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4G Model of Fractional Charge Strong-Weak Super Symmetry

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Authors' contributions

This work was carried out in collaboration between both authors. Author UVSS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SL managed the analyses of the study. Both authors read and approved the final manuscript.

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ABSTRACT

To understand the mystery of final unification, in our earlier publications, we proposed that (1), there exist three atomic gravitational constants associated with electroweak, strong and electromagnetic interactions; and (2), there exists a strong interaction elementary charge (e_s) in such a way that, it's squared ratio with normal elementary charge is close to inverse of the strong coupling constant. In this context, starting from lepton rest masses to stellar masses, we have developed many interesting and workable relations. In this paper the electroweak field seems to be operated by a primordial massive fermion of rest energy 585 GeV. It can be considered as the zygote of all elementary particles and galactic dark matter. Proceeding further, with a characteristic fermion-boson mass ratio of 2.27, quarks can be classified into quark fermions and quark bosons.

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Considering strong charge conservation and electromagnetic charge conservation, fractional charge quark fermions and quark bosons can be understood. Quark fermions that generate observable massive baryons can be called as Fluons. Quark bosons that generate observable mesons can be called as Bluons. By considering a new hadronic fermion of rest energy 103.4 GeV, rest masses of fluons and bluons can be estimated and there by baryon masses and meson masses can be estimated. We emphasize that, 1) Strong interaction is one best platform for observing and confirming super symmetry (SUSY), 2) All observed baryons and mesons are SUSY particles only and 3) SUSY particles exist at all energy scales and are within the reach of current accelerators.

Keywords: Four gravitational constants; hadron SUSY; strong charge; strong coupling constant; fluons & bluons.

NOMENCLATURES

1) *Newtonian gravitational constant =* G_N ;
2) *Electromagnetic gravitational constant=* G_e ;
3) *Nuclear gravitational constant =* G_s ;
4) *Weak gravitational constant =* G_w ;
5) *Fermi's weak coupling constant =* G_F ;
6) *New electroweak fermion =* M_{wf} ;
7) *New electroweak boson =* M_{wb} ;
8) *Reduced Planck's constant =* $\hbar$;
9) *Speed of light =* c ;
10) *Strong coupling constant =* α_s ;
11) *Elementary charge =* e ;
12) *Strong elementary charge =* e_s ;
13) *Mass of proton =* m_p ;
14) *Mass of neutron =* m_n ;
15) *Mass of electron =* m_e ;
16) *Mass of Up quark =* m_u ;
17) *Mass of Down quark =* m_d ;
18) *Bohr Radius =* a_0 ;
19) *Schwarzschild radius of* m_p = R_p ;
20) *Nuclear charge radius =* $R_{(Z,A)}$;
21) *Schwarzschild radius of* M_w = R_w ;
22) *Schwarzschild radius of* m_e = R_e ;
23) *Schwarzschild radius of atom =* R_{atom} ;
24) *Mean stable mass number =* A_m ;
25) *Nuclear binding energy =* $B_{(A,Z)}$;
26) *Nuclear binding energy coefficient =* B_0 ;
27) *Coefficients connected with nuclear stability and binding energy =* (k_1, k_2) ;
28) *Mass limit of stellar object =* M_X ;
29) *Characteristic ratio associated with charged leptons =* $\sqrt{\frac{4\pi\varepsilon_0 G_e m_e^2}{e^2}} \cong \gamma$;
30) *Mass of charged baby lepton=* $(m_{xl})^{\pm}$;
31) *Neutron life time =* t_n ;
32) *Mass of basic quark =* m_q ;
33) *Super symmetry fermion-boson mass ratio =* Ψ ;
34) *Mass of quark fermion =* m_{qf} ;
35) *Mass of quark boson =* m_{qb} ;
36) *Baryon mass generator =* M_{hf} ;
37) *Meson mass generator =* M_{hb} ;
38) *Mass of Fluon =* M_{qf} ;
39) *Mass of Bluon =* M_{qb} ;
40) *Mass of neutral electroweak boson =* M_Z ;
41) *Mass of charged electroweak boson =* M_W ;
42) *Mass of neutral Higg's boson =* M_H ;

1. INTRODUCTION

Even though celestial objects that show gravity are confirmed to be made up of so many atoms, so far scientists could not find any relation in between gravity and the atomic interactions at quantum gravity level [1,2]. Different references about Black hole temperature, strong interaction, electroweak interaction, Quantum cosmology, nuclear quantum gravity and super symmetry (SUSY) can be found in [3 -24], scientists found very interesting similarities in between gravity and quantum phenomena, we have developed many workable ideas, concepts and relations. On a whole, workability is still lagging. It clearly indicates that, there is something wrong in our notion of understanding or there is something missing in developing the unified physical concepts and needs a critical review at fundamental level. In this context, we hope that, electroweak scale [25-29] can certainly yield useful stuff.

2. MOTIVATING CONCEPTS

To develop new and workable ideas, we wish to highlight the following points.

1) During cosmic evolution, if one is willing to give equal importance to Higgs boson [29] and Planck mass in understanding the massive origin of elementary particles and observed matter [30,31], then it seems quite logical to expect a common relation in between Planck scale and Electroweak scale.
2) Whether particle's massive nature is due to electromagnetism or gravity or weak interaction or strong interaction or cosmic dust or dark matter [32] or something else, is unclear.
3) Without understanding the massive nature, it is not reasonable to classify the field created by any elementary particle.
4) The four interactions, i.e. (gravitational, electromagnetic, weak and strong interactions) seem to be associated with $(\hbar)$
5) Nobody knows the mystery of $(\hbar)$ which seems to be a basic measure of angular momentum [33-36].
6) Nobody knows the mystery of existence, stability and behavior of 'proton' or 'electron'.
7) 'Mass' is a basic property of space-time curvature and basic ingredient of angular momentum.
8) Atoms are mainly characterized by protons and electrons.
9) 'Free neutron' is an unstable particle.
10) So far no one could find particles associated with SUSY [37-41].

3. BASIC ASSUMPTIONS

1) There exists a characteristic electroweak fermion of rest energy [18], $M_{wf}c^2 \cong 584.725$ GeV.
2) M_{wf} can be considered as the zygote of all elementary particles.
3) Fermi's weak coupling constant (G_F) [25,35,36] can be considered as the basic unified coupling constant.
4) There exists a strong interaction elementary charge (e_s) in such a way that, it's squared ratio with normal elementary charge is close to inverse of the strong coupling constant.
5) Each atomic interaction is associated with a characteristic gravitational coupling constant.

$$G_e \cong 2.374335\times10^{37}\ \mathrm{m^3kg^{-1}sec^{-2}}$$
$$G_s \cong 3.329561\times10^{28}\mathrm{m^3kg^{-1}sec^{-2}}$$
$$G_w \cong 2.909745\times10^{22}\ \mathrm{m^3kg^{-1}sec^{-2}}$$
$$G_N \cong 6.679855\times10^{-11}\ \mathrm{m^3kg^{-1}sec^{-2}}$$

4. CHARACTERISTIC UNIFIED RELATIONS

Based on the proposed assumptions, we could arrive at the following new and workable relations [42].

$$\hbar c \cong G_w M_{wf}^2 \cong \sqrt{G_F\left(\frac{c^4}{4G_w}\right)} \quad (1)$$
$$\Rightarrow \hbar \cong \frac{G_w M_{wf}^2}{c} \cong \sqrt{\frac{G_F c^2}{4G_w}}$$

where $\left(\frac{c^4}{4G_w}\right) \cong 6.9401\times10^{10}$ N is the characteristic force associated with electroweak interaction.

$$m_e \cong \left(\frac{G_w}{G_s}\right)M_{wf} \quad (2)$$

$$m_p \cong \left(\frac{G_s}{G_w}\right)\left(\frac{G_s}{G_e}\right)M_w \cong \left(\frac{G_s^2}{G_w G_e}\right)M_{wf} \quad (3)$$

$$\frac{m_p}{m_e} \cong \frac{G_s^3}{G_w^2 G_e} \quad (4)$$

5. SPECIFIC UNIFIED RELATIONS CONNECTED WITH FOUR GRAVITATIONAL CONSTANTS

With reference to Newtonian gravitational constant [43-50],

$$\left(\frac{m_p}{m_e}\right)^{10} \cong \left(\frac{G_w}{G_N}\right) \quad (5)$$

$$\exp\left(\frac{1}{\alpha_s^2}\right) \cong \left(\frac{G_w}{G_N}\right) \quad (6)$$

where α_s=Strong coupling constant [35,36,51]

$$\frac{m_p}{m_e} \cong \left(\frac{G_s}{G_e^{1/3} G_N^{2/3}}\right)^{1/7} \quad (7)$$

$$\frac{M_{wf}}{m_e} \cong \frac{G_w^{5/2} G_e^{5/3}}{G_s^4 G_N^{1/6}} \quad (8)$$

$$\frac{M_{wf}}{m_p} \cong \frac{G_s^{1/2} G_e^{1/6} G_N^{1/12}}{G_w^{3/4}} \quad (9)$$

$$\frac{m_p}{m_e} \cong \frac{G_w^{13/4} G_e^{3/2}}{G_s^{9/2} G_N^{1/4}} \quad (10)$$

