Avogadro number - the 11 dimensions alternative

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Abstract

It is very clear that, to unify 2 interactions if 5 dimensions are required, for unifying 4 interactions 10 dimensions are required. For 3+1 dimensions if there exists 4 (observed) interactions, for 10 dimensions there may exist 10 (observable) interactions. To unify 10 interactions 20 dimensions are required. From this idea it can be suggested that- with 'n' new dimensions 'unification' problem can not be resolved. By implementing the gravitational constant in atomic and nuclear physics, independent of the CGS and SI units, Avogadro number can be obtained very easily and its order of magnitude is $\cong N \cong 6 \times 10^{23}$ but not 6×10^{26}. If M_P is the Planck mass and m_e is the rest mass of electron, semi empirically it is observed that, $M_g \cong N^{\frac{2}{3}} \cdot \sqrt{M_P m_e} \cong 1.0044118 \times 10^{-3}\ Kg$. If m_p is the rest mass of proton it is noticed that $\ln \sqrt{\frac{e^2}{4\pi\varepsilon_0 G m_P^2}} \cong \sqrt{\frac{m_p}{m_e} - \ln\left(N^2\right)}$. Key conceptual link that connects the gravitational force and non-gravitational forces is - the classical force limit $\left(\frac{c^4}{G}\right)$. For mole number of particles, if strength of gravity is $(N.G)$, any one particle's weak force magnitude is $F_W \cong \frac{1}{N} \cdot \left(\frac{c^4}{N.G}\right) \cong \frac{c^4}{N^2 G}$. Ratio of 'classical force limit' and 'weak force magnitude' is N^2. Assumed relation for strong force and weak force magnitudes is $\sqrt{\frac{F_S}{F_W}} \cong 2\pi \ln\left(N^2\right)$. From SUSY point of view, 'integral charge quark fermion' and 'integral charge quark boson' mass ratio is $\Psi = 2.262218404$ but not unity. With these advanced concepts an "alternative" to the 'standard model' can be developed.

Keywords: Avogadro number; classical gravitational constant; atomic gravitational constant; strong nuclear gravity; super atomic gravity;

1 Introduction

It is very clear that, to unify 2 interactions if 5 dimensions are required, for unifying 4 interactions 10 dimensions are required. For 3+1 dimensions if there exists 4 (observed) interactions, for 10 dimensions there may exist 10 (observable) interactions. To unify 10 interactions 20 dimensions are required. From this idea it can be suggested that- with 'n' new dimensions 'unification' problem can not be resolved. In his large number hypothesis P. A. M. Dirac [1,2] compared the ratio of characteristic size of the universe and classical radius of electron with the electromagnetic and gravitational force ratio of electron and proton. If the cosmic closure density is, $\rho_0 \cong \frac{3H_0^2}{8\pi G}$, number of nucleons in a Euclidean sphere of radius $\left(\frac{c}{H_0}\right)$ is equal to $\frac{c}{H_0} \div \frac{2Gm_n}{c^2}$. It can be suggested that coincidence of large number ratios reflects an intrinsic property of nature.

It can be supposed that elementary particles construction is much more fundamental than the black hole's construction. If one wishes to unify electroweak, strong and gravitational interactions it is a must to implement the classical gravitational constant G in the sub atomic physics [3-6]. By any reason if one implements the planck scale in elementary particle physics and nuclear physics automatically G comes into subatomic physics. Then a large 'arbitrary number' has to be considered as a proportionality constant. With this large arbitrary number it is be possible to understand the mystery of the strong interaction and strength of gravitation. The basic and important problem is : How to select the 'arbitrary number' ? For this purpose 'mole' concept can be considered as a fundamental tool [7-11]. The combination of Avogadro number and the classical gravitational constant generates the 'effective' 'atomic or strong' gravitational constant.

1.1 Key concept in unification

Either in SI system of units or in CGS system of units, value of the order of magnitude of Avogadro number $\cong N \cong 6 \times 10^{23}$ but not 6×10^{26}. The key conceptual link that connects the gravitational and non-gravitational forces is - the classical force limit $\left(\frac{c^4}{G}\right)$. Seshavatharam [12] discussed about the vital role of the classical force limit in Black hole and Planck scale physics. For mole number of particles, if strength of gravity is $(N.G)$, any one particle's weak force magnitude is $F_W \cong \frac{1}{N} \cdot \left(\frac{c^4}{N.G}\right) \cong \frac{c^4}{N^2 G} \cong 3.33715 \times 10^{-4}$ newton. Ratio of 'classical force limit' and 'weak force magnitude' is N^2. If $\left(\frac{c^4}{G}\right)$ is the 'limit of classical force', in a grand unified scheme $\frac{c^4}{N^2 G}$ can be defined as the 'characteristic weak force magnitude' and $E_W \cong \sqrt{\frac{e^2}{4\pi\varepsilon_0} \cdot \frac{c^4}{N^2 G}} \cong 1.731843735 \times 10^{-3}$ MeV can be defined as the 'characteristic weak energy constant'. This can be considered as the beginning of 'Super atomic gravity' or 'strong nuclear gravity' [13-17] . Authors proposed interesting concepts in this new direction [18-25].

2 History and current status of the Avogadro number

History: Avogadro's number, N is the fundamental physical constant that links the macroscopic physical world of objects that we can see and feel with the submicroscopic, invisible world of atoms. In theory, N specifies the exact number of atoms in a palm-sized specimen of a physical element such as carbon or silicon. The name honours the famous Italian mathematical physicist Amedeo Avogadro (1776-1856), who proposed that equal volumes of all gases at the same temperature and pressure contain the same number of molecules. Long after Avogadro's death, the concept of the mole was introduced, and it was experimentally observed that one mole (the molecular weight in grams) of any substance contains the same number of molecules. Today, Avogadro's number is formally defined to be the number of carbon-12 atoms in 12 grams of unbound carbon-12 in its rest-energy electronic state [7-11]. The current state of the art estimates the value of N, not based on experiments using carbon-12, but by using x-ray diffraction in crystal silicon lattices in the shape of a sphere or by a watt-balance method. According to the National Institute of Standards and Technology (NIST), the current accepted value for $N \cong (6.0221415 \pm 0.0000010) \times 10^{23}$. CODATA Recommended value is $N \cong 6.02214179(30) \times 10^{23}$.**This definition of N and the current experiments to estimate it, however, both rely on the precise definition of a gram**.

