63 |
| Bottom | 5287.579 | 2336.839 |
| **Top** | **182160.18** | **80505.46** |

Table 2: Fitting of quark fermion and quark boson masses.

### 4.1 Beta decay, Higg's charged fermion and its boson

It is well established that in Beta decay electron is instantaneously created from neutron and this nuclear weak force is mediated by $W$ and $Z$ bosons. If $W$ boson is really the SUSY partner of top quark then the role of 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. Semi empirically it is noticed that

$$\frac{m_e c^2}{F_W R_0} \cong \frac{\Psi M_{Hb}}{m_e} \tag{26}$$

Here, $M_{Hb}$ is the rest mass of charged Higgs boson and $\Psi M_{Hb}$ is its fermionic form. $\Psi$ is a unified SUSY fermion and boson mass ratio =2.2627. $m_e$ is the rest mass of electron, $R_0$ is nuclear characteristic charge radius. Mass of $\Psi M_{Hb}$ or $M_{Hf}$ can be expressed as

$$M_{Hf} c^2 \cong \left(\frac{m_e c^2}{F_W R_o}\right) \cdot m_e c^2 \tag{27}$$

and

$$M_{Hb} c^2 \cong \frac{M_{Hf} c^2}{\Psi} \cong \frac{1}{\Psi} \cdot \left(\frac{m_e c^2}{F_W R_o}\right) \cdot m_e c^2 \tag{28}$$

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

$$\hbar \cong \sqrt{\frac{G\,(N.m_e)^2\, m_e R_0}{2}} \tag{29}$$

$$M_{Hf} c^2 \cong \frac{1}{2} \cdot \left(\frac{G\,(N.m_e)^2}{\hbar c}\right)^2 \cdot m_e c^2 \cong 103125.417 \text{ MeV} \tag{30}$$

$$M_{Hb} c^2 \cong \frac{M_{Hf} c^2}{\Psi} \cong \frac{1}{2\Psi} \cdot \left(\frac{G\,(N.m_e)^2}{\hbar c}\right)^2 \cdot m_e c^2 \cong 45576.1467 \text{ MeV} \tag{31}$$

### 4.2 Rest energy of the neutral $Z$ boson

From above estimation, neutral $Z$ boson rest energy can be given as

$$m_Z c^2 \cong \left(M_{Hb} c^2\right)^{\pm} + \left(M_{Hb} c^2\right)^{\mp} \cong 2 M_{Hb} c^2 \cong 91152.293 \text{ MeV} \tag{32}$$

This obtained value can be compared with the experimental rest energy of $Z$ boson = 91187.621 MeV. Please refer M. Yao et al recommended PDG data [8].

### 4.3 Recently discovered boson of rest energy 126 GeV

Close to the predicted rest energy of Higgs boson, recently a new boson of rest energy 124 to 160 GeV was reported [6,7]. Surprising thing is that its existence is not matching with the current theoretical predictions. In this critical situation, with the help of strong nuclear gravity and modified super symmetry concepts, authors made an attempt to understand the origin of this new boson[3]. In our previous paper [2] it was suggested that: $W$ boson is the super symmetric boson of the top quark fermion and the charged Higgs boson pair generates the neutralized $Z$ boson.

It is noticed that Higgs charged boson and top quark boson couples together to form a new neutral boson of rest energy 126.0 GeV. This is a very interesting observation. Like $Z$ boson it can decay into 2 charged particles.

$$\left(M_{Hb}c^2\right)^{\pm} + \left(m_W c^2\right)^{\mp} \cong 126.0 \ \text{GeV}. \tag{33}$$

## 5 Quark baryon and quark meson masses with SUSY Higg's charged particle

In our earlier published paper it it was assumed that [2], if $Q_F$ is the quark baryon rest mass

$$Q_F c^2 \cong \left[M_{Gf}^2 \cdot Q_f\right]^{\frac{1}{3}} c^2 \tag{34}$$

If $Q_E$ is the quark effective baryon rest mass,

$$Q_E c^2 \cong \left[M_{Gf}^2 \cdot Q_{ef}\right]^{\frac{1}{3}} c^2 \tag{35}$$

If $Q_M$ is the quark meson rest mass,

$$Q_M c^2 \cong \left[M_{Gb}^2 \cdot Q_b\right]^{\frac{1}{3}} c^2 \tag{36}$$

where $M_{Gf}c^2 \cong 11460$ MeV and its bosonic form $M_{Gb}c^2 \cong \frac{M_{Gf}c^2}{\Psi} \cong 5066$ MeV. With reference to the newly proposed Higgs charged fermion and boson [3], above relations can be expressed as

$$Q_F c^2 \cong x \left[M_{Hf}^2 \cdot Q_f\right]^{\frac{1}{3}} c^2 \tag{37}$$

$$Q_E c^2 \cong x \left[M_{Hf}^2 \cdot Q_{ef}\right]^{\frac{1}{3}} c^2 \tag{38}$$

$$Q_M c^2 \cong x \left[M_{Hb}^2 \cdot Q_b\right]^{\frac{1}{3}} c^2 \tag{39}$$

$$\text{where} \quad \mathrm{x} \cong \frac{1}{2\alpha\left(\mathrm{X_E}+1\right)} \cong 0.23143232 \tag{40}$$

Please see table-3 for the quark baryon rest enegies and see table-4 for the quark meson rest energies.