Based on these relations,

$$G_N \cong \left(\frac{m_e}{m_p}\right)^4 \frac{G_w^{13} G_e^6}{G_s^{18}} \cong \frac{G_w^{21} G_e^{10}}{G_s^{30}} \quad (11)$$

Based on the nuclear experiments and astrophysical observations,

1) G_w can be estimated from relation (1).
2) G_s can be estimated from relations (12-14).
3) G_e can be estimated from relations (29, 30).

6. SPECIFIC UNIFIED RELATIONS CONNECTED WITH NUCLEAR RADIUS AND BOHR RADIUS

Characteristic Schwarzschild radius of proton and Schwarzschild radius of atom can be addressed with the following relations.

$$R_p \cong \frac{2G_s m_p}{c^2} \cong 1.2393 \text{ fm} \quad (12)$$
$$= \text{Characteristic nuclear charge radius [52,53]}$$

$$R_{(Z,A)} \cong \left\{Z^{1/3} + \left(\sqrt{Z(A-Z)}\right)^{1/3}\right\}\left(\frac{G_s m_p}{c^2}\right) \quad (13)$$
$$= \text{Nuclear charge radius [54]}$$

$$a_0 \cong \left(\frac{4\pi\varepsilon_0 G_e m_e^2}{e^2}\right)\left(\frac{G_s m_p}{c^2}\right) \cong 5.2918\times10^{-11} \text{ m}$$
$$\cong \left(\frac{m_p}{M_{wf}}\right)^2 \left(\frac{4\pi\varepsilon_0 G_e m_e^2}{e^2}\right)\left(\frac{G_e m_e}{c^2}\right)$$
$$= \text{Bohr radius of Hydrogen atom} \quad (14)$$

7. SPECIFIC UNIFIED RELATIONS CONNECTED WITH PROTON-ELECTRON MASS RATIO

With reference to electroweak interaction,

$$R_w \cong \frac{2G_w M_{wf}}{c^2} \cong 6.7494\times10^{-19} \text{ m} \quad (15)$$
$$= \text{Schwarzschild radius of } M_w$$

$$\frac{R_p}{R_w} \cong \left(\frac{2G_s m_p}{c^2}\right) \div \left(\frac{2G_w M_{wf}}{c^2}\right) \cong \frac{G_s m_p}{G_w M_{wf}} \cong \left(\frac{m_p}{m_e}\right) \quad (16)$$

With reference to $R_w \cong 6.7494\times10^{-19}$ m and cconsidering $\left(\frac{m_p}{m_e}\right)$ as a geometric ratio, nuclear radius and atomic radius can be estimated in the following way.

$$R_1 \cong \left(\frac{m_p}{m_e}\right)\left(\frac{2G_w M_{wf}}{c^2}\right) \cong 1.2393 \text{ fm} \quad (17)$$

$$R_2 \cong \left(\frac{m_p}{m_e}\right)^2 \left(\frac{2G_w M_{wf}}{c^2}\right) \cong 2.275 \text{ pm} \quad (18)$$

With reference to electromagnetic gravitational constant, Schwarzschild radius of electron can be addressed with,

$$R_e \cong \left(\frac{2G_e m_e}{c^2}\right) \cong 0.48 \text{ nm} \quad (19)$$

Based on relations (17) and (18) and identifying R_2 and R_e as characteristic length scales associated with characteristic atomic radius, we noticed that,

$$\sqrt{R_2 R_e} \cong \left(\frac{2\sqrt{G_e G_s}\, m_p}{c^2}\right) \cong 33.1 \text{ pm} \quad (20)$$
$$\cong R_{atom} \cong \text{Scwarzschild radius of atom [55]}$$

8. SPECIFIC UNIFIED RELATIONS CONNECTED WITH STRONG COUPLING CONSTANT

There exists a strong elementary charge (e_s) in such a way that,

$$\left.\begin{array}{l} \dfrac{m_p}{m_e} \cong \left(\dfrac{G_s m_p^2}{\hbar c}\right)\left(\dfrac{G_e m_e^2}{\hbar c}\right) \\ \cong \left(\dfrac{e_s^2}{4\pi\varepsilon_0 G_s m_p^2}\right) \Big/ \left(\dfrac{e^2}{4\pi\varepsilon_0 G_e m_e^2}\right) \end{array}\right\} \quad (21)$$

$$\rightarrow\left\{\begin{array}{l}\frac{e_s^2}{e^2}\cong\frac{1}{\alpha_s}\cong\left(\frac{G_s m_p^3}{G_e m_e^3}\right)\cong\left(\frac{G_s m_p^2}{\hbar c}\right)^2\cong\left(\frac{G_s^{10}}{G_e^4 G_w^6}\right)\\ \frac{e_s}{e}\cong\sqrt{\frac{1}{\alpha_s}}\cong\sqrt{\frac{G_s m_p^3}{G_e m_e^3}}\cong\left(\frac{G_s m_p^2}{\hbar c}\right)\cong\left(\frac{G_s^5}{G_e^2 G_w^3}\right)\end{array}\right\} \quad (22)$$

where, $\alpha_s \cong$ Strong coupling constant

Based on these relations,

$$\boxed{e_s \cong 2.9463591e,\ \alpha_s \cong 0.1151937 \quad \text{and } \frac{1}{\alpha_s} \cong 8.681032}$$

9. SPECIFIC UNIFIED RELATIONS CONNECTED WITH NUCLEAR STABILITY AND BINDING ENERGY

Nuclear mean stability and binding energy [51] can be understood with the following two relations.

Nuclear mean stability can be understood with,

$$\left.\begin{array}{l}(A_s)_{mean}\cong A_m\cong 2Z+k_1Z^2\\ \text{where}\left\{\begin{array}{l}k_1\cong 4\left(\frac{G_s^2}{G_eG_w}\right)\cong 4\left(\frac{m_p}{M_{wf}}\right)\\ \cong 0.0064185\end{array}\right.\end{array}\right\} \quad (23)$$

Nuclear binding energy can be understood with,

$$B_{(A,Z)}\cong\left\{\begin{array}{l}\left(1-k_2\sqrt{ZN}\right)A-A^{1/3}\\ -\left(1+\frac{(A_m-A)^2}{A_m}\right)\end{array}\right\}(B_0\cong 10.1\text{ MeV}) \quad (24)$$

$$\left.\begin{array}{l}\text{where, } k_2\cong 2\sqrt{\frac{G_w}{G_s}}\cong 2\sqrt{\frac{m_e}{M_{wf}}}\cong 0.00189\\ B_0\cong\left(\frac{1}{\alpha_s}\right)\frac{e^2}{4\pi\varepsilon_0R_0}\cong\frac{e_s^2}{4\pi\varepsilon_0R_0}\end{array}\right\}$$

Note-: The numbers k_1 and k_2 can be considered as the characteristic outcomes of the combined effect of strong and electromagnetic coupling constants. With trial-error method, we noticed that, $(k_1,\, k_2)\cong\left(\frac{(1-\alpha_s)^n}{2n-1}\right)\alpha\cong(0.00646, 0.0019043)$ where $n\cong 1,2$ and $\alpha_s\cong 0.1152$. It needs further study.

