A Bio-Info-Digital Universe Model (BIDUM version 1.1[1]) – On a Teller's large number derived-hypothesis overlooked by Tipler and Barrow

Author: Andrei-Lucian Drăgoi [2,3]

Part 6.2. On a Teller's large number derived-hypothesis overlooked by Tipler and Barrow

„Edward Teller appears to have been the first who speculate that there may exist a logarithmic relation between the fine structure constant (α) and the parameter $G \cdot m_N^2/(h \cdot c) \sim 10^{-39}$ of the form $\alpha \sim \ln[G \cdot m_N^2/(h \cdot c)]$ [equation 4.23] (in fact $\alpha^{-1} = \ln(3.17 \times 10^{60}$ and the formula is too insensitive to be of very much use in predicting exact relations)"**[1]**. (m_N stands for the neutron/nucleon rest mass)

In this BIDUM, I will try to demonstrate that Barrow and Tipler overlooked **[2]** the possibility that Teller's "speculation" may be much more inspired than the *Dirac's large number hypothesis (DLNH)***[3]** and may the basis of a new class of informational (bio-info-digital [BIDUM]) toy-models of the universe (info-universe), a class that can offer important physical explanations and predictions.

The logarithmic relation, $\alpha^{-1} \sim \ln(\alpha_G^{-1})$ (where $\alpha_G = Gm_N^2/\hbar c$ is the conventionally defined form of the GCC) has been long regarded as a requirement for a self-consistent electrodynamics**[2, 4, 5, 6, 7, 8, 9, 10, 11]**. A more recent renormalisation group analysis by Page of supersymmetric GUT suggests that $\alpha^{-1} \sim (5/\pi)\ln(\alpha_G^{-1})$ **[12]**

It is obvious that the natural logarithm variant of the *Teller's hypothesis* (TH) is „too insensitive to be of very much use in predicting exact relations":

$$\boxed{\alpha = \frac{1}{FSC} = \frac{\hbar c}{K_e q_e^{\,2}} = \left(\frac{\sqrt{\hbar c}}{k_e q_e}\right)^2 \sim 137.036 \Rightarrow e^{\alpha} \sim 3.3 \times 10^{59}} \text{ and (see next line)}$$

$$\ln\left(\frac{hc}{Gm_n^{\,2}}\right) \sim 89.9 \sim (65.6\%)\alpha \Rightarrow \frac{hc}{Gm_n^{\,2}} \sim 1.1 \times 10^{39} \sim (3.2 \times 10^{-23}\%)e^{\alpha}$$

Even if Teller himself overlooked the possibility of using *binary logarithm (BL)* (not natural logarithm [NL]) in his hypothesis mentioned in the abstract, it is quite strange that the vast majority of physicists also overlooked this possibility from 1948 until present. Despite Barrow's superficial analysis and exclusion of the NL-TH, here is a a much more „sensitive" BL-TH variant[4]:

$$\boxed{\log_2\left(\frac{hc}{Gm_n^{\,2}}\right) \sim 129.6 \sim (94.6\%)\alpha} \text{ and (see next line)}$$

$$2^{\alpha} \sim 1.8 \times 10^{41} \Rightarrow \frac{hc}{Gm_n^{\,2}} \sim 1.1 \times 10^{39} \sim (0.6\%)2^{\alpha}$$

Other „striking sensitive" BL-TH variants are presented in the next table (additional abbreviations used next: $\hbar$ – the half of reduced Planck constant [$=h/(4\pi) = \hbar/2$, the angular momentum of a spin 1/2 fermion like the electron/positron or the angular momentum of the hypothetical *de Broglie half-photon*], m_p – proton rest mass, m_e – electron rest mass)

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[1] Online preprints (DOI: 10.13140/RG.2.1.2747.9927) that can be downloaded from the following URLs: [1] univermed-cdgm.academia.edu/AndreiLucianDragoi; [2] vixra.org/author/andrei_lucian_dragoi; [3] gsjournal.net/Science-Journals-Papers/Author/1713/Andrei-Lucian,%20Dragoi; [4] researchgate.net/profile/Andrei_Lucian_Dragoi2