Current status: *The situation is very strange and sensitive. Now this is the time to think about the significance of 'Avogadro number' in a unified approach [18-25]. It couples the gravitational and non-gravitational interactions. It is observed that, either in SI system of units or in CGS system of units, value of the order of magnitude of Avogadro number* $\cong N \cong 6 \times 10^{23}$ *but not* 6×10^{26}. *But the most surprising thing is that, without implementing the classical gravitational constant in atomic or nuclear physics this fact cannot understood. It is also true that till today no unified model (String theory or Supergravity) successfully implemented the gravitational constant in the atomic or nuclear physics.* Really this is a challenge to the modern nuclear physics and astrophysics.

2.1 Mystery of the gram mole

If $M_P \cong \sqrt{\frac{\hbar c}{G}}$ is the Planck mass and m_e is the rest mass of electron, semi empirically it is observed that,

$$M_g \cong N^{-\frac{1}{3}} \cdot \sqrt{(N \cdot M_P)(N \cdot m_e)} \cong 1.0044118 \times 10^{-3}\ Kg \tag{1}$$

$$M_g \cong N^{\frac{2}{3}} \cdot \sqrt{M_P m_e} \tag{2}$$

Here M_g is just crossing the mass of one gram. If m_p is the rest mass of proton,

$$\frac{M_g}{m_p} \cong N \cong 6.003258583 \times 10^{23} \tag{3}$$

$$\frac{\sqrt{M_P m_e}}{m_p} \cong N^{\frac{1}{3}} \tag{4}$$

More accurate empirical relation is

$$\frac{\sqrt{M_P m_e}}{\frac{m_p c^2 + m_n c^2 - B_a}{2} + m_e c^2} \cong N^{\frac{1}{3}} \tag{5}$$

where m_n is the rest mass of neutron, and $B_a \cong 8$ MeV is the mean binding eneregy of nucleon. Obtained value of $N \cong 6.020215677 \times 10^{23}$.

2.2 Squared Avogadro number in unification

In SI system of units why gram mole is being used? This fundamental question can be answered if it is assumed that there exists a limit for the quantum mechanical atomic mass. The definition of 'quantum mechanical atomic mass' can be given as- it is the upper limit for the mass of an elementary particle or mass of a microscopic system or mass of an atom where in the existing quantum mechanical and atomic laws can be applied. If mass of the system crosses the limit, quantum mechanics and atomic structure transforms to classical physical laws. Quantitatively the assumed mass limit can be obtained in the following way.

$$G_A m_p^2 \cong G_C M_g^2 \tag{6}$$

$$\left(\frac{M_g}{m_p}\right)^2 \cong N^2 \cong \frac{G_A}{G_C} \tag{7}$$

where $m_p =$ operating mass unit in atomic physics $\cong$ mass of proton, $M_g =$ operating mass unit in classical physics, G_A is the atomic gravitational constant and G_C the classical gravitational constant.

Hence $M_g \cong N \times m_p \cong 1.0072466 \times 10^{-3}\ Kg \cong 1.0072466$ gram. In this way gram mole can be understood. Clearly speaking Avogadro number is the square root of ratio of atomic gravitational constant G_A and the classical gravitational constant G_C. Magnitude of $G_A \cong N^2 G_C = 2.420509614 \times 10^{37}\ m^3 kg^{-1} sec^{-2}$. Semi empirically it is also noticed that

$$\ln \sqrt{\frac{e^2}{4\pi\varepsilon_0 G_C m_P^2}} \cong \sqrt{\frac{m_p}{m_e} - \ln(N^2)} \tag{8}$$

where m_p is the proton rest mass and m_e is the electron rest mass. From this expression

$$G_C \cong \left(e^{\sqrt{\frac{m_p}{m_e}} - \ln(N^2)}\right)^{-2} \cdot \frac{e^2}{4\pi\varepsilon_0 m_P^2} \cong 6.666270179 \times 10^{-11} \text{ m}^3\text{Kg}^{-1}\text{sec}^{-2}. \tag{9}$$

These are very simple and strange observations. But their interpretation seems to be a big puzzle in fundamental physics. From nuclear physics point of view, minimum scattering distance between electron and the nucleus or the characteristic nuclear charge radius is [26]

$$R_0 \cong N^2 \left(\frac{\hbar c}{G_A m_e^2}\right)^2 \frac{2G_C m_e}{c^2} \cong \frac{2\hbar^2}{G_A m_e^3} \cong 1.215650083 \text{ fermi} \tag{10}$$

Here m_e is the rest mass of electron and $\frac{2G_C m_e}{c^2}$ is nothing but the classical black hole radius of electron.

$$N \cong \sqrt{\frac{2\hbar^2}{G_C m_e^3 R_0}} \tag{11}$$

If Avogadro number is known, value of G_C can be directly estimated from the atomic physical constants accurately.

$$G_C \cong \frac{2\hbar^2}{N^2 m_e^3 R_0} \tag{12}$$

Accuracy depends only on the value of R_0. But till today its origin is a mystery. In all of the above semi empirical relations, either in SI system of units or in CGS system of units, value of the order of magnitude of N is close to 6×10^{23} but not 6×10^{26}. Here the important question is: What is the role of squared Avogadro number in grand unified physics? In the foregoing sections it is discussed with many interesting results.

2.3 To fit the gravitational constant with atomic constants

It is well established that, in β decay, neutron emits an electron and transforms to proton. Thus the nuclear charge changes and the nucleus gets stability. From the semi empirical mass formula it is established that,

$$Z \cong \frac{A}{2 + (E_c/2E_a)\, A^{2/3}}. \tag{13}$$

where Z = number of protons of the stable nucleus and A =number of nucleons in the stable nucleus. E_a and E_c are the asymmetry and coulombic energy constants. Semi empirically it is noticed that,

$$A_S \cong 2Z + \frac{Z^2}{S_f} \cong 2Z + \frac{Z^2}{157.069} \tag{14}$$

Here S_f is a new number and can be called as the nuclear stability factor and A_S is stable mass number. With reference to the ratio of neutron and electron rest masses, S_f can be expressed as

$$S_f \cong \sqrt{\alpha} \cdot \frac{m_n}{m_e} \cong 157.0687113 \tag{15}$$

Here α is the fine structure ratio. If Z= 21, A_S = 44.8, Z= 29, A_S = 63.35, Z=47, A_S = 108.06, Z=79, A_S = 197.73 and Z=92, A_S = 237.88. By considering A as the fundamental input its corresponding stable Z = Z_S takes the following form.