10. SPECIFIC UNIFIED RELATIONS CONNECTED WITH STELLAR MASS LIMITS

With reference to strong nuclear gravitational constant and astro-physics point of view [14,16], by considering nucleon as a characteristic building block, stellar mass limit [56,57] can be understood with a relation of the form,

$$\frac{G_N M_X}{G_s m_n}\cong\sqrt{\frac{G_s}{G_N}} \quad (25)$$

Thus, characteristic stellar mass limit can be estimated with a very simple relation of the form,

$$M_X\cong\left(\frac{G_s}{G_N}\right)^{\frac{3}{2}}(m_n)\cong 9.37\text{ solar masses} \quad (26)$$

Another interesting relation is,

$$\frac{G_N M_X}{G_s\sqrt{m_n M_{wf}}}\cong\sqrt{\frac{G_s}{G_N}} \quad (27)$$

$$M_X\cong\left(\frac{G_s}{G_N}\right)^{\frac{3}{2}}\sqrt{m_n M_{wf}} \cong 234\text{ solar masses} \quad (28)$$

With reference to electromagnetic gravitational constant, mass limits of super massive stellar objects can be understood.

11. APPLICATIONS OF ELECTRO-MAGNETIC GRAVITATIONAL CONSTANT IN ELEMENTARY PARTICLE PHYSICS AND ASTROPHYSICS

A) Understanding the recently observed 3.5 keV galactic photon

Recent galactic X-ray [58,59] studies strongly confirm the existence of a new photon of energy 3.5 keV. So far, its origin is unknown and unclear. In this context, we propose the following alternative mechanism for understanding the origin of 3.5 keV photon.

1) There exists a characteristic charged baby lepton of rest mass,

$$(m_{xl})^{\pm}\cong\sqrt{\frac{e^2}{4\pi\varepsilon_0 G_e}}\cong 1.75\text{ keV}/c^2 \quad (29)$$

2) With pair annihilation mechanism, (m_{xl}) generates a photon of rest energy 3.5keV
3) With current and future particle accelerators, $(m_{xl})^{\pm} \cong 1.75 \text{ keV}/c^2$ can be generated.

B) Fitting Muon and Tau rest masses

Experimentally observed [35] Muon and Tau rest masses can be fitted in the following way.

$$m_{(\mu,\tau)}c^2 \cong \left\{ \left[\gamma^3 + \left(n^2\gamma\right)^n \left(\frac{G_e}{G_N}\right)^{1/4} \right]^{\frac{1}{3}} 1.75 \text{ keV} \right\} \quad (30)$$

where,

$$\gamma \cong \sqrt{\frac{4\pi\varepsilon_0 G_e m_e^2}{e^2}} \cong 292.187 \text{ and } n = 1 \text{ and } 2$$

For $n=1$, obtained $m_\mu c^2 \cong 106.5 \text{ MeV}$

$n=2$, obtained $m_\tau c^2 \cong 1781.5 \text{ MeV}$.

At $n=3$, a new heavy charged lepton of rest energy 42.2 GeV can be predicted.

12. UNDERSTANDING NEUTRON LIFE TIME WITH ELECTROMAGNETIC AND WEAK GRAVITATIONAL CONSTANTS

One of the key objectives of any unified description is to simplify or eliminate the complicated issues of known physics. Neutron life estimation is one of such complicated issue [60,61]. In this context, in our earlier publications [20,62], we proposed the following relations.

$$\left. \begin{aligned} t_n &\cong \left(\frac{G_e}{G_w}\right)\left(\frac{G_e m_n^2}{\left(m_n - m_p\right)c^3}\right) \\ &\cong \left(\frac{G_e^2 m_n^2}{G_w\left(m_n - m_p\right)c^3}\right) \cong 874.94 \text{ sec} \end{aligned} \right\} \quad (31)$$

Plausible point to be noted is that, relativistic mass of neutron seems to play a crucial role in understanding the increasing neutron life time. It can be understood with,

$$t_n \propto \frac{m_n^2}{\left[1-\left(v^2/c^2\right)\right]} \text{ and } t_n \cong \frac{874.94 \text{ sec}}{\left[1-\left(v^2/c^2\right)\right]} \quad (32)$$

In this way, bottle method [60] and beam method [61] of neutron life time experiments can be correlated with confined and moving neutrons.

13. QUARK FERMIONS, QUARK BOSONS, FLUONS AND BLUONS

SUSY first appeared as a mathematical symmetry in string theory in early 1970s. Over time, several people added new elements to SUSY. It builds on the Standard Model and associates a 'super partner' to each fundamental particle. Fermions get bosons as super partners and bosons get associated with fermions. Even though it is a promising mathematical model of elementary particles, SUSY is in fact a very loosely defined theory with so many free parameters like the 'mass of the SUSY particle, its 'decay sequence' and 'decay time' etc. One major problem with current notion of SUSY is that, "to guess the mass of SUSY particle wherein it can be detected". Following this idea, scientists are guessing different mass zones and trying for finding SUSY particles with different specific assumptions pertaining to decay scheme. If so, the basic question to be answered is - If SUSY is as good as it looks, why has none of the new SUSY particles been found yet? In this context, we would like to emphasize that,

1) Strong interaction is one best platform for observing and confirming SUSY.
2) All observed baryons and mesons are SUSY particles only.
3) SUSY particles exist at all energy scales and are within the reach of current accelerators.

With reference to our earlier publications on SUSY [21-24], we propose the following revised concepts.

A) Quark charge spectrum with respect to SUSY

1) Strong coupling constant plays a vital role in hadron mass generation and based on relation (22), it can be addressed with an expression of the form, $\frac{1}{\alpha_s} \cong \left(\frac{G_s^{10}}{G_e^4 G_w^6}\right)$.
2) There exists a strong interaction elementary charge (e_s) in such a way that, $e_s/e \cong \sqrt{1/0.1152} \cong 2.9463 \approx 3$ and $e_s \approx 3e$.
3) With reference to the integral nature of e, splitting of e_s can be visualized as

$$\left. \begin{aligned} &\pm e_s \to (\pm e \text{ and } \pm 2e) \\ &\Rightarrow \pm e = \pm\left(\frac{1}{3}e_s\right) \text{ and } \pm 2e = \pm\left(\frac{2}{3}e_s\right) \end{aligned} \right\}$$

4) Currently believed basic quarks can be represented by the symbol (m_q) with no second letter in the subscript.
5) Basic quarks can be classified into quark fermions and quark bosons.
6) Mass fraction gained by a quark under super symmetry can be called as 'Quark boson' and can be represented by (m_{qb}).
7) Effective quark that lost its fraction of mass to its corresponding boson can be called as 'quark fermion' and can be represented by (m_{qf}).
8) Quark fermion - boson mass ratio is very close to $\Psi \cong \ln\left(1+\frac{1}{\alpha_s}\right) \cong 2.27$ where, $\alpha_s \cong 0.1152$.
9) Quark boson mass can be represented by $m_{qb} \cong \frac{m_q}{\Psi} \cong \frac{m_q}{2.27} \cong 0.4405 m_q$.
10) Quark fermion mass can be represented by
$$\left.\begin{array}{l} m_{qf} \cong m_q - m_{qb} \cong m_q - \frac{m_q}{\Psi} \\ \cong \left(1-\frac{1}{2.27}\right) m_q \cong 0.5595 m_q \end{array}\right\}$$
11) At any level and at any state, if any quark splits into quark fermion and quark boson, due to its heavy mass fraction of $0.5595 m_q$, quark fermion carries a strong charge of magnitude $\pm\left(\frac{2}{3}e_s\right) \cong \pm 2e$. Due to its little mass fraction of $0.4405 m_q$, quark boson carries a strong charge of magnitude $\pm\left(\frac{1}{3}e_s\right) \cong \pm e$.
12) Independent of its level, at any *state*, strong charge is conserved. Clearly speaking, sum of quark fermion charge and quark boson charge = $\left[\pm\left(\frac{2}{3}e_s\right)\right] + \left[\pm\left(\frac{1}{3}e_s\right)\right] \cong \pm 3e \cong \pm e_s$.
13) At any level, if lower state is assumed to have quark fermions of charge $\mp\left(\frac{1}{3}e_s\right)$, then corresponding state quark bosons can have a charge of $\mp\left(\frac{2}{3}e_s\right)$.
14) At any level, if upper state is assumed to have quark fermions of charge $\pm\left(\frac{2}{3}e_s\right)$, then corresponding state quark bosons can have a charge of $\pm\left(\frac{1}{3}e_s\right)$.
15) At any *level*, electromagnetic charge is conserved. Clearly speaking, charge sum of the two states should always be $\pm\left(\frac{1}{3}e_s\right) \cong \pm e$
16) Up and Down quarks can be considered as first level upper and lower states. At first level,
    a) Upper state, Up fermion will have a charge of $\pm\left(\frac{2}{3}e_s\right)$ and Up boson will have a charge of $\pm\left(\frac{1}{3}e_s\right)$.
    b) Lower state, Down fermion will have a charge of $\mp\left(\frac{1}{3}e_s\right)$ and Down boson will have a charge of $\mp\left(\frac{2}{3}e_s\right)$.
17) Charm and Strange quarks can be considered as second level upper and lower states. At second level,
    a) Upper state, Charm fermion will have a charge of $\pm\left(\frac{2}{3}e_s\right)$ and Charm boson will have a charge of $\pm\left(\frac{1}{3}e_s\right)$.
    b) Lower state, Strange fermion will have a charge of $\mp\left(\frac{1}{3}e_s\right)$ and Strange boson will have a charge of $\mp\left(\frac{2}{3}e_s\right)$.
18) Top and Bottom quarks can be considered as third level upper and lower states. At third level,
    a) Upper state, Top fermion will have a charge of $\pm\left(\frac{2}{3}e_s\right)$ and Top boson will have a charge of $\pm\left(\frac{1}{3}e_s\right)$.
    b) Lower state, Bottom fermion will have a charge of $\mp\left(\frac{1}{3}e_s\right)$ and Bottom boson will have a charge of $\mp\left(\frac{2}{3}e_s\right)$.