[2] Pediatrician (specialist MD with no academic title) undertaking independent research in theoretical physics (including digital physics) and biology (including informational biology)

[3] Contact email: dr.dragoi@yahoo.com

[4] I have emailed a couple of years ago Mr. Barrow and Mr. Tipler on this BL-TH variant for their book next edition review, but never received any answer on this punctual observation

Table T5-1. Other „striking sensitive" BL-TH variants
$\log_2[hc/(Gm_{p(n)}m_e)] \sim 140.5 \sim (102.5\%)\alpha \Rightarrow hc/(Gm_{p(n)}m_e) \sim 1.9\times10^{42} \sim (1094\%)2^{\alpha}$
$\log_2[\hbar c/(Gm_{p(n)}m_e)] \sim 137.8 \sim (100.6\%)\alpha \Rightarrow \hbar c/(Gm_{p(n)}m_e) \sim 3.1\times10^{41} \sim (174\%)2^{\alpha}$
$\log_2[\lambda\!\!\!^{-}c/(Gm_{p(n)}m_e)] \sim 136.8 \sim (99.9\%)\alpha \Rightarrow \lambda\!\!\!^{-}c/(Gm_{p(n)}m_e) \sim 1.6\times10^{41} \sim (87\%)2^{\alpha}$

From the previous table I shall keep the main (apparent) coincidence which I consider the most important (as, for example, the description of the ^{1}H isotope of the hydrogen atom which contains just one proton and one electron in its lowest energetic state):

$$\boxed{\log_2[\lambda\!\!\!^{-}c/(Gm_pm_e)] \sim 136.8 \sim (99.9\%)\alpha} \Leftrightarrow \boxed{\lambda\!\!\!^{-}c/(Gm_pm_e) \sim 1.6\times10^{41} \sim (87\%)2^{\alpha}}$$

The alpha-beta coincidence. Additionally, there is also a relatively closeness between the adimensional value of the exponential $\alpha^{3/2}$ and the standard beta constants (β_p and β_n) defined next (**observation O-I.5**), which is also a notable (probably a non-) coincidence that I shall discuss later on:

$$\left\{\begin{array}{l}\alpha^{3/2} \sim 1604\\ \beta_p = m_p/m_e \sim 1836\\ \beta_n = m_n/m_e \sim 1839\end{array}\right\} \Rightarrow \boxed{\alpha^{3/2} \sim (87\%)\beta_{p/n}} \Leftrightarrow \boxed{\beta_{p/n} \sim \alpha^{3/2}/(87\%)}$$

I consider that the last 2 equations from above are in fact *non-coincidences* generated by *a more profound (yet) undiscovered law of nature*, as I shall try to explain next. But the proton and neutron are composite particles (quark-based hadrons), that's why I consider that m_p and m_n (generated mainly [~99%] by the kinetic energy of the gluons and just secondary [~1%] by the rest and kinetic masses of the inner up/down quarks) aren't really fundamental, but can theoretically be deducted from the combined properties of the up/down quarks, the gluons and the 3D spatial volume of vacuum they all occupy. However, the electron (and also the positron) is considered ("more") fundamental, as it is a point-like QP with no (experimentally apparent) inner structure, that's why a BL-TH variant implying just the electron/positron rest mass will deserve a special attention: it's also the main reason for which the gravitational coupling constant [α_G] is expressed as a function of m_e, not of m_p or m_n. I have defined 2 types of inverses of α_G (noted $\alpha\!\!\!^{-}_G$ and $\lambda\!\!\!^{-}_G$) to simplify the next logarithmic equations, such as:

$$\alpha\!\!\!^{-}_G = \alpha_G^{-1} = \hbar c/(Gm_e^2) \sim 1/(1.75\times10^{-45}) \sim 5.7\times10^{44}$$
$$\boxed{\lambda\!\!\!^{-}_G = \lambda\!\!\!^{-}c/(Gm_e^2) \sim 2.85\times10^{44}}$$