| **Quark** | $Q_f$**(MeV)** | $Q_F$**(MeV)** | $Q_{ef}$**(MeV)** | $Q_E$**(MeV)** |
|---|---|---|---|---|
| Up | 4.401 | 834.04 | 2.456 | 686.66 |
| Down | 9.4755 | 1076.97 | 5.2878 | 886.67 |
| Strange | 152.5427 | 2719.35 | 85.127 | 2238.84 |
| Charm | 1313.796 | 5574.13 | 733.165 | 4589.18 |
| Bottom | 5287.579 | 8866.53 | 2950.74 | 7299.81 |
| **Top** | **182160.18** | 28850.43 | 101654.72 | 23752.56 |

Table 3: Fitting of quark baryon and quark effective baryon rest energies.

| **Quark** | $Q_b$**(MeV)** | $Q_M$**(MeV)** |
|---|---|---|
| Up | 1.945 | 368.6 |
| Down | 4.188 | 475.98 |
| Strange | 67.416 | 1201.81 |
| Charm | 580.63 | 2463.48 |
| Bottom | 2336.839 | 3918.55 |
| **Top** | **80505.46** | **12750.41** |

Table 4: Fitting of quark boson and quark meson rest energies.

### 5.1 Rest energy of the nucleon

From table-3 it is noticed that, nucleon mass is very close to the harmonic mean of the up baryon and down baryon masses.

$$\frac{2\left(u_F c^2\right)\left(d_F c^2\right)}{\left(u_F + d_F\right)c^2} \cong 940.06 \text{ MeV} \tag{41}$$

where $u_F c^2 \cong 834.04$ MeV and $d_F c^2 \cong 1076.97$ MeV. It is also noticed that,

$$\left(m_n - m_p\right)c^2 \cong \sin^2\theta_W \left[\frac{2\left(u_f c^2\right)\left(d_f c^2\right)}{\left(u_f + d_f\right)c^2}\right] \cong 1.2964 \text{ MeV} \tag{42}$$

where $m_n$ and $m_p$ are the rest masses of proton and neutron respectively.

### 5.2 Super fine levels of $b\bar{b}$ neutral mesons

Coming to our actual discussion, please note that only bottom meson and anti bottom meson couples together to form a neutral meosn. The ground state rest energy is equal to 2*3918.55 = 7837.1 MeV. It's super fine levels can be expressed as $\left[\frac{n(n+1)}{2}\right]^{\frac{1}{12}} \cdot 7837.1$ MeV where $n = 1, 2, 3...$ Please see the following table-5. In this table at $n = 8$ obtained rest energy is 10564.46 MeV and can be compared with the newly discovered $b\bar{b}$ meson. It can be suggested that, average of any two successive levels can also be seen as an excited state. In the similar way excited levels of $c\bar{c}$ and $t\bar{t}$ can be understood [2]. Not only that, for the integral charge quark model, $c\bar{u}$, $c\bar{d}$, $c\bar{s}$ etc excited levels can also be predicted and fitted [2].

| **n** | $\left[\frac{n(n+1)}{2}\right]$ | $\left[\frac{n(n+1)}{2}\right]^{\frac{1}{12}} \cdot 7837.1$ |
|---|---|---|
| 1 | 1 | 7837.1 |
| 2 | 3 | 8588.46 |
| 3 | 6 | 9099.16 |
| 4 | 10 | 9494.86 |
| 5 | 15 | 9821.16 |
| 6 | 21 | 10100.44 |
| 7 | 28 | 10345.51 |
| **8** | **36** | **10564.46** |
| 9 | 45 | 10762.74 |
| 10 | 55 | 10944.24 |

Table 5: Fitting of excited levels $b\bar{b}$ meson rest energies.

# 6 Size of proton

It is noticed that,

$$R_p \cong \sqrt{\frac{e^2}{4\pi\varepsilon_0 G m_p^2}} \cdot \frac{2G\left(N.m_e\right)}{c^2} \cong 0.90566 \text{ fm} \tag{43}$$

This obtained magnitude can be compared with the rms charge radius of the proton. With different experimental methods its magnitude varies from 0.84184(67) fm to 0.895(18) fm [9,10,11]. Here it is very interesting to consider the role of the Schwarzschild radius of the 'molar electron mass' . From reference [10], $R_p = 0.870 \pm 0.023 \pm 0.012$ fm. This type of coincidence can not be ignored in the unification scheme.

## 6.1 Scattering distance between electron and the nucleus

If $R_0 \cong 1.21$ to 1.22 fm is the minimum scattering distance between electron and the nucleus, it is noticed that,

$$R_0 \cong \left(\frac{\hbar c}{G\left(N m_e\right)^2}\right) \cdot \left(\frac{\hbar c}{G m_e^2}\right) \cdot \frac{2G m_e}{c^2} \cong 1.21565 \text{ fm} \tag{44}$$

Here $(N m_e)$ is the molar electron mass. Here also it is very interesting to consider the role of the Schwarzschild radius of the 'electron mass' . Thus the two macroscopic physical constants $N$ and $G$ can be expressed in the following way.

$$N \cong \sqrt{\frac{2\hbar^2}{G m_e^3 R_0}} \tag{45}$$

$$G \cong \frac{2\hbar^2}{(N m_e)^2 m_e R_0} \tag{46}$$

In this way, either the Avogadro number or the gravitational constant can be obtained.

# Conclusions

It is very interesting to note that 176 members were involved in confirming the existence of the new meson $\chi_b\ (3p)$ . In this paper the proposed methodology is very simple and easy to fit & predict. Further research and analysis in this new direction and the experimental data may reveal the facts.

# Acknowledgements

The first author is indebted to professor K. V. Krishna Murthy, Chairman, Institute of Scientific Research on Vedas (I-SERVE), Hyderabad, India and Shri K. V. R. S. Murthy, former scientist IICT (CSIR) Govt. of India, Director, Research and Development, I-SERVE, for their valuable guidance and great support in developing this subject.

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