B) Quark mass spectrum with respect to SUSY

1) Up, Strange and Bottom quarks are in a geometric series with a geometric ratio,

$$\left.\begin{array}{l} r_{ug} \cong \left(\frac{x(x+1)}{x-1}\right)^2 \cong (5.8836)^2 \cong 34.617 \\ \text{where, } x \cong \ln\left(\frac{1}{\alpha_s}\right) \cong 2.1611 \end{array}\right\}$$

2) Down, Charm and Top quarks are in another geometric series with a geometric ratio,

$$\left.\begin{array}{l} r_{dg} \cong \left(\frac{2x(x+1)}{x-1}\right)^2 \cong 4r_{ug} \\ 4\times(5.8836)^2 \cong 138.468 \end{array}\right\}$$

3) Up quark mass can be estimated with $m_u \cong \left(\frac{1}{\alpha_s}\right)\times m_e c^2 \cong 4.436 \text{ MeV}.$
4) Down quark mass can be estimated with $m_d \cong x\times m_u c^2 \cong 9.586 \text{ MeV}.$
5) There exists a massive fermion of rest energy $\left(M_{hf}c^2\right)^{\pm} \cong 103.4 \text{ GeV}.$ It can be called as 'baryon mass generator' and needs a formula for its estimation. Roughly, it can be related with the following empirical relation,

$$\left\{\begin{array}{l} M_{hf} \cong \left(\frac{e_s}{e}\right)^2 * \left(M_{wf}^2 m_{uf}\right)^{\frac{1}{3}} \\ \cong 9*\left(M_{wf}^2 m_{uf}\right)^{\frac{1}{3}} \cong 103.403 \text{ GeV} \end{array}\right\}$$

6) Quark fermions that generate observable massive baryons can be called as 'Fluons'. They can be represented by $\left(M_{qf}\right)$.
7) Fluons rest mass can be estimated with a relation of the form, $M_{qf} \cong \frac{1}{2x}\left[m_{qf}\times M_{hf}^2\right]^{\frac{1}{3}}$ where $\frac{1}{2x} \cong \sin^2\theta_W \cong 0.23137.$
8) Obeying the concept of 'fractional quark charge', there exist two kinds of ground state baryons.
   a) Type-1 ground state baryons can be addressed with $\left(M_{qf1}\times M_{qf2}\times M_{qf3}\right)^{\frac{1}{3}}$ where $\left(M_{qf1}, M_{qf2} \text{ and } M_{qf3}\right)$ represent any three fluons.
   b) Type-2 ground state baryons can be addressed with $\left(M_{qf1}^2\times M_{qf2}\right)^{\frac{1}{3}}$ where $\left(M_{qf1} \text{ and } M_{qf2}\right)$ represent any two fluons.
   c) Type-3 ground state (double charge) baryons can be addressed with a relation of the form $\frac{3}{5}\left(3M_{qf}\right)$ or $\frac{3}{5}\left(2M_{qf1}+M_{qf2}\right)$ It needs a critical review.
9) There exist two basic types of excited levels. They can be called as 'fine rotational levels' and 'super fine rotational levels'.
   a) Fine rotational levels of ground state baryons can be represented by, $\left[I = n(n+1)\right]^{\frac{1}{4}}$ or $\left[I/2 = n(n+1)/2\right]^{\frac{1}{4}}$ where $n = 1,2,3,..$
   b) Super fine rotational levels of ground state baryons can be represented by $\left[I = n(n+1)\right]^{\frac{1}{12}}$ or $\left[I/2 = n(n+1)/2\right]^{\frac{1}{12}}$ where $n = 1,2,3,..$
10) Fine rotational levels seem to be associated with nucleons at low energy scales and super fine rotational levels seem to be associated with fluons and bluons. It needs further study.
11) There exists a massive boson of rest energy $\left(M_{hb}c^2\right)^{\pm} \cong \frac{103.403 \text{ GeV}}{2.27} \approx 45.552 \text{ GeV}.$ It can be called as 'meson mass generator'.
12) Quark bosons that generate observable mesons can be called as 'Bluons'. They can be represented by $\left(M_{qb}\right)$.
13) Bluons rest mass can be estimated with a relation of the form, $M_{qb} \cong \frac{1}{2x}\left[m_{qb}\times M_{hb}^2\right]^{\frac{1}{3}}$.
14) Obeying the concept of 'fractional quark charge', mesons can be understood in two different ways and needs further in depth study.
   a) Type-1 ground state mesons can be addressed with $\left(M_{qb1}+M_{qb2}\right)$ where $\left(M_{qb1} \text{ and } M_{qb2}\right)$ represent any two bluons. See Table 16.
   b) Type-2 ground state mesons can be addressed with $\left(M_{qf1}\times M_{qf2}\times M_{qf3}\right)^{\frac{1}{3}}/2.27$ or $\left(M_{qf1}^2\times M_{qf2}\right)^{\frac{1}{3}}/2.27$. See Table 14 and Table 15.
15) Super fine rotational levels of ground state mesons can be represented by $\left[I = n(n+1)\right]^{\frac{1}{12}}$ or $\left[I/2 = n(n+1)/2\right]^{\frac{1}{12}}$ where $n = 1,2,3,..$

C) Quark mass and charge spectrum

See Tables 1 to 5 pertaining to quark masses and charges.

Table 1. Basic quark masses and strong charge

Basic quark	(m_q) Mass (MeV)	Strong Charge
Up	4.44	$\pm e_s = \pm 3e$
Down	9.59	$\pm e_s = \pm 3e$
Strange	153.55	$\pm e_s = \pm 3e$
Charm	1327.36	$\pm e_s = \pm 3e$
Bottom	5315.50	$\pm e_s = \pm 3e$
Top	183796.1	$\pm e_s = \pm 3e$

Table 2. Quark fermion masses and strong charges

Quark fermion	(m_{qf}) Mass (MeV)	Strong Charge
Up	2.48	$\left(\pm\frac{2e_s}{3}\right)$
Down	5.37	$\left(\mp\frac{e_s}{3}\right)$
Charm	742.66	$\left(\pm\frac{2e_s}{3}\right)$
Strange	85.91	$\left(\mp\frac{e_s}{3}\right)$
Bottom	2974.02	$\left(\mp\frac{e_s}{3}\right)$
Top	102833.92	$\left(\pm\frac{2e_s}{3}\right)$

Table 3. Quark boson masses and strong charges

Quark boson	(m_{qb}) Mass (MeV)	Strong Charge
Up	1.96	$\left(\pm\frac{e_s}{3}\right)$
Down	4.22	$\left(\mp\frac{2e_s}{3}\right)$
Charm	584.70	$\left(\pm\frac{e_s}{3}\right)$
Strange	67.64	$\left(\mp\frac{2e_s}{3}\right)$
Top	80962.18	$\left(\pm\frac{e_s}{3}\right)$
Bottom	2341.48	$\left(\mp\frac{2e_s}{3}\right)$