$$Z_S \cong \left[\sqrt{\frac{A}{157.069} + 1} - 1\right] 157.069 \tag{16}$$

Thus Green's stability formula in terms of Z takes the following form.

$$\frac{0.4A^2}{A + 200} \cong A_S - 2Z \cong \frac{Z^2}{S_f}. \tag{17}$$

Surprisingly it is noticed that this number S_f plays a crucial role in fitting the nucleons rest mass. Another interesting observation is that

$$(m_n - m_p)\, c^2 \cong \ln\left(\sqrt{S_f}\right) m_e c^2 \cong 1.29198 \text{ MeV} \tag{18}$$

Here m$_n$, m$_p$ and m$_e$ are the rest masses of neutron, proton and electron respectively. Semi empirically it is noticed that

$$\frac{E_c}{2E_a} \cdot \frac{e^{S_f}}{N} \cong \frac{e^2}{4\pi\varepsilon_0 G_C m_e^2} \tag{19}$$

Electron rest mass can be expressed as

$$m_e \cong \sqrt{\frac{2E_a}{E_c} \cdot \frac{N}{e^{S_f}}} \cdot \sqrt{\frac{e^2}{4\pi\varepsilon_0 G_C}} \tag{20}$$

Here N is the Avogadro number. $\frac{e^2}{4\pi\varepsilon_0 G_C m_e^2}$ is the electromagnetic and gravitational force ratio of electron. In this proposal the important questions are: What is the role of Avogadro number in β decay ? and How to interpret the expression $\sqrt{\frac{e^2}{4\pi\varepsilon_0 G_C}}$? This is a multi-purpose expression. Either the value of Avogadro number or the value of gravitational constant can be fitted. From the semi empirical mass formula if E$_a$= 23.21 MeV and E$_c$= 0.71 MeV,

$$G \cong \frac{2E_a}{E_c} \cdot \frac{N}{e^{S_f}} \cdot \frac{e^2}{4\pi\varepsilon_0 m_e^2} \cong 6.6866323 \times 10^{-11} \ \ \text{m}^3\text{Kg}^{-1}\text{sec}^{-2} \tag{21}$$

Since all other atomic constants are well measured, accuracy of G only depends upon E$_a$ and E$_c$ of the semi empirical mass formula. Multiplying and dividing RHS of equation (20) by N

$$m_e c^2 \cong \sqrt{\frac{2E_a}{E_c} \cdot \frac{N^3}{e^{S_f}}} \cdot \sqrt{\frac{e^2}{4\pi\varepsilon_0} \cdot \frac{c^4}{N^2 G}} \cong X_E \cdot \sqrt{\frac{e^2}{4\pi\varepsilon_0} \cdot \frac{c^4}{N^2 G_C}} \tag{22}$$

where $X_E \cong \sqrt{\frac{2E_a}{E_c} \cdot \frac{N^3}{e^{S_f}}}$ can be called as the 'gravitational mass generator' of electron.

2.4 The characteristic atomic 'planck mass', 'coulomb mass' and the dark matter

With reference to the above relations it is possible to define two new mass units as

$$m_X \cong \sqrt{\frac{e^2}{4\pi\epsilon_0 \left(N^2 G_C\right)}} \cong 3.087291597 \times 10^{-33}\ Kg \tag{23}$$

$$m_X c^2 \cong \sqrt{\frac{e^2 c^4}{4\pi\epsilon_0 \left(N^2 G_C\right)}} \cong \sqrt{\frac{e^2}{4\pi\epsilon_0}\left(\frac{c^4}{G_A}\right)} \cong 1.731843735\ KeV \tag{24}$$

Similar to the Planck mass, 'Atomic planck mass' can be represented as

$$m_P \cong \sqrt{\frac{\hbar c}{\left(N^2 G_C\right)}} \cong 3.614056909 \times 10^{-32}\ Kg. \tag{25}$$

$$m_P c^2 \cong \sqrt{\frac{\hbar c^5}{\left(N^2 G_C\right)}} \cong \sqrt{\hbar c\left(\frac{c^4}{G_A}\right)} \cong 20.27337431\ KeV \tag{26}$$

Conceptually these two mass units can be compared with the characteristic building block of the 'charged' or 'neutral' dark matter [27]. Note that either in cosmology or particle physics till today there is no clear cut mechanism for understanding the massive origin of the dark matter. Its existence changes the fate of 'modern'

n	Obtained Lepton mass, MeV	Exp. Lepton Mass, MeV
0	Defined	0.510998922
1	105.951	105.658369
2	1777.384	1776.84 ±0.17
3	42262.415	to be discovered

Tab. 1: Fitting of charged lepton rest masses.

thoughts in cosmology and particle physics. In this critical situation proposed ideas can be given a chance. 1.732 KeV is very close the (neutral) neutrino mass. The fundamental question to be answered is: 1.732 KeV is a potential or a charged massive particle? If it is a particle its pair annihilation leads to radiation energy. If it is the base particle in elementary particle physics - observed particle rest masses can be fitted. Authors humble opinion is: it can be considered as the basic charged lepton or lepton potential. It can also be considered as the basic charged 'dark matter' candidate.

2.5 To fit the Muon and Tau rest masses

Let us define a new number X_E as

$$X_E \cong \sqrt{\frac{4\pi\epsilon_0 G_A m_e^2}{e^2}} \cong 295.0606338 \tag{27}$$

It can be called as the lepton-quark-nucleon gravitational mass generator. With trial-error method, empirically it is noticed that, $X_E \cong e^1\,(x-1) + \frac{1}{\sqrt{x-\sqrt{x}}} \cong 295.0606991$ where $x = \ln\left(N^2\right)$. It plays a very interesting role in nuclear and particle physics. **Weak coupling angle** can be defined as

$$\sin\theta_W \cong \frac{1}{\alpha X_E} \cong 0.464433353 \tag{28}$$

Using $X_E = 295.0606338$, charged muon and tau masses [28] can be fitted as

$$m_l c^2 \cong \left[X_E^3 + \left(n^2 X_E\right)^n \sqrt{N}\right]^{\frac{1}{3}} \sqrt{\frac{e^2c^4}{4\pi\epsilon_0 G_A}} \cong \frac{2}{3}\left[E_c^3 + \left(n^2 X_E\right)^n E_a^3\right]^{\frac{1}{3}} \tag{29}$$

Here n= 0,1, 2. E_c and E_a are the coulombic and asymmetric energy constants of the semi empirical mass formula [29,30]. Qualitatively this expression is connected with β decay. See the above table-1. Obtained data can be compared with the PDG recommended charged lepton masses. If electron mass is fitting at n = 0, muon mass is fitting at n = 1 and tau mass is fitting at n = 2 it is quite reasonable and natural to predict a new heavy charged lepton at n = 3. By selecting the proper quantum mechanical rules if one is able to confirm the existence of the number n = 3, existence of the new lepton can be understood. **At n=3 there may exist a heavy charged lepton at 42262 MeV**.

