

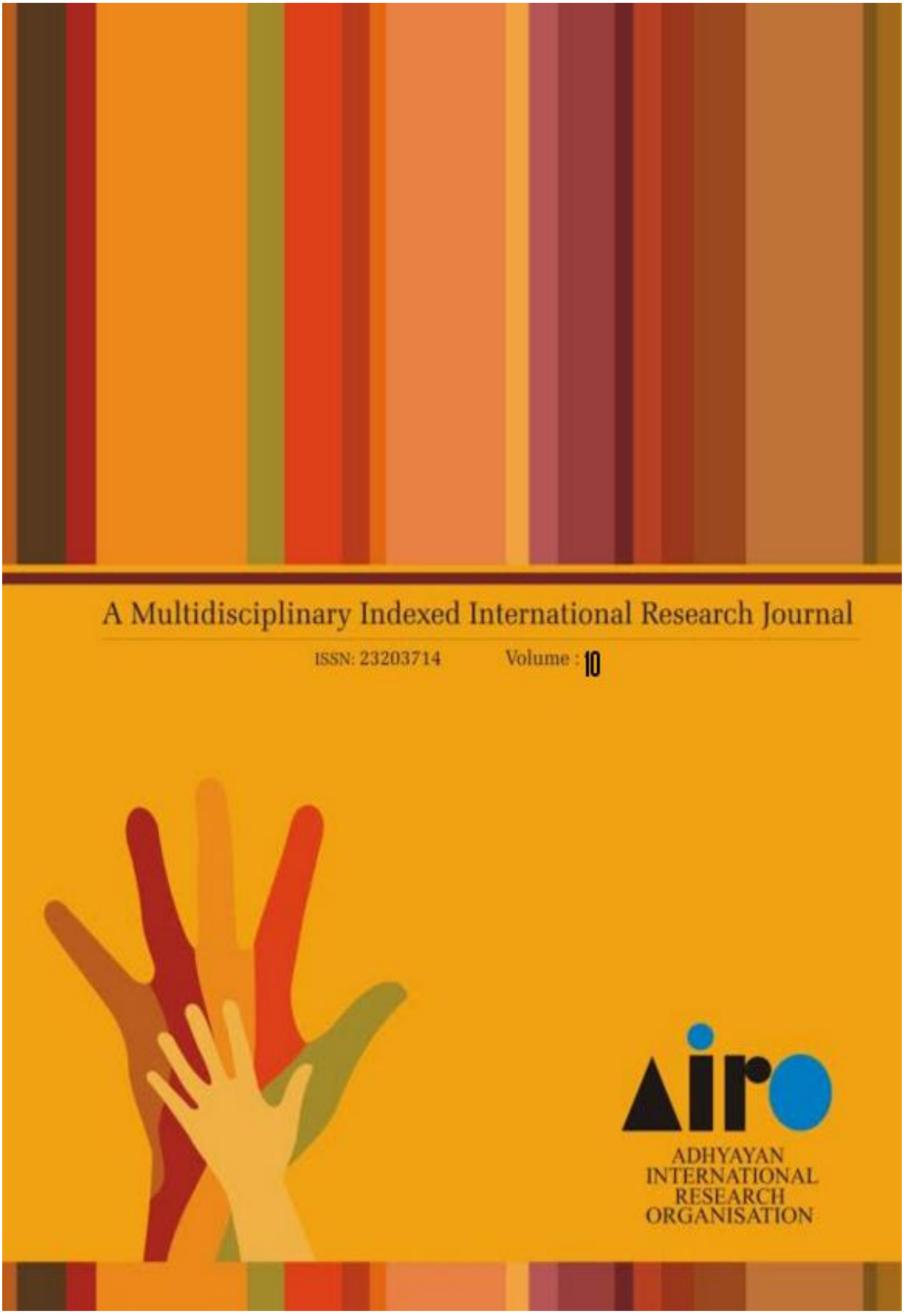
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A STUDY ON QUANTUM THEORY AND ROLE OF AVOGADRO NUMBER

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ABSTRACT

Suppose that 'N' is an Avogadro number then there exists a charged lepton mass unit mL = 3.087292×10^{-33} Kg in such a way that it's electromagnetic and classical gravitational force ratio is N^2. It is assumed that N neutrons convert into ½ N neutrons, ½ N protons and ½ N electrons a simple relation is proposed in between the lepton mass generator X_E strong gravitational constant GS, classical gravitational constant GC and the Avogadro number N.