Table 4. Fluon masses and strong charges

Fluons	(M_{qf}) Mass (MeV)	Strong Charge
Up	690.32	$\left(\pm\frac{2e_s}{3}\right)$
Down	892.34	$\left(\mp\frac{e_s}{3}\right)$
Charm	4615.82	$\left(\pm\frac{2e_s}{3}\right)$
Strange	2249.10	$\left(\mp\frac{e_s}{3}\right)$
Top	23880.18	$\left(\pm\frac{2e_s}{3}\right)$
Bottom	7330.05	$\left(\mp\frac{e_s}{3}\right)$

Table 5. Bluon masses and strong charges

Bluons	(M_{qb}) Mass (MeV)	Strong charge
Up	369.04	$\left(\pm\frac{e_s}{3}\right)$
Down	477.04	$\left(\mp\frac{2e_s}{3}\right)$
Charm	2467.58	$\left(\pm\frac{e_s}{3}\right)$
Strange	1202.35	$\left(\mp\frac{2e_s}{3}\right)$
Top	12766.16	$\left(\pm\frac{e_s}{3}\right)$
Bottom	3918.59	$\left(\mp\frac{2e_s}{3}\right)$

14. DISCUSSION ON BARYON MASSES

Considering fine rotational levels of neutron, many neutral baryons can be estimated. See Table 6. Here, the basic question to be answered is - why proton is not showing such charged fine rotational levels? Even though, we are not in a position to answer this question, based on the data presented in Table 6, Table 14 and Table 15, we are sure that, with further study, mystery can be understood. From Table 4, baryon ground state masses can be estimated. See Table 7.

We assure the readers that, with these ground state baryon masses and considering their super fine rotational levels, most of the observed baryons can be fitted and many new states can also be predicted for future experimental verification/ observation. There may be some minor differences in the current classification scheme and proposed scheme of baryon super symmetry.

Observed bottom baryons can be understood with super fine rotational levels of –

$$\left.\begin{array}{l}\left(M_{sf}M_{cf}M_{bf}\right)^{\frac{1}{3}} \cong \left(4237.62\ \mathrm{MeV}\right)^{0} \\ \left(M_{df}M_{cf}M_{tf}\right)^{\frac{1}{3}} \cong \left(4616.07\ \mathrm{MeV}\right)^{+} \\ \left\{\begin{array}{l}\left(M_{bf}^{2}M_{sf}\right)^{\frac{1}{3}} \cong \left(4943.95\ \mathrm{MeV}\right)^{-} \\ \left(M_{uf}M_{bf}M_{tf}\right)^{\frac{1}{3}} \cong \left(4943.85\ \mathrm{MeV}\right)^{+}\end{array}\right\} \\ \left\{\begin{array}{l}\left(M_{cf}^{2}M_{bf}\right)^{\frac{1}{3}} \cong \left(5385.20\ \mathrm{MeV}\right)^{-} \\ \left(M_{df}M_{bf}M_{tf}\right)^{\frac{1}{3}} \cong \left(5385.49\ \mathrm{MeV}\right)^{0}\end{array}\right\}\end{array}\right\}$$

$\left(1232\ \mathrm{MeV}\right)^{++}$ can be understood with $0.6*\left(3M_{uf}\right) \cong 1246\ \mathrm{MeV}$ and $\left(3620\ \mathrm{MeV}\right)^{++}$ can be understood with $0.6*\left(2M_{uf}+M_{cf}\right) \cong 3600\ \mathrm{MeV}$. Extending this idea, existence of a new particle $0.6*\left(M_{uf}+2M_{cf}\right) \cong \left(5953\ \mathrm{MeV}\right)^{++}$ can be predicted. Triple charmed baryon can be understood with, $0.6*\left(3M_{cf}\right) \cong \left(8308.5\ \mathrm{MeV}\right)^{++}$.

Table 6. Neutral fine rotational levels of neutron

n	$I = n(n+1)$	$(I/2)^{1/4} * 939.56$ **(MeV)**	$(I)^{1/4} * 939.56$ **(MeV)**
1	2	939.6	1117.3
2	6	1236.5	1470.5
3	12	1470.5	1748.7
4	20	1670.8	1986.9
5	30	1849.1	2198.9
6	42	2011.3	2391.9
7	56	2161.3	2570.2
8	72	2301.5	2736.9
9	90	2433.5	2893.9
10	110	2558.7	3042.8

Table 7. Ground state mass of baryons

Combination of fluons	**Ground state mass of baryon (MeV)**	**Experimental baryon with charge**
$\left(M_{uf}^{2}M_{df}\right)^{\frac{1}{3}}$	751.99	$(+e)$
$\left(M_{df}^{2}M_{uf}\right)^{\frac{1}{3}}$	819.63	(0)
$\left(M_{uf}^{2}M_{sf}\right)^{\frac{1}{3}}$	1023.38	$(+e)$
$\left(M_{uf}M_{df}M_{sf}\right)^{\frac{1}{3}}$	1114.80	$\Lambda,(0)$
$\left(M_{df}^{2}M_{sf}\right)^{\frac{1}{3}}$	1214.38	$\Sigma,(-e)$
$\left(M_{sf}^{2}M_{uf}\right)^{\frac{1}{3}}$	1517.13	$\Sigma,(0)$
$\left(M_{sf}^{2}M_{df}\right)^{\frac{1}{3}}$	1652.66	$\Omega,(-e)$
$\left(M_{uf}^{2}M_{cf}\right)^{\frac{1}{3}}$	1300.52	$(+2e)$
$\left(M_{df}^{2}M_{cf}\right)^{\frac{1}{3}}$	1543.25	(0)
$\left(M_{sf}^{2}M_{cf}\right)^{\frac{1}{3}}$	2858.17	(0)
$\left(M_{cf}^{2}M_{uf}\right)^{\frac{1}{3}}$	2450.1	$\Sigma_{c},(+2e)$
$\left(M_{cf}^{2}M_{df}\right)^{\frac{1}{3}}$	2668.96	$\Lambda_{c},(+e)$
$\left(M_{cf}^{2}M_{sf}\right)^{\frac{1}{3}}$	3632.19	$P_{c},(+e)$

Combination of fluons	Ground state mass of baryon (MeV)	Experimental baryon with charge
$\left(M_{uf}M_{df}M_{cf}\right)^{\frac{1}{3}}$	1416.70	$(+e)$
$\left(M_{uf}M_{sf}M_{cf}\right)^{\frac{1}{3}}$	1927.98	$(+e)$
$\left(M_{df}M_{sf}M_{cf}\right)^{\frac{1}{3}}$	2100.21	(0)
$\left(M_{uf}^{2}M_{bf}\right)^{\frac{1}{3}}$	1517.29	$\Sigma,(+e)$
$\left(M_{df}^{2}M_{bf}\right)^{\frac{1}{3}}$	1800.48	$(-e)$
$\left(M_{sf}^{2}M_{bf}\right)^{\frac{1}{3}}$	3334.58	$(-e)$
$\left(M_{cf}^{2}M_{bf}\right)^{\frac{1}{3}}$	5385.20	$\Lambda,\Xi,\Sigma,\Omega,(-e)$
$\left(M_{bf}^{2}M_{uf}\right)^{\frac{1}{3}}$	3334.94	(0)
$\left(M_{bf}^{2}M_{df}\right)^{\frac{1}{3}}$	3632.85	$(-e)$
$\left(M_{bf}^{2}M_{sf}\right)^{\frac{1}{3}}$	4943.95	$\Lambda,\Xi,\Sigma,\Omega,(-e)$
$\left(M_{bf}^{2}M_{cf}\right)^{\frac{1}{3}}$	6282.82	(0)
$\left(M_{uf}M_{df}M_{bf}\right)^{\frac{1}{3}}$	1652.83	(0)
$\left(M_{uf}M_{sf}M_{bf}\right)^{\frac{1}{3}}$	2249.34	(0)
$\left(M_{uf}M_{cf}M_{bf}\right)^{\frac{1}{3}}$	2858.48	$\Lambda_{c},(+e)$
$\left(M_{df}M_{sf}M_{bf}\right)^{\frac{1}{3}}$	2450.28	$(-e)$
$\left(M_{df}M_{cf}M_{bf}\right)^{\frac{1}{3}}$	3113.83	(0)
$\left(M_{sf}M_{cf}M_{bf}\right)^{\frac{1}{3}}$	4237.62	$\Lambda,\Xi,\Sigma,\Omega,(0)$
$\left(M_{tf}^{2}M_{uf}\right)^{\frac{1}{3}}$	7328.95	$(+2e)$
$\left(M_{tf}^{2}M_{df}\right)^{\frac{1}{3}}$	7983.66	$(+e)$
$\left(M_{tf}^{2}M_{sf}\right)^{\frac{1}{3}}$	10864.96	$(+e)$
$\left(M_{tf}^{2}M_{cf}\right)^{\frac{1}{3}}$	13807.28	$(+2e)$
$\left(M_{tf}^{2}M_{bf}\right)^{\frac{1}{3}}$	16108.71	$(+e)$
$\left(M_{uf}M_{df}M_{tf}\right)^{\frac{1}{3}}$	2450.23	$\Sigma_{c},(+e)$
$\left(M_{uf}M_{sf}M_{tf}\right)^{\frac{1}{3}}$	3334.51	$(+e)$
$\left(M_{uf}M_{cf}M_{tf}\right)^{\frac{1}{3}}$	4237.52	$(+2e)$
$\left(M_{uf}M_{bf}M_{tf}\right)^{\frac{1}{3}}$	4943.85	$\Lambda,\Xi,\Sigma,\Omega,(+e)$
$\left(M_{df}M_{sf}M_{tf}\right)^{\frac{1}{3}}$	3632.39	(0)
$\left(M_{df}M_{cf}M_{tf}\right)^{\frac{1}{3}}$	4616.07	$\Lambda,\Xi,\Sigma,\Omega,(+e)$

