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Is Strong Interaction - A Cosmological Manifestation?

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Is Strong Interaction - A Cosmological Manifestation?

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Abstract - Even though Hubble volume is virtual in the flat universe, by considering the product of critical mass density and the Hubble volume, one can estimate the Hubble mass. By coupling the Hubble mass with the Mach's principle, one can understand the origin of cosmic, atomic and nuclear physical parameters. Thus the four fundamental interactions can be studied in a unified manner. In this connection it can be suggested that, proton mass, nuclear binding energy and strong interaction range are cosmic variables and not fundamental physical constants. Molar electron mass is the planck scale mass of the proton.

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I. Introduction

In understanding the basic concepts of unification or TOE, role of dark energy and dark matter is insignificant. In the universe, if the critical density is $\rho_c \cong \left(3H_0^2/8\pi G\right)$ and the characteristic Hubble radius is $R_0 \cong (c/H_0)$, mass of the cosmic Hubble volume is $M_0 \cong c^3/2GH_0$. It can be called as the "Hubble mass". Very interesting thing is that, CMBR energy density, matter energy density and the critical energy density are in a geometric series and the geometric ratio is $1+\ln(M_0/M_C)$ where $M_C \cong \sqrt{\alpha}$ times $\sqrt{\hbar c/G}$ = $\sqrt{e^2/4\pi\varepsilon_0 G} \cong 1.859211\times10^{-9}$ Kg.

It is well established that, gravitational and electromagnetic interactions range is infinity. If one is willing to replace the word "infinity" with the "Hubble size", automatically gravitational and electromagnetic interactions come under one roof. Extending this idea to the strong interaction - it is noticed that, strong interaction range is roughly 17 times smaller than the Schwarzschild radius of the geometric mean mass of the Hubble mass and the proton mass.

In this connection it is assumed that- there exists a charged heavy massive elementary particle M_X in such a way that, inverse of the fine structure ratio is equal to the natural logarithm of the sum of number of positively and negatively charged M_X in the Hubble volume. Surprisingly it is noticed that, M_X mass is close to Avogadro Number times the rest mass of electron. It is noticed that M_X plays a very interesting role in particle and nuclear physics. We discussed these ideas in our earlier published works. In this paper the very interesting idea that we wish to propose is: M_X can be considered as the planck scale rest mass of proton. Considering the Mach's principle and the Hubble mass, in this paper an attempt is made to understand the origin of the cosmic, atomic and strong interaction physical parameters in brief [1-8].

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II. Updated 13 Key Concepts in Unification

Concept-1: In the expanding cosmic Hubble volume, characteristic cosmic Hubble mass is the product of the cosmic critical density and the Hubble volume. If the critical density is $\rho_c \cong \left(3H_0^2/8\pi G\right)$ and characteristic Hubble radius is $R_0 \cong (c/H_0)$, mass of the cosmic Hubble volume is

$$M_0 \cong \frac{c^3}{2GH_0} \tag{1}$$

Concept-2: There exists a charged heavy massive elementary particle M_X in such a way that, inverse of the fine structure ratio is equal to the natural logarithm of the sum of number of positively and negatively charged M_X in the Hubble volume. If the number of positively charged $(M_X)^+$ is $\left(\frac{M_0}{M_X}\right)$ and the number of negatively charged $(M_X)^-$ is also $\left(\frac{M_0}{M_X}\right)$ then

$$\frac{1}{\alpha} \cong \ln\left(\frac{M_0}{M_X}+\frac{M_0}{M_X}\right) \cong \ln\left(\frac{2M_0}{M_X}\right) \tag{2}$$

From experiments $1/\alpha \cong 137.0359997$ and from the current observations, magnitude of the Hubble constant is, $H_0 \cong 70.4^{+1.3}_{-1.4}$ Km/sec/Mpc. Thus

$$M_X \cong e^{-\frac{1}{\alpha}}\left(\frac{c^3}{GH_0}\right) \cong e^{-\frac{1}{\alpha}} \cdot 2M_0 \cong (5.32 \text{ to } 5.53)\times 10^{-7} \text{ Kg} \quad (3)$$