2.6 Hydrogen atom, nuclear stability, strong coupling constant and binding energy constants

In Super atomic gravity,

1. Giving importance to the phenomena of β -decay, rest mass-energy of electron can be expressed as $m_e c^2 \cong \frac{1}{\alpha^2} \times \frac{E_c}{2E_a} \times \sqrt{\frac{e^2 F_W}{4\pi\epsilon_0}} \cong X_E \times \sqrt{\frac{e^2 F_W}{4\pi\epsilon_0}}$.

2. If a_0 is the Bohr radius, in Hydrogen atom force on electron is $\frac{e^2}{4\pi\epsilon_0 a_0^2} \cong \left(X_E\alpha^2\right)^2 \frac{c^4}{G_A} \cong \left(X_E\alpha^2\right)^2 F_W$. If F_E is the electromagnetic force on electron, square root of ratio of electromagnetic force and weak force is $\sqrt{\frac{F_E}{F_W}} \cong \frac{E_c}{2E_a} \cong X_E\alpha^2 \cong 0.015712378$.

3. The proton-nucleon nuclear stability factor is $S_f \cong X_E - \frac{1}{\alpha} - 1 \cong 157.0246441$. Proton and nucleon stability relation can be expressed as, stable mass number $= A_S \cong 2Z + \frac{Z^2}{S_f}$ where Z is the proton number.

4. $X_S \cong \ln\left(X_E^2\sqrt{\alpha}\right) \cong 8.91424 \cong \frac{1}{\alpha_s}$ can be considered as 'inverse of the strong coupling constant'. Thus $X_S \cong \ln\left(X_E\right) + \ln\sqrt{\frac{G_A m_e^2}{\hbar c}} \cong \frac{1}{\alpha_s}$. It can also be expressed as $X_S \cong \frac{1}{\alpha_s} \cong 1 + \sqrt{\frac{1}{X_E \alpha^2} - 1} \cong 8.91480183$.

5. With reference to proton rest energy, semi empirical mass formula coulombic energy constant can be expressed as $E_c \cong \frac{\alpha}{X_S} \cdot m_p c^2 \cong \alpha \cdot \alpha_s \cdot m_p c^2 \cong 0.7681\ MeV$.

6. Pairing energy constant is close to $E_p \cong \frac{m_p c^2 + m_n c^2}{S_f} \cong 11.959\ \mathrm{Me}V$ and asymmetry energy constant can be expressed as $E_a \cong 2E_p \cong 23.918\ \mathrm{Me}V$.

7. Volume and surface energy constants and asymmetric and pairing energy constants can be co-related as $E_a - E_v \cong E_s - E_p \cong \left(X_S + 1\right) E_c \cong 7.615$ MeV. $E_v + E_s \cong\ E_a + E_p \cong 3E_p$. Thus $E_v \cong 16.303$ MeV and $E_s \cong 19.574$ MeV.

8. It is also noticed that, $\frac{E_a}{E_v} \cong 1 + \sin\theta_W$ and $\frac{E_a}{E_s} \cong 1 + \sin^2\theta_W$. Thus $E_v \cong 16.332$ MeV and $E_s \cong 19.674$ MeV.

9. Nuclear binding energy can be fitted with 2 terms or 5 factors with $E_c \cong 0.7681$ MeV as the single energy constant. First term can be expressed as $= T_1 \cong (f)\left(A+1\right)\ln\left[\left(A+1\right)X_S\right]E_c$, second term $= T_2 \cong \left[\frac{A^2 + \left(f.Z^2\right)}{X_S^2}\right] E_c$ where $f \cong 1 + \frac{2Z}{A_S} \cong \frac{4S_f + Z}{2S_f + Z} < 2$ and $A_S \cong 2Z + \frac{Z^2}{S_f} \cong 2Z + \frac{Z^2}{157.025}$. Close to the stable mass number, binding energy $= T_1 - T_2$.

2.7 Strong nuclear force and its applications

Assumed relation for strong force and weak force magnitudes is

$$\sqrt{\frac{F_S}{F_W}} \cong 2\pi \ln\left(N^2\right) \tag{30}$$

Thus $F_S \cong 157.9944058$ newton. Its applications can be given in the following way.

1. Characteristic nuclear size is $R_0 \cong \sqrt{\frac{e^2}{4\pi\varepsilon_0 F_S}} \cong 1.208398568$ fm.

2. Nuclear strong energy constant is $E_S \cong \sqrt{\frac{e^2 F_S}{4\pi\varepsilon_0}} \cong 1.191630355$ MeV and nuclear coulombic energy constant is $E_c \cong \frac{3}{5}E_S \cong 0.715$ MeV.

3. Proton rest mass is $m_p c^2 \cong \left(\frac{F_S}{F_W} + X_E^2 - \frac{1}{\alpha^2}\right) E_W \cong 938.1791391$ MeV. Neutron, proton mass difference is $m_n c^2 - m_p c^2 \cong \sqrt{\frac{F_S}{F_W} + X_E^2} \cdot E_W \cong 1.29657348$ MeV.

4. Magnetic moment of electron is $\mu_B \cong \frac{ec}{2}\sqrt{\frac{e^2}{4\pi\varepsilon_0 F_W}} \sin\theta_W$ and magnetic moment of nucleon is $\mu_n \cong \frac{ec}{2}\sqrt{\frac{e^2}{4\pi\varepsilon_0 F_S}} \sin\theta_W \cong \frac{ecR_0}{2}\sin\theta_W$ where R_0 is unit nuclear size or nucleon size.

5. Strong coupling constant can be expressed as $X_S \cong \frac{1}{\alpha_s} \cong \ln\left(\frac{F_S}{F_W}\sqrt{\frac{F_E}{F_W}}\right) \cong 8.914476$.

6. Up quark and electron mass ratio can be expressed as $\frac{Uc^2}{m_e c^2} \cong \ln\sqrt{\frac{F_S}{\sqrt{F_W F_E}}} \cong e^{\alpha X_E}$.