Combination of fluons	Ground state mass of baryon (MeV)	Experimental baryon with charge
$\left(M_{df}M_{bf}M_{tf}\right)^{\frac{1}{3}}$	5385.49	$\Lambda,\Xi,\Sigma,\Omega,(0)$
$\left(M_{sf}M_{bf}M_{tf}\right)^{\frac{1}{3}}$	7329.11	$(+e)$
$\left(M_{sf}M_{cf}M_{tf}\right)^{\frac{1}{3}}$	6282.00	$(+e)$
$\left(M_{bf}^{2}M_{tf}\right)^{\frac{1}{3}}$	10866.35	(0)
$\left(M_{bf}M_{cf}M_{tf}\right)^{\frac{1}{3}}$	9313.89	$(+e)$
$\left(M_{cf}^{2}M_{tf}\right)^{\frac{1}{3}}$	7983.23	$(+2e)$

Table 8. Super fine rotational levels of $(4237.6\text{ MeV})^{0}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\,4237.6$ (MeV)	$(I)^{1/12}\,4237.6$ (MeV)
1	2	4237.6	4489.6
2	6	4643.9	4920.0
3	12	4920.0	5212.6
4	20	5134.0	5439.3
5	30	5310.4	5626.2
6	42	5461.4	5786.2
7	56	5593.9	5926.6
8	72	5712.3	6052.0
9	90	5819.6	6165.6
10	110	5917.7	6269.6

Table 9. Super fine rotational levels of $(4616.1\text{ MeV})^{+}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\,4616.1$ (MeV)	$(I)^{1/12}\,4616.1$ (MeV)
1	2	4616.1	4890.6
2	6	5058.6	5359.4
3	12	5359.4	5678.1
4	20	5592.5	5925.0
5	30	5784.7	6128.7
6	42	5949.2	6302.9
7	56	6093.5	6455.9
8	72	6222.5	6592.5
9	90	6339.3	6716.2
10	110	6446.2	6829.5

15. DISCUSSION ON MESON MASSES

A) Fine rotational levels of SUSY Neutron and SUSY Proton

Observed charged and neutral mesons like Eta mesons, Omega mesons, Rho mesons, Kaons, etc can be understood with fine rotational levels of SUSY proton (s'proton) and SUSY neutron (s'neutron).

1) SUSY proton rest energy can be expressed as,

$$m_{pb}c^{2}\cong\frac{m_{p}c^{2}}{\Psi}\cong\frac{938.272}{2.27}\cong 413.34\text{ MeV}$$

2) SUSY neutron rest energy can be expressed as,

$$m_{nb}c^{2}\cong\frac{m_{n}c^{2}}{\Psi}\cong\frac{939.5654}{2.27}\cong 413.91\text{ MeV}$$

See Table 14 and Table 15 for the fine rotational levels of SUSY proton and SUSY neutron.

B) Ground and Super fine rotational levels of Bluons

From Table 5, ground state meson masses can be estimated. See Table 16.

16. RESULTS AND DISCUSSION ON SUSY

a) Compared to the current status of SUSY, our approach is simple to follow, easy to implement and practically observable. This can be best understood with the proposed SUSY proton and SUSY neutron wide Table 14 and Table 15.

b) Fractional charge quarks can be best understood with proposed concepts of strong charge conservation, electromagnetic charge conservation and super symmetry.

c) Our proposal is absolutely free from currently believed 'color charge' and 'gluons'.

d) Particle mass estimation point of view, our proposed method is very much simpler than the currently believed mathematical calculations.

e) $\left[I=n(n+1)\right]^{\frac{1}{4}}$ or $\left[I/2=n(n+1)/2\right]^{\frac{1}{4}}$ and

$\left[I=n(n+1)\right]^{\frac{1}{12}}$ or $\left[I/2=n(n+1)/2\right]^{\frac{1}{12}}$

excited states can be compared with different vibrating modes of a string.

f) Considering advanced quantum rules and simplified selection procedures, data presented in most of the tables can be filtered with respect to observational viability.

g) Massive double charge baryons like 1232 MeV and 3620 MeV seem to a follow a new method and we are working on it.

h) Estimated masses of charged X mesons like 3900 MeV, 4020 MeV, 4250 MeV and 4430 MeV etc presented in Table 25 seem to give a good support to our SUSY approach.

i) Free parameters are less in our model and seem to be inter-connected with strong coupling constant.

j) Considering 585 GeV fermion as the characteristic building block of all elementary particles, an attempt is made to fit proton and electron masses.

k) Based on the proposed concept of SUSY, corresponding to the proposed electroweak fermion of rest energy $\left(M_{wf}c^2\right)^{\pm}\cong 584.725\text{ GeV},$ there exists a possibility of finding a characteristic electroweak boson of rest energy, $\left(M_{wb}c^2\right)^{\pm}\cong\frac{\left(M_{wf}c^2\right)^{\pm}}{\Psi}\cong 257.59\text{ GeV}.$

l) In our earlier publications [53,54], we expressed our view that, charged electroweak boson $\left(M_W\right)^{\pm}$ is a super symmetric boson of "integral" charge top quark. In this paper, we have reviewed our earlier paper with respect to 'strong' charge and fractional charge quark bosons. By assuming the combination of Top quark boson and anti Strange boson or anti Down boson, there is a possibility of observing $\left(M_W\right)^{\pm}$. If so, there is also a possibility of observing neutral boson of rest energy close to $\left(M_W\right)^{\pm}$ boson. Hence, it needs further study with respect to the fractional charge quark boson of rest energy of 80.9 GeV.

m) Neutral electroweak boson constitutes two charged bosons of rest energy $\left(45.5\text{ GeV}\right)^{\pm}$. It can be expressed as,

$$M_Z\cong\left(\frac{M_{hf}}{\Psi}\right)^{\pm}+\left(\frac{M_{hf}}{\Psi}\right)^{\mp}$$

$$\cong\left(M_{hb}\right)^{\pm}+\left(M_{hb}\right)^{\mp}\cong\frac{2M_{hf}}{\Psi}\cong 91.104\ \text{GeV}/c^2$$

n) Neutral Higg's boson constitutes [23,62] a charged electroweak boson $\left(M_W\right)^{\pm}$ and a charged $\left(M_{hb}\right)^{\mp}$. It can be expressed as,

$$\left(M_H\right)^0\cong\left(M_W\right)^{\pm}+\left(M_{hb}\right)^{\mp}$$
$$\cong\left(80.379+45.552\right)\ \text{GeV}/c^2$$
$$\cong 125.93\ \text{GeV}/c^2$$

o) With reference to the data presented in Table 3, neutral pion seems to constitute Strange boson and anti Strange boson. It's rest energy seems to be 2*67.64=135.3 MeV.

p) Nuclear 'space' seems to be a "strange sea" of –
   i. Six fractional charge quark bosons of rest energy 2 MeV to 81 GeV,
   ii. Six fractional charge quark fermions of rest energy 2.5 MeV to 103 GeV,
   iii. Six fractional charge fluons of rest energy 692 MeV to 24 GeV and
   iv. Six fractional charge bluons of rest energy 369 MeV to 13 GeV.