If $N \cong 6.022141793\times 10^{23}$ is the Avogadro number and m_e is the rest mass of electron, surprisingly it is noticed that, $N.m_e \cong 5.485799098\times 10^{-7}$ Kg and this is close to the above estimation of M_X. Thus it can be suggested that,

$$\frac{M_X}{m_e} \cong N \quad (4)$$

In this way, Avogadro number can be coupled with the cosmic, atomic and particle physics. Then with reference to $(N.m_e)$, the obtained cosmic Hubble mass is $M_0 \cong 8.96\times 10^{52}$ Kg and thus the obtained Hubble's constant is $H_0 \cong \frac{c^3}{2GM_0} \cong 69.54$ Km/sec/Mpc.

Concept-3: For any observable charged particle, there exists 2 kinds of masses and their mass ratio is 295.0606339. Let this number be represented by X_E. First kind of mass seems to be the 'gravitational or observed' mass and the second kind of mass seems to be the 'electromagnetic' mass. This idea can be applied to proton, electron and the Hubble mass.

This number is obtained in the following way. In the Planck scale, similar to the Planck mass, with reference to the elementary charge, a new mass unit can be constructed in the following way.

$$M_C \cong \sqrt{\frac{e^2}{4\pi\varepsilon_0 G}} \cong 1.859210775\times 10^{-9} \text{ Kg} \quad (5)$$

$$M_C c^2 \cong \sqrt{\frac{e^2 c^4}{4\pi\varepsilon_0 G}} \cong 1.042941\times 10^{18} \text{ GeV} \quad (6)$$

Here e is the elementary charge. How to interpret this mass unit? Is it a primordial massive charged particle? If 2 such oppositely charged particles annihilates, a large amount of energy can be released. Such pairs may be the chief constituents of black holes. In certain time interval with a well defined quantum rules they annihilate and release a large amount of energy in the form of γ photons. In the Hubble volume, with its pair annihilation, origin of the CMBR can be understood. Clearly speaking, gravitational and electromagnetic force ratio of M_X is X_E^2.

$$\frac{M_X}{M_C} \cong \sqrt{\frac{4\pi\varepsilon_0 G M_X^2}{e^2}} \cong 295.0606338 \quad (7)$$

It can be interpreted that, if 5.486×10^{-7} Kg is the observable or gravitational mass of M_X then M_C is the electromagnetic mass of M_X. With reference to the electron rest mass,

$$\left(\frac{M_X}{m_e}\right)^2 \cong X_E^2 \cdot \frac{e^2}{4\pi\varepsilon_0 G m_e^2} \cong N^2 \quad (8)$$

Concept-4: If $\hbar$ is the quanta of the gravitational angular momentum, then the electromagnetic quanta can be expressed as $\left(\frac{\hbar}{X_E}\right)$. Thus the ratio,

$$\left(\frac{\hbar}{X_E}\right) \div \left(\frac{e^2}{4\pi\varepsilon_0 c}\right) \cong (X_E\alpha)^{-1} \cong 0.464433353 \cong \sin\theta_W \quad (9)$$

where $\sin\theta_W$ is very close to the weak mixing angle.

Concept-5: For electron, starting from infinity, its characteristic interaction ending range can be expressed as

$$r_{ee} \cong \frac{e^2}{4\pi\varepsilon_0 (m_e/X_E)c^2} \cong X_E \frac{e^2}{4\pi\varepsilon_0 m_e c^2} \cong 8.315\times 10^{-13} \text{ m} \quad (10)$$

Similarly, for proton, its characteristic interaction starting range can be expressed as

$$r_{ss} \cong \frac{e^2}{4\pi\varepsilon_0 (m_p/X_E)c^2} \cong X_E \frac{e^2}{4\pi\varepsilon_0 m_p c^2} \cong 4.53\times 10^{-16} \text{ m} \quad (11)$$

Concept-6: Ratio of electromagnetic ending interaction range and strong interaction ending rage can be expressed as

$$\frac{r_{ee}}{r_{se}} \cong \frac{GM_X^2}{\hbar c} \cong 635.3131866 \quad (12)$$

Thus if $r_{ee} \cong 8.315\times 10^{-13}$ m, $r_{se} \cong 1.309\times 10^{-15}$ m,

$$\left(\frac{r_{ee}}{r_{se}}\right)^2 \cong \left(\frac{GM_X^2}{\hbar c}\right)^2 \quad (13)$$

Interesting observation is

$$\frac{r_{ss}+r_{se}}{2} \cong 0.881\times 10^{-15} \text{ m} \quad (14)$$

This can be considered as the mean strong interaction range and is close to the proton rms radius.