A simple relation is considered for calculating the mass of strong interaction mass unit $M_{Sf}c^2$ ~ = 105.33255 MeV. From super symmetry showing the proposed value of fermion-boson mass ratio = Ψ = 2.2623411 values of nuclear stability factor S_f and strong interaction mass generator X_S are considered in a unified manner.

Finally, the proposed strongly interacting ferm-ionic mass unit 11450 MeV is fitted within N^2.

Keywords: *Avogadro, Quantum, Constant, Mass*

I. INTRODUCTION

Without considering the classical gravitational constant GC, developing a relation in between charged particle's mass and charge is impossible. Till now, Avogadro number is a mystery. The basic counting unit in chemistry, the mole, has a special name Avogadro's number in honor of the Italian scientist Amadeo Avogadro (1776-1856).

The general definition of Avogadro number is the number of atoms in exactly 12 g of the isotope $^{12}{}_6$C and the quantity itself is 6.02214179(30) × 1023.

An attempt is made to correlate the electron rest mass and its charge by assuming N as a fundamental input in grand unified scheme. It is also observed that h is slipping and there lies the secret of true grand unification. At the end of his life work, Einstein wished to see a unification of gravity and electromagnetism as aspects of one single force. Also, it is wished to unite electric charge with the gravitational charge into one single entity. Further, observing that 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 objectives of a unified theory should explain the existence and calculate the properties of matter. Stephen Hawking - in his book- "A brief history of time" 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 explain a limited range of happenings and by removing other effects or approximating them by certain numbers. Chemistry, for example, permits us to evaluate the interactions of atoms, without knowing the internal structure of an atomic nucleus.

Ultimately, however, one would wish 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 information by selecting 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, there were partial theories for gravity and the electromagnetic force, but a little-bit 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 this paper, lepton mass generator X_E is redefined in a unified approach and is considered that it is more fundamental than the fine structure ratio α. Since X_E is the ratio electron so rest mass is proportional to its charge and inversely proportional to N and √GC. With an uncertain quantum number at n=3, a new heavy charged lepton at 42260 MeV is considered. Considering N, 2N, 3N... moles X_E takes discrete values and it can

be noticed that h is a true unified compound physical constant.

Proportionality constant being X_S if nuclear mass is proportional to integral multiples M_{Sf} ,it can be observed that revolving electron's angular momentum is discrete. From the joint effects of M_{Sf} and (M_{Sf}/Ψ), mystery of $\sqrt{n2} + n$ can be understood. Proton and neutron rest masses are contained to 3 decimal places. It is supposed that $X_E \sin(\theta W) \sim = 1 \alpha$.

II. CHARGE-MASS UNIFICATION

The first step in unification is to know the origin of the rest mass of a charged elementary particle. Second step is to evaluate the combined effects of its electromagnetic and gravitational interactions. Third step is to understand its behavior with surroundings when it is created. Fourth step is to understand its behavior 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. Till now quantitatively or qualitatively either the large number hypothesis or the string theory or the Planck scale is not implemented in particle physics. Unifying gravity with the other three interactions would form a theory of everything (TOE), rather than a GUT.

As of 2009, there is still no hard proof that nature is explained by a Grand Unified Theory. Moreover, since the Higgs particle has not yet been observed, the smaller electroweak unification is still pending. The discovery of neutrino oscillations indicates that the Standard Model is incomplete. The gauge coupling strengths of QCD, the weak interaction and hypercharge seem to meet at a common length scale called the GUT scale and approximately equal to 1016 GeV, which is slightly suggestive. This interesting numerical observation is called the gauge coupling unification and it works particularly well if one assumes the existence of super partners of the Standard Model particles.

III. SUPER SYMMETRY

It is clearly showed that in strong interaction there exists super symmetry with a fermion-boson mass ratio, $\Psi \sim = 2.26$. The word super partner is a portmanteau of the words super symmetry and partner. Super symmetry is one of the synergistic bleeding-edge theories in

current high-energy physics which predicts the existence of these "shadow" particles.