Table 10.Super fine rotational levels of $(4943.95\ \text{MeV})^{-}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\ 4944.0$ **(MeV)**	$(I)^{1/12}\ 4944.0$ **(MeV)**
1	2	4944.0	5237.9
2	6	5417.9	5740.1
3	12	5740.1	6081.4
4	20	5989.7	6345.9
5	30	6195.6	6564.0
6	42	6371.8	6750.6
7	56	6526.4	6914.4
8	72	6664.5	7060.8
9	90	6789.6	7193.3
10	110	6904.1	7314.6

Table 11. Super fine rotational levels of $(4943.85\ \text{MeV})^{+}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\ 4943.85$ **(MeV)**	$(I)^{1/12}\ 4943.85$ **(MeV)**
1	2	4943.9	5237.8
2	6	5417.8	5740.0
3	12	5740.0	6081.3
4	20	5989.6	6345.8
5	30	6195.5	6563.9
6	42	6371.6	6750.5
7	56	6526.2	6914.3
8	72	6664.3	7060.6
9	90	6789.4	7193.1
10	110	6903.9	7314.4

Table 12. Super fine rotational levels of $(5385.20\ \text{MeV})^{-}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\ 5385.20$ **(MeV)**	$(I)^{1/12}\ 5385.20$ **(MeV)**
1	2	5385.2	5705.4
2	6	5901.5	6252.4
3	12	6252.4	6624.2
4	20	6524.3	6912.3
5	30	6748.5	7149.8
6	42	6940.4	7353.1
7	56	7108.8	7531.5
8	72	7259.3	7690.9
9	90	7395.5	7835.3
10	110	7520.2	7967.4

Table 13. Super fine rotational levels of $(5385.49\ \text{MeV})^{0}$: Bottom baryons

n	$I=n(n+1)$	$(I/2)^{1/12}\ 5385.49$ **(MeV)**	$(I)^{1/12}\ 5385.49$ **(MeV)**
1	2	5385.5	5705.7
2	6	5901.8	6252.8
3	12	6252.8	6624.6
4	20	6524.7	6912.6
5	30	6748.9	7150.2
6	42	6940.8	7353.5
7	56	7109.2	7532.0
8	72	7259.7	7691.4
9	90	7395.9	7835.7
10	110	7520.7	7967.9

Table 14. Fine rotational levels of $(413.3\text{ MeV})^{+e}$: Charged mesons like (k^+, ρ^+)

n	$I = n(n+1)$	$(I/2)^{1/4} * 413.3$ **(MeV)**	$(I)^{1/4} * 413.3$ **(MeV)**
1	2	413.3	491.5
2	6	544.0	646.9
3	12	646.9	769.3
4	20	735.0	874.1
5	30	813.4	967.4
6	42	884.8	1052.3
7	56	950.8	1130.7
8	72	1012.5	1204.0
9	90	1070.6	1273.1
10	110	1125.6	1338.6
11	132	1178.1	1401.0
12	156	1228.4	1460.8
13	182	1276.6	1518.2
14	210	1323.1	1573.5
15	240	1368.1	1626.9
16	272	1411.5	1678.6
17	306	1453.7	1728.8
18	342	1494.7	1777.5
19	380	1534.6	1825.0
20	420	1573.5	1871.2

Table 15. Fine rotational levels of $(413.9\text{ MeV})^{0}$: Neutral mesons like (k, η, ρ)

n	$I = n(n+1)$	$(I/2)^{1/4} * 413.9$ **(MeV)**	$(I)^{1/4} * 413.9$ **(MeV)**
1	2	413.9	492.2
2	6	544.7	647.8
3	12	647.8	770.4
4	20	736.0	875.3
5	30	814.6	968.7
6	42	886.1	1053.7
7	56	952.1	1132.3
8	72	1013.9	1205.7
9	90	1072.0	1274.9
10	110	1127.2	1340.5
11	132	1179.8	1403.0
12	156	1230.1	1462.8
13	182	1278.4	1520.3
14	210	1325.0	1575.7
15	240	1369.9	1629.1
16	272	1413.5	1680.9
17	306	1455.7	1731.2
18	342	1496.8	1780.0
19	380	1536.7	1827.5
20	420	1575.7	1873.8

Table 16. Ground state mass of mesons

Combination of bluons with charge	Ground state mass of meson (MeV)	Experimental mesons
$\left(M_{ub}+\overline{M}_{ub}\right)^{0}$	738.08	See Table 17
$\left(M_{db}+M_{ub}\right)^{-e}$	846.08	See Table 18
$\left(M_{db}+\overline{M}_{db}\right)^{0}$	954.08	See Table 19
$\left(M_{sb}+M_{ub}\right)^{-e}$	1571.39	See Table 20
$\left(M_{sb}+\overline{M_{db}}\right)^{0}$	1679.39	See Table 21
$\left(M_{sb}+\overline{M_{sb}}\right)^{0}$	2404.7	See Table 22
$\left(M_{cb}+\overline{M_{ub}}\right)^{0}$	2836.62	See Table 23
$\left(M_{cb}+M_{db}\right)^{-e}$	2944.62	See Table 24 (New states)
$\left(M_{cb}+M_{sb}\right)^{-e}$	3669.93	See Table 25 (X mesons)
$\left(M_{cb}+\overline{M_{cb}}\right)^{0}$	4935.16	See Table 26 (New states)
$\left(M_{bb}+M_{ub}\right)^{-e}$	4287.63	See Table 27
$\left(M_{bb}+\overline{M_{db}}\right)^{0}$	4395.63	See Table 28
$\left(M_{bb}+\overline{M_{sb}}\right)^{0}$	5120.94	See Table 29
$\left(M_{bb}+M_{cb}\right)^{-e}$	6386.17	See Table 30
$\left(M_{bb}+\overline{M_{bb}}\right)^{0}$	7837.18	See Table 31
$\left(M_{tb}+\overline{M_{ub}}\right)^{0}$	13135.2	Needs confirmation with further study and observations
$\left(M_{tb}+M_{db}\right)^{-e}$	13243.2	
$\left(M_{tb}+M_{sb}\right)^{-e}$	13968.51	
$\left(M_{tb}+\overline{M_{cb}}\right)^{0}$	15233.74	
$\left(M_{tb}+M_{bb}\right)^{-e}$	16684.75	
$\left(M_{tb}+\overline{M_{tb}}\right)^{0}$	25532.32	

Table 17. Super fine rotational levels of $\left(738.08\text{ MeV}\right)^{0}$: Neutral mesons like $\left(\omega, K^{*0}, a_0\right)$

n	$I=n(n+1)$	$\left(I/2\right)^{1/12}*738.1$ (MeV)	$\left(I\right)^{1/12}*738.1$ (MeV)
1	2	738.1	782.0
2	6	808.8	856.9
3	12	856.9	907.9
4	20	894.2	947.4
5	30	924.9	979.9

Table 18. Super fine rotational levels of $\left(846.1\text{ MeV}\right)^{-e}$: Charged mesons like $\left(K^{*-}\right)$

n	$I=n(n+1)$	$\left(I/2\right)^{1/12}*846.1$ (MeV)	$\left(I\right)^{1/12}*846.1$ (MeV)
1	2	846.1	896.4
2	6	927.2	982.3
3	12	982.3	1040.7
4	20	1025.0	1086.0
5	30	1060.3	1123.3

Table 19. Super fine rotational levels of $(954.1\ \mathrm{MeV})^{0}$: Neutral mesons like (η',ϕ)

n	$I=n(n+1)$	$(I/2)^{1/12}*954.1$ (MeV)	$(I)^{1/12}*954.1$ (MeV)
1	2	954.1	1010.8
2	6	1045.6	1107.7
3	12	1107.7	1173.6
4	20	1155.9	1224.6
5	30	1195.6	1266.7

Table 20. Super fine rotational levels of $(1571.4\ \mathrm{MeV})^{-e}$: All Charm and Charm-Strange mesons (First three levels seems to be forbidden)

n	$I=n(n+1)$	$(I/2)^{1/12}*1571.4$ (MeV)	$(I)^{1/12}*1571.4$ (MeV)
1	2	1571.4	1664.8
2	6	1722.0	1824.4
3	12	1824.4	1932.9
4	20	1903.8	2017.0
5	30	1969.2	2086.3
6	42	2025.2	2145.6
7	56	2074.3	2197.7
8	72	2118.2	2244.2
9	90	2158.0	2286.3
10	110	2194.4	2324.9
11	132	2228.0	2360.5
12	156	2259.2	2393.6
13	182	2288.4	2424.5
14	210	2315.9	2453.6
15	240	2341.8	2481.0
16	272	2366.3	2507.1
17	306	2389.7	2531.8
18	342	2411.9	2555.4
19	380	2433.2	2577.9
20	420	2453.6	2599.5
21	462	2473.2	2620.2
22	506	2492.0	2640.2
23	552	2510.1	2659.4
24	600	2527.6	2677.9
25	650	2544.5	2695.8