The last chosen BL-TH variant can be rewritten as a function of β_p and m_e, such as:

$$\log_2[\lambda\!\!\!^{-}c/(G\beta_pm_e^2)] \sim 136.8 \sim (99.9\%)\alpha \Leftrightarrow \lambda\!\!\!^{-}c/(G\beta_pm_e^2) \sim 1.6\times10^{41} \sim (87\%)2^{\alpha}$$

Replacing β_p as deduced from the alpha-beta coincidence, with $\alpha^{3/2}$, eliminating the (~87%) factor and separating the adimensional factor $\alpha^{3/2}$ as a denominator in the last equation, one can obtain:

$$\boxed{\log_2\left[\frac{\lambda\!\!\!^{-}c/(Gm_e^2)}{\alpha^{3/2}}\right] \sim 137.0304 \sim (99.996\%)\alpha} \Leftrightarrow \boxed{\frac{\lambda\!\!\!^{-}c/(Gm_e^2)}{\alpha^{3/2}} \sim 1.78\times10^{41} \sim (99.613\%)2^{\alpha}}$$

As previously defined, the $\hbar c/(Gm_e^2)$ factor can be identified and replaced with α_G in the last equation above, so that one can essentialise:

$$\boxed{\log_2\left(\frac{\alpha_G}{\alpha^{3/2}}\right)\sim\alpha} \Leftrightarrow \boxed{\alpha_G\sim\alpha^{3/2}2^{\alpha}} \Leftrightarrow \boxed{\log_2\left[\frac{\hbar c/(Gm_e^2)}{\alpha^{3/2}}\right]\sim\alpha} \Leftrightarrow \boxed{\hbar c/(Gm_e^2)\sim\alpha^{3/2}2^{\alpha}}$$

I consider this last coincidence-equation the *main BL-TH (MBL-TH)*, as it is the most striking simple and "sensitive" BL-TH variant. MBL-TH deserves a very special attention (in my opinion) as it may have great importance in formulating a quantitative description/prediction of *gravitons and quantum gravity theory*. I consider it very small the probability that this "too-simple-and-elegant" numerical coincidence is "just" the result of pure chance. I don't have any information from the physics literature on a more sensitive theoretical numerical *prediction of* α_G and a *quantum G scalar for a 2 electron/positron system* (including the Einstein's $8\pi G$ general relativity equation factor) using only α (as an adimensional combination of almost all the physical constants fundamental to quantum mechanics theory).

MBL-TH also suggests that FSC has a dual electrogravitational significance (with FSC being a both electromagnetic and gravitational constant). In the next versions of BIDUM, I shall try to bring more arguments that *MBL-TH is very probably a true non-coincidence due to a more profound yet undiscovered law of nature.*

In conclusion, MBL-TH can be formulated as an *equality (which is a new quantum electronic[qe] definition [* α_{Gqe} *] alternative to the classical* α_G *)*:

$$\boxed{\alpha_{Gqe}=\alpha^{3/2}2^{\alpha}} \Leftrightarrow \boxed{\hbar c/(G_{qe}m_e^2)=\alpha^{3/2}2^{\alpha}}$$

As G is the only classical constant (with the highest value of uncertainty when compared with the other quantum constants) in the MBL-TH equation, a hypothetic G quantum electronic (qe) (/positronic) scalar (G_{qe}) (anticipated in the last equation above) can be deducted for an electro-gravitational system of 2 resting electrons/positrons localized in vacuum, at a distance λ > 1cm (the limit scale of G measurement) from each other. However, it can be predicted that this scalar is also valid for much smaller distances (**λ << 1cm**), with **λ ≥ $D_{p/n}$** (the approximate real diameter of the low energy proton/neutron, where SNF, WNF and a possible a strong gravity**[13,14]** force (SGF) may also come into action). The value of G_{qe} scalar is very close to the standard CODATA-2012 G value:

$$\boxed{\begin{aligned}&\frac{G_{qe}m_e^2}{\lambda}=\frac{\hbar/(\alpha^{3/2}2^{\alpha})\cdot c}{\lambda} \Leftrightarrow G_{qe}=\frac{1}{m_e^2}\cdot\frac{hc}{(4\pi)\alpha^{3/2}2^{\alpha}} \Leftrightarrow G_{qe}=\frac{c}{m_e^2(2\pi)\alpha}\cdot\frac{h}{2\alpha^{1/2}2^{\alpha}}=f(h_{eg})=k_G h_{eg},\\ &\text{with } \lambda\geq D_{p/n}\ , k_G=\frac{c}{m_e^2(2\pi)\alpha} \text{ and } h_{eg}=\frac{h}{2\alpha^{1/2}2^{\alpha}}=\frac{h}{K_{eg}}\left(with\ K_{eg}=2\alpha^{1/2}2^{\alpha}=\alpha^{1/2}2^{\alpha+1}\right)\end{aligned}},$$

$$\boxed{G_{qe}\sim 6.648\cdot10^{-11}m^3kg^{-1}s^{-2}\sim 99.613\%\cdot G_{CODATA\_2012}}$$

$$\boxed{\alpha_{Gqe}=\hbar c/(G_{qe}m_e^2)\sim 5.71\times10^{44}\sim(100.4\%)\alpha_G}$$

$$\boxed{\alpha_{Gqe}=\hbar c/(G_{qe}m_e^2)\sim 2.87\times10^{44}\sim(100.4\%)\alpha_G}$$

The G_{qe} scalar expressed in the last equations is very similar to the Coulomb constant (K_e) extracted from the α(=1/FSC) definition:

$$\alpha = \frac{\hbar c}{K_e q_e^{\,2}} \Leftrightarrow \boxed{K_e = \frac{1}{q_e^{\,2}} \cdot \frac{hc}{(2\pi)\alpha} = \frac{c}{q_e^{\,2}(2\pi)\alpha} \cdot h = f(h) = k_C \cdot h} \left(with\, k_C = \frac{c}{q_e^{\,2}(2\pi)\alpha} \right) analogous\, to$$

$$\boxed{G_{qe} = \frac{1}{m_e^{\,2}} \cdot \frac{hc}{(4\pi)\alpha^{3/2} 2^{\alpha}} = f(h_{eg}) = k_G h_{eg}}, with\, k_G = \frac{c}{m_e^{\,2}(2\pi)\alpha}\, and\, h_{eg} = \frac{h}{2\alpha^{1/2} 2^{\alpha}}$$

As it can be observed from the last analogic equations, the (classical) K_e can be considered an indirect way to measure the quantum constants: q_e, h, c, but also the adimensional FSC(=1/α). Measuring K_e at different distances (λ) is essentially and indirect way to measure photon energy at different wavelengths (**λ**) (with $E_{ph}(\lambda)=hc/\lambda = h\upsilon$) and especially and indirect way to measure h (the electromagnetic quanta, as the Coulomb force is considered to be generated by interchanging virtual photons):

$$\frac{K_e}{\lambda} = \frac{1}{q_e^{\,2}(2\pi\alpha)} \cdot \frac{hc}{\lambda} = \frac{1}{q_e^{\,2}(2\pi\alpha)} \cdot E_{ph}(\lambda) \Leftrightarrow \boxed{K_e = \frac{c}{q_e^{\,2}(2\pi\alpha)} \cdot h = f(h) = k_C \cdot h} \left(with\, k_C = \frac{c}{q_e^{\,2}(2\pi)\alpha} \right)$$