Concept-7: For any elementary particle of charge e, electromagnetic mass (m/X_E) and characteristic radius R, it can be assumed as

Global Journal of Science Frontier Research (A) Volume XII Issue VI Version I Year 2012

$$\frac{e^2}{4\pi\varepsilon_0 R} \cong \frac{1}{2}\left(\frac{m}{X_E}\right)c^2 \tag{15}$$

This idea can be applied to proton as well as electron. Electron's characteristic radius is

$$R_e \cong 2X_E \frac{e^2}{4\pi\varepsilon_0 m_e c^2} \cong 1.663\times10^{-12}\ \text{m} \tag{16}$$

Similarly proton's characteristic radius is

$$R_p \cong 2X_E \frac{e^2}{4\pi\varepsilon_0 m_p c^2} \cong 0.906\times10^{-15}\ \text{m} \tag{17}$$

This obtained magnitude can be compared with the rms charge radius of the proton. With different experimental methods its magnitude varies from 0.84184(67) fm to 0.895(18) fm.

Concept-8: Proton rest mass is a cosmic variable and not a fundamental physical constant. M_X can be considered as the planck scale rest mass of the proton. It is noticed that, the present rest mass of proton is strongly connected with the present cosmic Hubble mass and the proposed M_X.

Concept-9: $M_0 \cong \frac{c^3}{2GH_0}$ can be considered as the electromagnetic mass of the present universe. The gravitational mass of the present universe is X_E times of M_0.

Concept-10: Characteristic mass of the nucleus is $X_E m_0 \cong X_E\left(\frac{M_C^4}{M_0}\right)^3 \approx X_E 2.884\ \text{MeV}/c^2 \approx 851\ \text{MeV}/c^2$.

It is noticed that, proton and the proposed $(X_E m_0)$ mass difference is connected with the maximum nuclear binding energy per nucleon (B_A). If H_0 is 70.82 Km/Sec/Mpc, it is noticed that $B_A \cong 8.987$ MeV and the proton rest mass is $m_p c^2 \cong X_E m_0 c^2 + \sqrt{X_E m_0 c^2 * B_A}$ $\cong 938.3$ MeV.

$$\frac{1}{2}\ln\left(\frac{M_0}{m_0}\right) \cong \frac{2}{3}\ln\left(\frac{M_0}{M_C}\right) \cong \frac{X_E m_0 c^2}{B_a}. \tag{18}$$

Another interesting observation is

$$\frac{X_E m_0 c^2}{B_a} + \sqrt{\frac{m_p c^2}{m_e c^2}} - \sqrt{\frac{m_p c^2}{m_e c^2}} \cong \frac{1}{\alpha} \tag{19}$$

where m_p and m_e are the rest masses proton and electron respectively.

Concept-11: In the semi empirical mass formula, coulombic energy constant is equal to $\sqrt{\alpha} * B_A$. Ratio of surface and coulombic energy constants is close to $\sqrt{\frac{GM_X^2}{\hbar c}}$. Ratio of volume and coulombic energy constants is close to $\sqrt{\frac{GM_X^2}{\sqrt{2}\ \hbar c}}$. Sum of volume and surface energy constants is close to the sum of asymmetry and pairing energy constants. The asymmetry energy constant is close to $(2/3)$ of the sum of volume and surface energy constants and pairing energy constant is close to $(1/3)$ of the sum of volume and surface energy constants.Thus $a_v \cong 16.27$ MeV, $a_s \cong 19.35$ MeV, $a_c \cong 0.7677$ MeV, $a_a \cong 23.75$ MeV and $a_p \cong 11.87$ MeV. For medium and heavy stable (A, Z), $\left(\frac{A}{2Z}\right) \approx 1 + 2Z\left(\frac{a_c}{a_s}\right)^2 \approx 1 + 2Z\left(\frac{\hbar c}{GM_X^2}\right)$ and for upper stability upto Z=56 or A=137,

$$\left(\frac{A}{2Z}\right) \approx 1 + 2Z\left(\frac{a_c}{a_s}\right)^2 \approx 1 + 2Z\left(\frac{\hbar c}{GM_X^2}\right) \qquad A \approx 2Z + Z^2\alpha.$$