Table 21. Super fine rotational levels of $(1679.4\ \mathrm{MeV})^{0}$: Neutral mesons like $(K^{*},K^{*}_{3},K^{*}_{4})$

n	$I=n(n+1)$	$(I/2)^{1/12}*1679.4$ (MeV)	$(I)^{1/12}*1679.4$ (MeV)
1	2	1679.4	1779.3
2	6	1840.4	1949.8
3	12	1949.8	2065.8
4	20	2034.6	2155.6
5	30	2104.5	2229.7
6	42	2164.4	2293.1
7	56	2216.9	2348.7
8	72	2263.8	2398.4
9	90	2306.3	2443.5
10	110	2345.2	2484.7

Table 22. Super fine rotational levels of $(2404.7\ \text{MeV})^0$: Neutral mesons like D_1

n	$I=n(n+1)$	$(I/2)^{1/12}*2404.7$ (MeV)	$(I)^{1/12}*2404.7$ (MeV)
1	2	2404.7	2547.7
2	6	2635.2	2791.9
3	12	2791.9	2958.0
4	20	2913.4	3086.6
5	30	3013.5	3192.7
6	42	3099.2	3283.5
7	56	3174.4	3363.1
8	72	3241.6	3434.3
9	90	3302.4	3498.8
10	110	3358.1	3557.8

Table 23. Super fine rotational levels of $(2836.6\ \text{MeV})^0$: Charmed and anti charmed mesons

n	$I=n(n+1)$	$(I/2)^{1/12}*2836.6$ (MeV)	$(I)^{1/12}*2836.6$ (MeV)
1	2	2836.6	3005.3
2	6	3108.6	3293.4
3	12	3293.4	3489.3
4	20	3436.6	3641.0
5	30	3554.7	3766.1
6	42	3655.8	3873.2
7	56	3744.5	3967.2
8	72	3823.8	4051.2
9	90	3895.6	4127.2
10	110	3961.2	4196.8
11	132	4021.9	4261.0
12	156	4078.3	4320.8
13	182	4131.0	4376.6
14	210	4180.6	4429.1
15	240	4227.3	4478.7
16	272	4271.7	4525.7
17	306	4313.8	4570.3
18	342	4354.0	4612.9
19	380	4392.4	4653.5
20	420	4429.1	4692.5

Table 24. Super fine rotational levels of $(2944.6\ \text{MeV})^{-e}$: New charged mesons connected with Charm and Down bluons

n	$I=n(n+1)$	$(I/2)^{1/12}*2944.6$ (MeV)	$(I)^{1/12}*2944.6$ (MeV)
1	2	2944.6	3119.7
2	6	3226.9	3418.8
3	12	3418.8	3622.1
4	20	3567.5	3779.6
5	30	3690.1	3909.5
6	42	3795.0	4020.7
7	56	3887.1	4118.2
8	72	3969.4	4205.4
9	90	4043.9	4284.3
10	110	4112.1	4356.6

Table 25. Super fine rotational levels of $(3669.9\text{ MeV})^{-e}$: Charged X mesons like 3900 MeV, 4020 MeV, 4250 MeV, 4430 MeV etc

n	$I = n(n+1)$	$(I/2)^{1/12} * 3669.9$ (MeV)	$(I)^{1/12} * 3669.9$ (MeV)
1	2	3669.9	3888.2
2	6	4021.8	4260.9
3	12	4260.9	4514.3
4	20	4446.2	4710.6
5	30	4599.0	4872.5
6	42	4729.8	5011.0
7	56	4844.6	5132.6
8	72	4947.1	5241.3
9	90	5039.9	5339.6
10	110	5124.9	5429.7

Table 26. Super fine rotational levels of $(4935.2\text{ MeV})^{0}$: Neutral mesons connected with Charm and Anti Charm bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 4935.2$ (MeV)	$(I)^{1/12} * 4935.2$ (MeV)
1	2	4935.2	5228.6
2	6	5408.3	5729.9
3	12	5729.9	6070.6
4	20	5979.1	6334.6
5	30	6184.6	6552.3
6	42	6360.4	6738.6
7	56	6514.7	6902.1
8	72	6652.6	7048.2
9	90	6777.5	7180.5
10	110	6891.8	7301.6

Table 27. Super fine rotational levels of $(4287.6\text{ MeV})^{-e}$: Charged mesons connected with Bottom and Up bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 4287.6$ (MeV)	$(I)^{1/12} * 4287.6$ (MeV)
1	2	4287.6	4542.6
2	6	4698.7	4978.1
3	12	4978.1	5274.1
4	20	5194.6	5503.5
5	30	5373.1	5692.6
6	42	5525.9	5854.5
7	56	5660.0	5996.5
8	72	5779.8	6123.4
9	90	5888.2	6238.4
10	110	5987.5	6343.6

Table 28. Super fine rotational levels of $(4395.6\ \text{MeV})^0$: Neutral mesons connected with Bottom and Anti Down bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 4395.6$ **(MeV)**	$(I)^{1/12} * 4395.6$ **(MeV)**
1	2	4395.6	4657.0
2	6	4817.1	5103.5
3	12	5103.5	5407.0
4	20	5325.4	5642.1
5	30	5508.4	5836.0
6	42	5665.1	6001.9
7	56	5802.5	6147.6
8	72	5925.3	6277.7
9	90	6036.6	6395.5
10	110	6138.3	6503.4

Table 29. Super fine rotational levels of $(5120.9\ \text{MeV})^0$: Neutral mesons connected with Bottom and Anti Strange bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 5120.9$ **(MeV)**	$(I)^{1/12} * 5120.9$ **(MeV)**
1	2	5120.9	5425.4
2	6	5611.9	5945.6
3	12	5945.6	6299.1
4	20	6204.2	6573.1
5	30	6417.4	6799.0
6	42	6599.9	6992.3
7	56	6760.0	7162.0
8	72	6903.1	7313.5
9	90	7032.6	7450.8
10	110	7151.2	7576.4

Table 30. Super fine rotational levels of $(6386.2\ \text{MeV})^{-e}$: Charged mesons connected with Bottom and Charm bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 6386.2$ **(MeV)**	$(I)^{1/12} * 6386.2$ **(MeV)**
1	2	6386.2	6765.9
2	6	6998.4	7414.6
3	12	7414.6	7855.5
4	20	7737.0	8197.1
5	30	8002.9	8478.8
6	42	8230.5	8719.9
7	56	8430.2	8931.5
8	72	8608.6	9120.5
9	90	8770.2	9291.7
10	110	8918.1	9448.4

Table 31. Super fine rotational levels of $(7837.2\ \text{MeV})^0$: Neutral mesons connected with Bottom and Anti Bottom bluons

n	$I = n(n+1)$	$(I/2)^{1/12} * 7837.2$ (MeV)	$(I)^{1/12} * 7837.2$ (MeV)
1	2	7837.2	8303.2
2	6	8588.6	9099.3
3	12	9099.3	9640.3
4	20	9495.0	10059.6
5	30	9821.3	10405.3
6	42	10100.5	10701.2
7	56	10345.6	10960.8
8	72	10564.6	11192.8
9	90	10762.9	11402.8
10	110	10944.4	11595.1
11	132	11111.9	11772.7
12	156	11267.7	11937.7
13	182	11413.4	12092.0
14	210	11550.3	12237.1
15	240	11679.5	12374.0

17. CONCLUSIONS

With further study, research and confirming the existence of the proposed $\left(M_{wf}c^2\right)^{\pm} \cong 584.725\ \text{GeV}$, or confirming the existence of its corresponding SUSY boson, $\left(M_{wb}c^2\right)^{\pm} \cong \frac{\left(M_{wf}c^2\right)^{\pm}}{\Psi} \cong 257.59\ \text{GeV}$, actual essence of final unification can be understood. Even though it is very intuitive, as current status of SUSY is unclear and doubtful, we emphasize the point that, by correlating the currently believed baryons and mesons with the proposed scheme of hadronic SUSY, further research can be carried out.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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