7. Fine structure ratio is $\frac{1}{\alpha} \cong \frac{1}{2}\sqrt{X_E^2 - \left[\ln\left(N^2\right)\right]^2} \cong 136.9930484$. Or $\frac{1}{\alpha} \cong \frac{1}{2}\sqrt{X_E^2 - \left(\frac{F_S}{4\pi^2 F_W}\right)} \cong 137.036$.

2.8 Is $\sin\theta_W$ an independent and absolute physical constant?

In the published paper [18,24] authors proposed that:

1. Fermion of spin $\frac{1}{2}$ makes 13 jumps in one revolution and comes to the initial position and boson of spin 1 makes 6 jumps in each incomplete revolution and comes to its starting position in 13 revolutions.

2. With reference to fermion's assumed 13 jumps in one revolution, angle of jump can be obtained as

$$\text{angle of jump} \cong \theta_{\mathrm{j}} \cong \frac{360^0}{13} \cong 27.69230769^0 \tag{31}$$

   Thus farmions characteristic angle of jump is $27.69230769^0 \cong 0.483321946$ rad $\cong \frac{1}{2}$ rad and boson's characteristic angle of jump is $2 \times 27.69230769^0 \cong 55.384615386^0 \cong 0.966643893$ rad $\cong 1$ rad. It can be suggested that, spin $\frac{1}{2}$ means $\cong \frac{1}{2}$ rad and spin 1 means $\cong 1$ rad.

3. Fermion and boson mass conversion factor Ψ is assumed as

$$\Psi \cong \ln\left(6+\sqrt{13}\right) \cong 2.262341189 \tag{32}$$

4. If m_f represents the mass of fermion and m_b represents the mass of corresponding SUSY boson, then it is assumed that,

$$\frac{m_f}{m_b} \cong \Psi \cong 2.262341189 \tag{33}$$

   Interesting thing is that $\left(1-\frac{1}{\Psi}\right) m_f$ acts as the effective fermion.

5. If $\sin\theta_j \cong 0.464723172$ semiempirically it is noticed that,

$$\Psi^2 \ln\left(1+\sin^2\theta_j\right) \cong 1 \;\text{ and }\; \Psi \cong 2.261424102. \tag{34}$$

6. From electro weak physics point of view, $\sin\theta_j$ can be compared with the famous weak coupling angle $\sin\theta_W$.

7. If $\sin\theta_j$ is having an indepedent and absolute existence in unification program, the reduced Planck's constant can be expressed as

$$\hbar \cong \sqrt{\left(\frac{e^2}{4\pi\varepsilon_0 c}\right)\cdot\left(\frac{G_A m_e^2}{c}\right)}\sin\theta_j \cong \sqrt{\left(\frac{e^2}{4\pi\varepsilon_0 c}\right)\cdot\left(\frac{G_A m_e^2}{c}\right)}\sin\theta_W \tag{35}$$

   where $G_A \cong N^2 G_C$. In terms of Avogadro number and the classical gravitational constant,

$$\hbar \cong N\sqrt{\left(\frac{e^2}{4\pi\varepsilon_0 c}\right)\cdot\left(\frac{G_C m_e^2}{c}\right)}\sin\theta_W \tag{36}$$

   This may be a coincidence also. If it is really true, this may be considered as the beginning of unified quantum mechanics. From the quantum nature of elementary charge, quantum nature of $\hbar$ can be understood.

8. Clearly speaking $\hbar$ is the angular momentum of electron per one radian. If electron revolves round the nucleus with an angle of jump of θ_j, the characteristic angular momentum is $\left(\frac{\theta_j}{360}\cdot 2\pi\right)\cdot\hbar \cong 0.482994665\cdot\hbar \cong \frac{1}{2}\hbar$. In this way 'spin' of electron can be unsderstood. Not only that, during this jump, measuring its position or velocity is also not possible. Thus it leads to the concept of famous 'uncertainity relation'.

2.9 New 105.323 MeV fermion, Fermion-boson mass ratio $\cong (\Psi)$, $(\hbar)$ and the Fermi's weak coupling constant (G_F)

1. For any one elementary particle of mass m_0, magnitude of gravitational constant is $\mathrm{G_C}$ only. As the number of particles increases to Avogadro number (N), magnitude of gravitational constant approaches $N.G_C$. Mass of the system approaches to $N.m_0$. Based on strong gravity, similar to the 'Schwarzschild radius', size of the system can be expressed as $R_N \cong \frac{2(NG_C)(Nm_0)}{c^2}$. Volume of one particle can be expressed as total volume divided by Avogadro number $= \frac{4\pi}{3N} R_N^3$.

2. If nuclear charge radius or characteristic size of nucleus is $R_0 \approx 1.20$ fm, its volume $V_0 \cong \frac{4\pi}{3} R_0^3$ and total volume of N nucleons is $V_N \cong N \cdot \frac{4\pi}{3} R_0^3$. Thus size of N nucleons is $R_N \cong N^{\frac{1}{3}} R_0 \cong \frac{2(NG)(Nm_0)}{c^2}$. Then rest energy of nucleon comes out to be $\mathrm{m_0c^2} \approx 105\ MeV$. This is not matching with the rest energy of nucleon but matching with the geometric mean of nucleon rest energy and its pairing energy constant, 12 MeV. If α_s is the strong coupling constant, it is noticed that $\frac{1}{\alpha_s}\mathrm{m_0c^2} \approx 939\ MeV$ and $\alpha_s \cdot \mathrm{m_0c^2} \approx 12$ MeV. More over it is noticed that $\mathrm{m_0c^2} \approx 105\ MeV$ is close to "half of the QCD energy scale $\approx 217\ MeV''$. It is also noticed that $\ln \sqrt{\frac{c^4}{N^2 G_C} \div \frac{e^2}{4\pi\varepsilon_o R_N^2}} \cong \frac{1}{\sqrt{\alpha}}$.

3. Very strange and astounding fit is $\sqrt{e^{\frac{m_0}{m_e}}} \times \frac{G_C m_e^2}{c} \cong e^{\frac{m_0}{2m_e}} \times \frac{G_C m_e^2}{c} \cong \hbar$. Here m_e is the rest mass of electron. If so it can be represented as $\frac{m_0}{m_e} \cong \ln\left(\frac{\hbar c}{G_C m_e^2}\right)^2 \cong 206.1113643$, $\mathrm{m_0c^2} \cong 105.3226825\ MeV$.