Concept-12: Considering (B_A) as the maximum mean binding per nucleon, nuclear binding energy can be understood in a very simplified manner. Authors are working in this new direction. It is noticed that, for light atoms,

$$BE \cong (A-2)B_a \tag{20}$$

For medium and heavy atoms,

$$BE \cong \left[A - \left(\frac{3(A-2Z)^2}{A}\right)\right]B_a \tag{21}$$

It will be discussed in our forth coming paper.

Concept-13: In modified quark SUSY, if Q_f is the mass of quark fermion and Q_b is the mass of quark boson, then

$$\frac{Q_f}{Q_b} \cong \Psi \cong 2.2627062 \tag{22}$$

and $\left(1-\frac{1}{\Psi}\right)Q_f$ represents the effective fermion mass. The number Ψ can be fitted with the following empirical relation

$$\Psi^2 \ln\left(1+\sin^2\theta_W\right) \cong 1 \tag{23}$$

With this idea super symmetry can be observed in the strong interactions and electroweak interactions. It is already discussed in our earlier published papers [2].

a) Characteristic cosmological nuclear relations

In a very simplified picture, it can be proposed as follows. At any time, let $M_t \cong c^3 / 2GH_t$ be the cosmic electromagnetic mass, m_t be the nuclear characteristic electromagnetic mass. Their respective gravitational mass units are $X_E M_t$ and. $X_E m_t$

$$m_t \cong \left(\frac{M_C^4}{M_t}\right)^{\frac{1}{3}} \tag{24}$$

$$\frac{e^2}{4\pi\varepsilon_0} \cong Gm_t\sqrt{M_t m_t} \tag{25}$$

$$R_t \cong \frac{2G\sqrt{M_t m_t}}{c^2} \tag{26}$$

Where R_t is the characteristic nuclear size At present it is noticed that

$$\frac{X_E m_0 c^2}{B_a} \cong \frac{1}{2}\ln\left(\frac{M_0}{m_0}\right) \tag{27}$$

Where B_a is the maximum nuclear mean binding energy per nucleon Thus

$$\left(m_p c^2\right)_0 \cong X_E m_0 c^2 + \sqrt{X_E m_0 c^2 * B_a} \tag{28}$$

Where $\left(m_p c^2\right)_0$ is the gravitational mass of the present proton Thus it is noticed that,

$$\frac{M_C^2}{m_t\sqrt{M_t\left(\frac{m_e}{X_E}\right)}} \cong \sqrt{\frac{X_E m_t}{m_e}} \tag{29}$$

Where $\frac{X_E m_t}{m_e}$ is the characteristic nuclear mass and electron mass ratio.At planck scale, $m_t \cong M_C \cong M_t$ and thus $\frac{X_E m_t}{m_e} \cong N$ and at present $\frac{X_E m_t}{m_e} \cong 1665.36$.

This ratio can be compared with the present proton and electron mass ratio. Please note that, the basic aim of unification is to explain the (present) proton-electron mass ratio. It can be understood in this way.