Analogously, the Newtonian universal gravitational constant (**G**) may be considered an indirect measure scalar function of a hypothetical (electro)gravitational (**EGF**) Plank-like PIqua ($\mathbf{h_{eg}}$) of a hypothetical electrograviton (**eg**) having a scalar exactly analogous to K_e (this scalar analogy being the reason for calling this hypothetical graviton an "electrograviton"), considering ~~$\alpha_G = 1/\alpha_G$~~ a pre-designed adimensional constant, with another definition which is theoretically independent of h (as explained later in this BIDUMv1.1):

$$\boxed{G = f\left(h_{eg}\right) = k_G \cdot h_{eg}}, with \boxed{k_G = \frac{c}{m_e^{\,2}(2\pi\alpha)} \sim 4.196 \times 10^{65}\, m/\left(kg^2 \cdot s\right)},$$

$$\boxed{h_{eg} = \frac{h}{K_{eg}} = \left(\sim 1.58 \times 10^{-76}\, pit\right)}, with \boxed{K_{eg} = \alpha_G / \alpha \left(\sim 4.166 \times 10^{42}\right)}\, and \quad [5]$$

$$\boxed{\alpha_G = \frac{1}{\alpha_G} = \frac{\hbar c}{G m_e^{\,2}} \left(\sim 5.71 \times 10^{44}\right)}$$

The G_{qe} scalar can be expressed in perfect analogy with K_e, as a function of the EGF Planck-like constant ($\mathbf{h_{eg}}$) such as:

$$\frac{G_{qe} m_e^{\,2}}{\lambda} = \frac{\frac{h}{(4\pi)\alpha^{3/2} 2^{\alpha}} \cdot c}{\lambda} \Leftrightarrow \frac{G_{qe}}{\lambda} = \frac{1}{m_e^{\,2}(2\pi\alpha)} \cdot \frac{\frac{h}{2\alpha^{1/2} 2^{\alpha}} \cdot c}{\lambda} \Leftrightarrow$$

$$\Leftrightarrow \boxed{G_{qe} = \frac{c}{m_e^{\,2}(2\pi\alpha)} \cdot \frac{h}{2\alpha^{1/2} 2^{\alpha}} = f(h_{eg}) = k_G h_{eg}}, with\, k_G = \frac{c}{m_e^{\,2}(2\pi)\alpha}\, and\, h_{eg} = \frac{h}{2\alpha^{1/2} 2^{\alpha}}$$

Expressing the Newtonian gravitational force (F_g) as a function of G_{qe}, one may obtain multiple equivalent equations that maintain the inverse square law (ISL) up to atomic scale, with $\lambda \geq \mathbf{D_{p/n}}$:

$$\boxed{F_g = G_{qe} \frac{m_1 m_2}{\lambda^2}} = \boxed{\frac{hc}{m_e^{\,2}\alpha^{3/2}} \frac{1}{2^{\alpha}} \cdot \frac{m_1 m_2}{4\pi\lambda^2}} = \boxed{\frac{\Gamma}{2^{\alpha}} \cdot \frac{m_1 m_2}{4\pi\lambda^2}}$$

$$with \boxed{\Gamma^* = \frac{hc}{m_e^{\,2}\alpha^{3/2}} \sim 1.5 \times 10^{32}\, m^3 kg^{-1} s^{-2}}\, and \boxed{\Gamma / G \sim 2.2 \times 10^{42}}$$

[5] m_e is the rest mass of the electron; c is speed of light in vacuum

(*Γ is a plausible strong-gravity constant [SGC] [13] with a value close to that determined by Perng in 1978[13,14] of ~$2.77\times10^{32} m^3 kg^{-1} s^{-2}$)

$$\boxed{F_g = hc\cdot\frac{\left(\frac{m_1}{m_e}\right)\left(\frac{m_2}{m_e}\right)}{4\pi\lambda^2}\frac{1}{\alpha^{3/2}2^{\alpha}}} = \boxed{hc\cdot\frac{\beta_1\beta_2}{4\pi\lambda^2}\frac{1}{\alpha^{3/2}2^{\alpha}}}$$

$$\boxed{F_g = \frac{4\pi K_e}{\alpha^{1/2}2^{\alpha}}\cdot\frac{(\beta_1 q_e)(\beta_2 q_e)}{8\pi\lambda^2}} = \boxed{\frac{F_e(\beta_1 q_e, \beta_2 q_e, \lambda)}{2\alpha^{1/2}2^{\alpha}}}$$

$$\boxed{F_g = \frac{\beta_1\beta_2}{2\pi\lambda + 2\pi\lambda}\cdot\frac{E_f(\lambda)}{\alpha^{3/2}2^{\alpha}}, with\ E_f(\lambda) = hc/\lambda}$$