4. Another fit is $R_0 \cong \left(\frac{m_e}{m_0}\right)^3 \cdot \frac{NG_C\sqrt{(Nm_p)(Nm_e)}}{c^2} \cong \left(\frac{m_e}{m_0}\right)^3 \cdot \left(\frac{N^2 G_C}{c^4}\right) \cdot \sqrt{m_p m_e}\ c^2 \cong 1.2$ fm where m_p is the rest mass of proton.

5. Interesting observation is $\sqrt{\frac{\sqrt{m_p m_e}}{m_0}} \cdot \frac{\hbar}{m_0 c} \cong 0.8543$ fm. This can be compared with the 'rms' radius of proton. Thus it is noticed that, $R_0 \cong \sqrt{\frac{\sqrt{m_p m_e}}{m_0}} \cdot \frac{\sqrt{2}\hbar}{m_0 c} \cong 1.2081$ fm. It can be suggested that, in nuclear electron scattering experiments minimum distance between proton and electron is close to $\sqrt{2}$ times the proton size.

6. There exists a strongly interacting confined fermion of rest energy $M_{Sf}c^2 \cong m_o c^2 \equiv 105.3226825$ MeV. Its boson rest energy can be expressed as $M_{Sb}c^2 \cong \frac{M_{Sf}c^2}{\Psi} \cong 46.6$ MeV where $\Psi \approx 2.26$ is the fermion and boson mass ratio. In particle physics these mass units play a very interesting role. It is noticed that, $\Psi^2 \ln\left(1+\sin^2\theta\right) \cong 1$.

7. Thus it is assumed that $m_e \cong \alpha.\sqrt{M_{Sf}.M_{Sb}} \cong \alpha.\sqrt{M_{Sf}.\left(\frac{M_{Sf}}{\Psi}\right)}$. In this way value of $\Psi \cong 2.262218404$ is fitted. If m_f and m_b are the rest masses of fermion and boson, $m_b \cong \frac{m_f}{\Psi}$. Interesting thing is that $\left(1-\frac{1}{\Psi}\right) m_f$ acts as the effective fermion.

8. Total energy of electron in Hydrogen atom is $\left(\frac{\alpha^2}{2}\right) m_e c^2 \cong G_F\left(\frac{\hbar}{M_{Sf}c}\right)^{-3}$ where G_F is the Fermi's weak coupling constant. Thus $G_F \approx \frac{1}{3}\left(\frac{e^2}{4\pi\varepsilon_o M_{Sf}c^2}\right)^3 M_{Sf}c^2 \cong \frac{1}{2\sqrt{\Psi}}\left(\frac{e^2}{4\pi\varepsilon_0 M_{Sf}c^2}\right)^3 M_{Sf}c^2 \cong 1.43358632 \times 10^{-62}$ Jm^3.

9. Characteristic nuclear fermion rest energy can be expressed as $X_S.M_{Sf}c^2 \cong 938.872$ MeV and its corresponding nuclear boson is $M_{Sb}c^2 \cong \frac{X_S M_{Sf}c^2}{\Psi} \cong \frac{938.8716604}{\Psi} \cong 415.0225543$ MeV. This boson is the mother of presently believed strange mesons like 493, 548, 1020 MeV etc. Here X_S is the assumed 'inverse of the strong coupling constant' $\cong \frac{1}{\alpha_s} \cong \ln\left(X_E^2\sqrt{\alpha}\right) \cong 8.91424$.

10. In the semi empirical mass formula, $E_p \cong \frac{M_{Sf}c^2}{X_S} \cong 11.815$ MeV, $E_a \cong 2E_p \cong 23.63$ MeV, $\frac{E_c}{2E_a} \cong X_E\alpha^2$ $\cong 0.015712378$ and $E_c \cong 0.7426$ MeV, and $(E_v, E_s) \cong \left(\frac{E_a+E_p}{2}\right) \mp (\alpha X_E)\cdot E_c \cong (16.124, 19.32)$ MeV.

11. Strong coupling constant can be expressed as $X_S \cong \frac{1}{\alpha_s} \cong \ln\sqrt{\frac{2G_A M_{Sf}}{c^2} \div \frac{\hbar}{M_{Sf}c}} \cong 8.902049259$.

3 Quark fermion rest masses and the strong coupling constant (α_s)

In Super atomic gravity, quark (fermion) rest masses can be obtained in the following way.

1. Relation between electron rest mass and up quark rest mass can be expressed as $\frac{Uc^2}{m_ec^2} \cong \left[\frac{m_e^2c^4}{\hbar cF_W}\right]^{\frac{1}{3}} \cong 8.596650881 \cong e^{\alpha X_E}$. Relation between up quark and down quark rest masses is $\frac{Dc^2}{Uc^2} \cong \ln\left[\frac{Uc^2}{m_ec^2}\right] \cong 2.151372695 \cong \alpha X_E$. Up, strange and bottom quarks are in first geometric series and Down, charm and top quarks are in second geometric series.

2. USB geometric ratio is $g_U \cong \left[\frac{D}{U}\cdot\frac{D+U}{D-U}\right]^2 \cong \left[\alpha X_E\cdot\frac{\alpha X_E+1}{\alpha X_E-1}\right]^2 \cong 34.66$ and

   DCT geometric ratio is $g_D \cong \left[2\cdot\frac{D}{U}\cdot\frac{D+U}{D-U}\right]^2 \cong \left[2\cdot\alpha X_E\cdot\frac{\alpha X_E+1}{\alpha X_E-1}\right]^2 \cong 138.64 \cong 4r_U$.

3. Surprisingly it is also noticed that $\frac{1}{\alpha_s} \cong \ln(g_Ug_D) \cong 8.4747 \cong \frac{1}{0.1179598}$.

4. Interesting observation is $\left(\frac{1}{\alpha}+\frac{1}{\alpha_s}\right)\sqrt{UD}\cdot c^2 \cong m_pc^2$ and $\frac{\sqrt{UD}\cdot c^2}{(m_n-m_p)c^2} \cong \ln\left(\frac{1}{\alpha}+\frac{1}{\alpha_s}\right)$ where m_p and m_n are the rest mass of proton and neutron.

3.1 Integral charge Higgs and quark super symmetry in Super atomic gravity

If a charged quark flavour rests in a fermionic container it is a quark fermion. Similarly if a charged quark flavour rests in a bosonic container it is a quark boson. Strong interaction charge contains 'multiple flavours' and can be called as the hybrid (charge) quark. No three quark fermions couples together to form a baryon and no two quark fermions couples together to form a meson. 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.