III. The Characteristic Nuclear Radii in Cosmology

Please recall that, assumed planck scale proton mass is $M_X = X_E M_C$.

a) The characteristic nuclear charge radius

If $H_0 \cong 70.82$ Km/sec/Mpc, R_S is the characteristic radius of nucleus, it is noticed that,

$$R_S \cong \left(\frac{m_p}{M_X}\right)^2 \frac{c}{H_0} \cong 1.2144\times 10^{-15}\ \text{m} \tag{30}$$

Where m_p is the proton rest mass. This can be compared with the characteristic radius of the nucleus and the strong interaction range.

b) To fit the radius of proton

Let R_p be the radius of proton. It is noticed that,

$$R_p \cong \left(\frac{X_E M_C}{m_p}\right)\cdot\frac{2GM_C}{c^2} \cong 9.0566\times 10^{-16}\ \text{m} \tag{31}$$

This obtained magnitude can be compared with the rms charge radius of the proton. With different experimental methods its magnitude varies from 0.84184(67) fm to 0.895(18) fm. Here also it is very interesting to consider the role of the Schwarzschild radius of M_C.

c) Strong interaction range

Considering the above coincidences it can be suggested that, there exists a strong connection in between Hubble mass and the nucleus. It is noticed that,

$$R_S \cong \frac{2G\sqrt{M_0\left(m_p / X_E\right)}}{c^2} \cong 1.04875\times 10^{-15}\ \text{m} \tag{32}$$

Where $H_0 \cong 70.82$ Km/sec/Mpc and $M_0 \cong 8.79564\times 10^{52}$ Kg. Here R_S represents the Schwarzschild radius of $\sqrt{M_0\left(m_p / X_E\right)}$. How to understand this radius! Here the very peculiar and careful observation is

$$R_S \cong \sqrt{\left(\frac{2GM_0}{c^2}\right)\left(\frac{2G\left(m_p / X_E\right)}{c^2}\right)} \approx 1.05\times 10^{-15}\text{m} \tag{33}$$

In this relation, $\frac{2GM_0}{c^2}$ is the Schwarzschild radius of the Hubble mass! Another interesting concept is M_0 is the electromagnetic mass of the universe. If we do not yet know whether the universe is spatially closed or open, then the idea of Hubble mass can be used as a tool in cosmology and unification [7].

IV. Potential Energy of Electron in Hydrogen Atom

Let E_p be the potential energy of electron in the Hydrogen atom. It is noticed that,

$$E_p \cong \frac{e^2}{4\pi\varepsilon_0 a_0} \cong \left(\frac{\hbar c}{GM_X^2}\right)\frac{(\hbar / X_E)c}{\sqrt{R_e R_p}} \cong 27.12493044 \text{ eV} \tag{34}$$

Where a_0 is the Bohr radius With 99.6822% this is matching with $\alpha^2 m_e c^2 \cong 27.21138388$ eV. After simplification it takes the following form.

$$E_p \cong \left(\frac{\hbar c}{GM_X^2}\right)^2 \frac{\sqrt{m_p m_e}c^2}{2} \cong \alpha^2 m_e c^2 \tag{35}$$

Thus the Bohr radius can be expressed as

$$a_0 \cong \left(\frac{GM_X^2}{\hbar c}\right)^2 \frac{2e^2}{4\pi\varepsilon_0 \sqrt{m_p m_e}c^2} \tag{36}$$

Without considering the integral nature of angular momentum, here by considering the integral nature of the elementary charge e, Bohr radius in n^{th} orbit can be expressed as

$$a_n \cong \left(\frac{GM_X^2}{\hbar c}\right)^2 \frac{2(ne)^2}{4\pi\varepsilon_0 \sqrt{m_p m_e}c^2} \cong n^2 \cdot a_0 \tag{37}$$

Where a_n is the radius of n^{th} orbit and $n = 1, 2, 3, ..$ Thus in Hydrogen atom, potential energy of electron in n^{th} orbit can be expressed as

$$\frac{e^2}{4\pi\varepsilon_0 a_n} \cong \left(\frac{\hbar c}{GM_X^2}\right)^2 \frac{\sqrt{m_p m_e}c^2}{2n^2} \tag{38}$$

Note that, from the atomic theory it is well established that, total number of electrons in a shell of principal quantum number n is $2n^2$. Thus on comparison, it can suggested that, $\left(\frac{\hbar c}{GM_X^2}\right)^2 \sqrt{m_p m_e}c^2$ is the potential energy of $2n^2$ electrons and potential energy of one electron is equal to $\left(\frac{\hbar c}{GM_X^2}\right)^2 \frac{\sqrt{m_p m_e}c^2}{2n^2}$.