According to the theory, each fermion should have a partner boson, the fermions' super partner and each boson should have a partner fermion. When the more familiar leptons, photons and quarks were produced in the Big Bang, each one was accompanied by a matching sparticle: sleptons, photinos and squarks. This state of affairs occurred at a time when the universe was undergoing a rapid phase change, and theorists believe this state of affairs lasted only some 10^{-35} seconds before the particles we see now "condensed" out and froze into space-time. S particles have not existed naturally since that time. In this case, it is observed that these s particles or super symmetric bosons can be seen at any time in the laboratory. Boson corresponding to nucleon mass is 415 MeV and considering the basic idea of string theory that elementary particle masses are excited states of basic levels, it is clearly shown that 493, 547 and 890 MeV etc strange mesons are the excited states of 415 MeV boson.

IV. PLANCK MASS, NEUTRINO MASS AND AVOGADRO NUMBER

It is observed that ratio of Planck mass and electron mass is 2.389×1022 and is 25.2 times smaller than the Avogadro number. Qualitatively, this idea implements gravitational constant in particle physics. Note that Planck mass is the heaviest mass and neutrino mass is the lightest mass in the known elementary particle mass spectrum. As the mass of neutrino is smaller than the electron mass, ratio of Planck mass and neutrino mass will be close to the Avogadro number or crosses the Avogadro number. Since neutrino is an electrically neutral particle if one is able to assume a charged particle close to neutrino mass it opens a window to understand the combined effects of electromagnetic (or charged) and gravitational interactions in sub atomic physics. Compared to Planck scale (past cosmic high energy scale), Avogadro number is having some physical significance in the (observed or present low energy scale) fundamental physics or chemistry.

V. PROPOSED NEW IDEAS IN RESEARCHES

In the previous studies, researchers collectively proposed the following new ideas.

Strong nuclear gravitational constant can be given as GS = 6.94273×1031 $m^3/kgsec^2$.

- There exists two strongly interacting "confined" Fermi-ionic mass units $M_{Sf}c^2$ = 105.38 MeV and $M_{Gf}c^2$ = 11450 MeV.
- In super symmetry, for strong and weak interactions boson mass is equal to fermion mass/2.26234.
- There exist integral charge quark bosons.
- There exist integral charge quark effective fermions and effective Fermi-gluons.
- No two fermions couples together to form a meson. Only bosons couples together to form a meson. Light quark bosons couples with effective quark Fermi gluons to form doublets and triplets.
- Strong interaction mass generator = X_S = 8.8034856 and it can be considered as the inverse of the strong coupling constant.
- Lepton mass generator = X_E = 294.8183 is a number. It plays a crucial role in particle and nuclear physics.
- In the semi empirical mass formula ratio of "columbic energy coefficient" and the proposed 105.383 MeV is equal to α. The columbic energy constant = E_C = 0.769 MeV.
- The characteristic nucleon's kinetic energy or sum of potential and kinetic energies is close to the rest energy of electron.

VI. MOLE NEUTRONS & RELATION BETWEEN ELECTRON REST MASS AND ITS CHARGE

Assuming that N neutrons transform into ½ N neutrons, ½ N protons and ½ N electrons authors tried to establish a relation in between the electron rest mass and its charge. This idea may be a hypothesis or might have happened in the history of cosmic evolution. For the time being authors request the world science community to consider this idea positively. Assume that out of N neutrons one neutron transforms into one proton and one electron. Focusing our attention to the rest energy of electron it is assumed that

$$m_e \propto e,$$
$$m_e \propto \frac{1}{N},$$
$$m_e \propto \sqrt{\frac{1}{G_C}},$$

n it can be written as

$$m_e \propto \frac{1}{N}\sqrt{\frac{e^2}{4\pi\epsilon_0 G_C}},$$

$$m_e c^2 \propto \frac{1}{N}\sqrt{\frac{e^2 c^4}{4\pi\epsilon_0 G_C}},$$

$$m_e c^2 \cong X_E \left(\frac{1}{N}\sqrt{\frac{e^2 c^4}{4\pi\epsilon_0 G_C}}\right).$$

$$m_e c^2 \cong X_E\, E_L \cong X_E\, 1.732 \times 10^{-3}\ \text{MeV}.$$

Here X_E is a number and can be called as 'lepton mass generator' and E_L = 1.732×10^{-3} MeV can be called as the 'characteristic lepton potential'.

VII. CONCLUSIONS

If one is able to develop a relation between electron rest mass and charge certainly, it can lead to the true grand unification. To understand the mystery of TOE, quantum theory of radiation and quantum mechanics Avogadro number can be given a chance.

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