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. The basic idea is that for each and every quark fermion of mass Q_f there exists a corresponding super symmetric quark boson of mass Q_b. Proposed quark fermion and quark boson mass ratio is $\frac{Q_f}{Q_b} \cong \Psi \cong 2.262218404$. Interesting thing is that $\left(1-\frac{1}{\Psi}\right)Q_f$ acts as the effective quark fermion of mass Q_{ef}. 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 $\pm e$. It is noticed that,

$$\Psi^2 \ln\left(1+\sin^2\theta_W\right) \cong 1 \tag{37}$$

In Super atomic gravity, it is assumed that there exists a Higgs 'charged fermion' of rest energy $M_{Hf}c^2 \cong 103125.417$ MeV. Its corresponding Higgs 'charged boson' rest energy is $M_{Hb}c^2 \cong \frac{M_{Hf}c^2}{\Psi} \cong 45585.97\ MeV$. With reference to Beta decay, if $R_0 \cong 1.2$ fermi, and $F_W \cong \frac{c^4}{G_A}$, it is noticed that

$$\frac{m_ec^2}{F_WR_0} \cong \frac{M_{Hf}}{m_e} \cong \frac{1}{2}\left(\frac{m_e^2c^4}{\hbar cF_W}\right)^2 \tag{38}$$

Higgs charged boson pair generates the electro weak neutral Z boson. Obtained [18,19,21] top quark boson mass is 80523 MeV and its assumed charge is $\pm e$. This is close to the $W^{\pm}$ mass (average with CERN UA2

Quark	Q_f MeV	Q_F MeV	Q_{ef} MeV	Q_E MeV
Up	4.4	**833.973**	2.455	686.571
Down	9.4755	**1076.966**	5.287	886.615
Strange	152.5427	2719.35	85.11	2238.71
Charm	1313.796	5574.13	733.04	4588.92
Bottom	5287.579	8866.525	2950.24	7299.393
Top	182160.18	28850.43	101637.37	23751.20

Tab. 2: Proposed quark fermion family rest energies.

Quark	Q_b MeV	Q_B MeV
Up	1.945	368.65
Down	4.189	476.07
Strange	67.43	1202.07
Charm	580.756	2464.01
Bottom	2337.34	3919.39
Top	**80522.81**	12753.16

Tab. 3: Proposed quark boson and quark meson rest energies.

data) = 80.454 $\pm$ 0.059 GeV. This may be a coincidence or there is some mystery behind the charged weak boson! **Higgs charged boson and W boson couples together to form a neutral boson of rest energy 126 GeV** [31,32]. W boson pair generates a neutral boson of rest energy 161 GeV. Interesting observation is that magnitude of $F_W R_0$ is 2.52 eV and can be compared with the rest energy of neutrino.

With the involvement of 'Higgs fermion', quark fermions convert into **quark baryons** of mass Q_F and effective quark fermions convert into **effective quark baryons** of mass Q_E. Similarly With the involvement of 'Higgs boson', quark bosons convert into **quark mesons** of mass Q_B. **Effective quark baryons** generates charged and unstable multi flavour baryons.'**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'. Please see tables 2 and 3 for the proposed 'quark fermion family' and 'quark boson family' rest energies [19,21].

1. Quark baryon rest energy is $Q_F c^2 \cong \frac{\sin\theta_W}{2}\left[M_{Hf}^2 \times Q_f\right]^{\frac{1}{3}} c^2$ and similarly Quark meson rest energy is $Q_B c^2 \cong \frac{\sin\theta_W}{2}\left[M_{Hb}^2 \times Q_b\right]^{\frac{1}{3}} c^2$. Accuracy point of view $\frac{\sin\theta_W}{2}$ can be replaced with $\frac{1}{2\alpha(X_E+1)}$.

2. Rest energy of nucleon is close to $\left(\frac{2U_F D_F}{U_F+D_F}\right)c^2 \cong 940.02$ MeV and nucleon rest energy difference is close to $(m_n - m_p)\,c^2 \cong \sin^2\theta_W \cdot \left(\frac{2U_f D_f}{U_f+D_f}\right)c^2 \cong 1.29623$ MeV.

3. Effective quark baryon rest energy is $Q_E c^2 \cong \frac{\sin\theta_W}{2}\left[M_{Hf}^2 \times Q_{ef}\right]^{\frac{1}{3}} c^2$. 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.

4. Charged ground state baryon rest energy is close to $(Q_{E1}Q_{E2})^{\frac{1}{2}} c^2$ or $\left(Q_{E1}Q_{E2}^2\right)^{\frac{1}{3}} c^2$ or $(Q_{E1}Q_{E2}Q_{E3})^{\frac{1}{3}} c^2$ where Q_{E1}, Q_{E2}, and Q_{E3} represents any three effective quark baryons.

5. Neutral ground state meson rest energy is close to $(Q_{B1} + Q_{B2})\,c^2$ where Q_{B1} and Q_{B2} represents any two quark mesons.

6. Fine rotational levels of any ground state energy $m_x c^2$ can be expressed as, if n =1,2,3, $\left(mc^2\right)_I \cong [n\,(n+1)]^{\frac{1}{4}}\, m_x c^2$

$\cong [I]^{\frac{1}{4}}\, m_x c^2$ and $\left(mc^2\right)_{I/2} \cong \left[\frac{n(n+1)}{2}\right]^{\frac{1}{4}} m_x c^2 \cong \left[\frac{I}{2}\right]^{\frac{1}{4}} m_x c^2$. Super fine rotational levels are $\left(mc^2\right)_I \cong [n\,(n+1)]^{\frac{1}{12}}\, m_x c^2 \cong [I]^{\frac{1}{12}}\, m_x c^2$ and $\left(mc^2\right)_{I/2} \cong \left[\frac{n(n+1)}{2}\right]^{\frac{1}{12}} m_x c^2 \cong \left[\frac{I}{2}\right]^{\frac{1}{12}} m_x c^2$.

4 Discussion

As of 2011, all GUT models which aim to be completely realistic are quite complicated, even compared to the Standard Model, because they need to introduce additional fields and interactions, or even additional dimensions of space. The main reason for this complexity lies in the difficulty of reproducing the observed fermion masses and mixing angles. Due to this difficulty, and due to the lack of any observed effect of grand unification so far, there is no generally accepted GUT model. Note that in the atomic or nuclear physics, till today no one measured the gravitational force of attraction between the proton and electron and experimentally no one measured the value of the gravitational constant. Physicists say, if strength of strong interaction is unity, with reference to the strong interaction, strength of gravitation is 10^{-39}. The fundamental question to be answered is: is mass an inherent property of any elementary particle?