V. Magnetic Moments of the Nucleon

If $(\alpha X_E)^{-1} \cong \sin\theta_W$, magnetic moment of electron can be expressed as

$$\mu_e \cong \frac{1}{2}\sin\theta_W \cdot ec \cdot r_{ee} \cong 9.274 \times 10^{-24} \text{ J/tesla} \tag{39}$$

It can be suggested that electron's magnetic moment is due to the electromagnetic interaction range. Similarly magnetic moment of proton is due to the strong interaction ending range.

$$\mu_p \cong \frac{1}{2}\sin\theta_W \cdot ec \cdot r_{se} \cong 1.46 \times 10^{-26} \text{ J/tesla} \tag{40}$$

If proton and neutron are the two quantum states of the nucleon, by considering the mean strong interaction range $\left(\frac{r_{ss}+r_{se}}{2}\right)$, magnetic moment of neutron can be fitted as

$$\mu_n \cong \frac{1}{2}\sin\theta_W \cdot ec \cdot \left(\frac{r_{ss}+r_{se}}{2}\right) \cong 9.82 \times 10^{-27} \text{ J/tesla} \tag{41}$$

VI. Cosmic Critical Density, Matter Density and Thermal Energy Density

It is noticed that, there exists a very simple relation in between the cosmic critical density, matter density and the thermal energy density. It can be expressed in the following way. At any time t,

$$\left(\frac{\rho_c}{\rho_m}\right)_t \cong \left(\frac{\rho_m}{\rho_T}\right)_t \cong 1 + \ln\left(\frac{M_t}{M_C}\right) \tag{42}$$

where $\rho_c \cong M_t\left[\frac{4\pi}{3}\left(\frac{c}{H_t}\right)^3\right]^{-1} \cong \frac{3H_t^2}{8\pi G}$, ρ_m is the matter density and ρ_T is the thermal energy density expressed in gram/cm^3 or Kg/m^3. Considering the Planck - Coulomb scale, at the beginning if $M_t \cong M_C$

$$\left(\frac{\rho_c}{\rho_m}\right)_C \cong \left(\frac{\rho_m}{\rho_T}\right)_C \cong 1 \tag{43}$$

$$(\rho_c)_C \cong (\rho_m)_C \cong (\rho_T)_C \tag{44}$$

Thus at any time t,

$$\rho_m \cong \sqrt{\rho_c \cdot \rho_T} \tag{45}$$

Global Journal of Science Frontier Research (A) Volume XII Issue VI Version I Year 2012

$$\rho_m \cong \left[1+\ln\left(\frac{M_t}{M_C}\right)\right]^{-1} \rho_c \quad (46)$$

$$\rho_T \cong \left[1+\ln\left(\frac{M_t}{M_C}\right)\right]^{-2} \rho_c \cong \left[1+\ln\left(\frac{M_t}{M_C}\right)\right]^{-1} \rho_m \quad (47)$$

In this way, observed matter density and the thermal energy density can be studied in a unified manner. The observed CMB anisotropy can be related with the inter galactic matter density fluctuations.

a) Present matter density of the universe

At present if $H_0 \cong 70.82$ Km/sec/Mpc,

$$\left(\rho_m\right)_0 \cong \left[1+\ln\left(\frac{M_0}{M_C}\right)\right]^{-1} \left(\rho_c\right)_0 \quad (48)$$

$$\cong 6.586\times10^{-32} \text{ gram/cm}^3$$

Where $\left(\rho_c\right)_0 \cong 9.418821\times10^{-30}$ gram/cm^3 and $\left[1+\ln\left(\frac{M_0}{M_C}\right)\right] \cong 143.03$. Based on the average mass-to-light ratio for any galaxy

$$\left(\rho_m\right)_0 \cong 1.5\times10^{-32}\,\eta h_0 \text{ gram/cm}^3 \quad (49)$$

where for any galaxy, $\left\langle\frac{M_G}{L_G}\right\rangle \cong \eta\left(\frac{M_{\odot}}{L_{\odot}}\right)$ and the number . $h_0 \cong \frac{H_0}{100 \text{ Km/sec/Mpc}} \cong \frac{70.82}{100} \cong 0.7082$

Note that elliptical galaxies probably comprise about 60% of the galaxies in the universe and spiral galaxies thought to make up about 20% percent of the galaxies in the universe. Almost 80% of the galaxies are in the form of elliptical and spiral galaxies. For spiral galaxies, $\eta h_0^{-1} \cong 9\pm1$ and for elliptical galaxies, $\eta h_0^{-1} \cong 10\pm2$. For our galaxy inner part, $\eta h_0^{-1} \cong 6\pm2$. Thus the average ηh_0^{-1} is very close to 8 to 9 and its corresponding matter density is close to $(6.0 \text{ to } 6.76)\times10^{-32}$ gram/cm^3 and can be compared with the above proposed magnitude of 6.586×10^{-32} gram/cm^3.

b) Present thermal energy density of the universe

At present if $H_0 \cong 70.82$ Km/sec/Mpc

$$\left(\rho_T\right)_0 \cong \left[1+\ln\left(\frac{M_0}{M_C}\right)\right]^{-2} \left(\rho_c\right)_0 \cong 4.605\times10^{-34}\,, \text{ gram/cm}^3 \quad (50)$$

and thus

$$\left(\rho_T c^2\right)_0 \cong \left[1+\ln\left(\frac{M_0}{M_C}\right)\right]^{-2} \left(\rho_c c^2\right)_0 \cong 4.139\times10^{-14} \text{ J/m}^3 \quad (51)$$

At present if

$$\left(\rho_T c^2\right)_0 \cong aT_0^4 \quad (52)$$

Where $a \cong 7.56576\times10^{-16}$ J/m^{3}K^4 is the radiation energy density constant, then the obtained temperature is, $T_0 \cong 2.7196\ ^0$Kelvin. This is accurately fitting with the observed CMBR temperature, $T_0 \cong 2.725\ ^0$Kelvin.

Thus in this way, the present value of the Hubble's constant and the present CMBR temperature can be co-related with the following trial-error relation.

$$\left[1+\ln\left(\frac{c^3}{2GH_0M_C}\right)\right]^{-1} H_0 \cong \sqrt{\frac{8\pi GaT_0^4}{3c^2}} \quad (53)$$

With reference to this relation, H_0 value seems to be close to 71 Km/Sec/Mpc.

VII. Conclusions

Considering the proposed relations and concepts it is possible to say that there exists a strong relation between cosmic Hubble mass and unification. Authors request the science community to kindly look into this new approach.

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References Références Referencias

1. U. V. S. Seshavatharam and S. Lakshminarayana. Nucleus in Strong nuclear gravity. Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) p.302
2. U. V. S. Seshavatharam and S. Lakshminarayana. Integral charge SUSY in Strong nuclear gravity. Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) p.842
3. U. V. S. Seshavatharam and S. Lakshminarayana. Strong nuclear gravity - a brief report. Hadronic journal. Vol. 34, No. 4, p.431, 2011.

4. U.V.S. Seshavatharam and S. Lakshminarayana. Quantum Mechanics, Cosmic Acceleration and CMB Radiation. Global Journal of Science Frontier Research Vol. 12 Issue 4, p.17, 2012.
5. U.V.S. Seshavatharam and S. Lakshminarayana. Atom, Universe and the Fundamental interactions Global Journal of Science Frontier Research. Vol. 12 Issue 5, p.1, 2012.
6. U.V.S. Seshavatharam and S. Lakshminarayana Hubble Volume, Cosmic Variable Proton Mass and the CMB Radiation Energy Density. Global Journal of Science Frontier Research. Vol. 12 Issue 5, p.23, 2012.
7. U. V. S. Seshavatharam. The primordial cosmic black hole and the cosmic axis of evil. International Journal of Astronomy 2012, 1(2): 20-37, DOI: 10.5923/j.astronomy.20120102.02
8. Recami E. Elementary Particles as Micro-Universes, and ''Strong Black-holes'': A Bi-Scale Approach to Gravitational and Strong Interactions. Preprint NSF-ITP-02-94.