Unification means : finding the similarities, finding the limiting physical constants, finding the key numbers, coupling the key physical constants, coupling the key physical concepts, coupling the key physical properties, minimizing the number of dimensions, minimizing the number of inputs and implementing the key physical constant or key number in different branches of physics. This is a very lengthy process. In all these cases observations, interpretations, experiments and imagination play a key role. The main difficulty is with interpretations and observations. As the interpretation changes physical concept changes, physical equation changes and finally the destiny changes. Universe is a very big laboratory and its life span is very large. Modern physics is having only and hardly 200 years of strong scientific back ground. Strong motivation, good reasoning, nature friendly concepts, simplicity and applicability are the most favourable and widely accepted qualities of any new model.

As the culmination of his life work, Einstein wished to see a unification of gravity and electromagnetism as aspects of one single force. In modern language he wished to unite electric charge with the gravitational charge (mass) into one single entity. Further, having shown that mass the 'gravitational charge' was connected with space-time curvature, he hoped that the electric charge would likewise be so connected with some other geometrical property of space-time structure. For Einstein the existence, the mass, the charge of the electron and the proton the only elementary particles recognized back in 1920s were arbitrary features. One of the main goals of a unified theory should explain the existence and calculate the properties of matter.

Stephen Hawking - in his famous book - says: It would be very difficult to construct a complete unified theory of everything in the universe all at one go. So instead we have made progress by finding partial theories that describe a limited range of happenings and by neglecting other effects or approximating them by certain numbers. (Chemistry, for example, allows us to calculate the interactions of atoms, without knowing the internal structure of an atomic nucleus.) Ultimately, however, one would hope to find a complete, consistent, unified theory that would include all these partial theories as approximations, and that did not need to be adjusted to fit the facts by picking the values of certain arbitrary numbers in the theory. The quest for such a theory is known as "the unification of physics". Einstein spent most of his later years unsuccessfully searching for a unified theory, but the time was not ripe: there were partial theories for gravity and the electromagnetic force, but very little was known about the nuclear forces. Moreover, Einstein refused to believe in the reality of quantum mechanics, despite the important role he had played in its development.

In strong (nuclear) gravity, the strong or atomic gravitational constant is the supposed physical constant of strong gravitation, involved in the calculation of the gravitational attraction at the level of elementary particles and atoms. The idea of strong gravity originally referred specifically to mathematical approach of Abdus Salam of unification of gravity and quantum chromo-dynamics, but is now often used for any particle level gravity approach. In literature one can refer the works of Abdus Salam, C. Sivaram, Sabbata, A. H. Chamseddine, J. Strathdee, Usha Raut, K. P. Sinha, J. J. Perng, E. Recami, R. L. Oldershaw, K. Tennakone, S. I Fisenko and S. G. Fedosion.

4.1 About the 'Theory of Everything'

The first step in unification is to understand the origin of the rest mass of a charged elementary particle. Second step is to understand the combined effects of its electromagnetic (or charged) and gravitational interactions. Third step is to understand its behaviour with surroundings when it is created. Fourth step is to understand its behaviour with cosmic space-time or other particles. Right from its birth to death, in all these steps the underlying fact is that whether it is a strongly interacting particle or weakly interacting particle, it is having some rest mass. To understand the first 2 steps somehow one must implement the gravitational constant in sub atomic physics.

String theory is an active research framework in particle physics that attempts to reconcile quantum mechanics and general relativity. It is a contender for a theory of everything (TOE), a manner of describing the known fundamental forces and matter in a mathematically complete system. The theory has yet to make novel experimental predictions at accessible energy scales. Many theoretical physicists (e.g., Hawking, Witten, Maldacena and Susskind) believe that string theory is a step toward the correct fundamental description of nature. This is because string theory allows for the consistent combination of quantum field theory and general relativity, agrees with general insights in quantum gravity (such as the holographic principle and Black hole thermodynamics), and because it has passed many non-trivial checks of its internal consistency. According to Stephen Hawking in particular, "M-theory is the only candidate for a complete theory of the universe". Nevertheless, other physicists (e.g. Feynman and Glashow) have criticized string theory for not providing any quantitative experimental predictions. Some common criticisms include:Very high energies needed to test quantum gravity, lack of uniqueness of predictions due to the large number of solutions and lack of background independence.

In theoretical physics, 'Supergravity' is a field theory that combines the principles of supersymmetry and general relativity. Together, these imply that, in supergravity, the supersymmetry is a local symmetry (in contrast to non-gravitational supersymmetric theories, such as the Minimal Supersymmetric Standard Model). Since the generators of supersymmetry (SUSY) are convoluted with the Poincar group to form a Super-Poincare algebra it is very natural to see that supergravity follows naturally from supersymmetry. Historically, then, supergravity has come "full circle". It is a commonly used framework in understanding features of string theories, M-theory and their compactifications to lower spacetime dimensions.

A Theory of Everything would unify all the fundamental interactions of nature: gravitation, strong interaction, weak interaction, and electromagnetism. Because the weak interaction can transform elementary particles from one kind into another, the TOE should also yield a deep understanding of the various different kinds of possible particles. At present, no convincing candidate for a TOE is available. Most particle physicists state that the outcome of the ongoing experiments - the search for new particles at the large particle accelerators and for dark matter - are needed in order to provide theoretical physicists with precise input for a TOE. No argument against the existence of a theory of everything has gained general acceptance. Most physicists expect that experiments and theory will allow to reach a deeper level of understanding and a higher degree of unification in the future. Whether the next, if any, level will be the actual theory of everything, however, is unknown.

5 Conclusion

Estimating the value of Avogadro number and its order of magnitude is a challenging task in classical or unified physics. In this paper authors proposed many interesting relations for estimating the Avogadro number. Not only that, its absolute value was fitted independent of the various system of units. The very interesting thing is that in this new approach, the classical gravitational constant can also be fitted and implemented in atomic and nuclear physics.

Success of any model depends on how the gravitational constant is implemented in atomic, nuclear and particle physics. Now this is the time to think and decide: whether to consider theories of 11 dimensions or models of Avogadro like numbers. Developing a true unified theory at 'one go' is not an easy task. In this critical situation, authors showed many interesting applications in this new direction. Qualitatively proposed semi empirical relations can be given a chance in understanding and developing the unified concepts. This can be considered as the beginning of "**Strong (nuclear) gravity**" or "**Super atomic gravity**".

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