From the last 3 equations F_g can be seen as a form of strong gravity dispersed/divided by the factor 2^{α} (on the significance of this BL-TH factor it shall be discussed later on). This is not the first attempt **[15]** to link FSC with a hypothetical strong gravity constant (**SGC**).

From the second last equation above, F_g can also be seen as a form of modified Coulomb force generated by strong-charges (multiple to q_e by beta-constants $\beta_1 = m_1/m_e$ and $\beta_2 = m_2/m_e$) $F_e(\beta_1 q_e, \beta_2 q_e, \lambda) = K_e\cdot\frac{(\beta_1 q_e)(\beta_2 q_e)}{\lambda^2}$ dispersed/divided by the factor $2\alpha^{1/2}2^{\alpha}$ (on the significance of this BL-TH factor it shall be discussed later on) with *charges and masses being interchangeable using beta-constants* (*as masses can be treated as gravitational charges possibly generated by same mechanism that also generates the electromagnetic charges, as it shall be discussed later on*)

As SST and MT propose the existence of additional spacetime (ST) dimensions (at least 2 additional micro-dimensions with compact topology that may alter ISL by leaking of hypothetical gravitons in those additional ST dimensions) in order to unify the Standard Model (**SM**) with General Relativity (**GR**), it's an experimental priority for the gravitational ISL to be verified at micronic and atomic scales (short range gravity tests**[16,17,18,19]**).

The Gqe definition can also be written as equivalent to $\boxed{FSC^{3/2} \propto G_{qe}}$, which has a strong similarity with a prediction **[20]** of SST:

$$\boxed{G_{qe} = \frac{c}{m_e^{\,2}(2\pi\alpha)}\cdot\frac{h}{2\alpha^{1/2}2^{\alpha}} = \frac{hc}{m_e^{\,2}}\cdot\frac{1}{4\pi\alpha^{3/2}2^{\alpha}} = \frac{hc}{m_e^{\,2}}\cdot\frac{FSC^{3/2}}{4\pi 2^{1/FSC}}} \Leftrightarrow$$

$$\boxed{FSC^{3/2} = \left(\frac{m_e^{\,2}}{hc}4\pi 2^{1/FSC}\right)G_{qe}} \Leftrightarrow \boxed{FSC^{3/2} \propto G_{qe}}$$

It's important to remark that k_G (as defined in Part 2 of this paper) can also be derived from the hypothetical SGC determined by Perng in 1978 (noted as Γ_{Perng}) **[13,14]:**

$$\boxed{\Gamma_{Perng} = \frac{hc}{m_e^{\,2}(2\pi\alpha)} = \frac{\hbar c}{m_e^{\,2}\alpha} \sim 2.78\times10^{32} m^3 kg^{-1} s^{-2}}\ and\ \boxed{\Gamma_{Perng}/G \sim 4.2\times10^{42}}$$

$$\boxed{k_G = \Gamma_{Perng}/h = \frac{c}{m_e^{\,2}(2\pi\alpha)}}$$

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Part 6.3. A unified EMF-EGF interpretation of FSC and GCC based on MBL-TH. A possible Eddington-like connection between FSC, GCC and the nof. peps in the WU

As FSC can be viewed as the ratio of two PIqs (both expressed in qbits, which qbit is a (pure) base-2 logarithmic nof. quantum/subquantum [macro/micro] states of a quantum system), FSC is in fact a way of measuring a PIqua using another PIqua as a measure-unit, so that FSC is essentially ALSO a (meta) PIqua (expressed as probability or as an inverse probability, α=1/FSC). All the other α coupling constants generalized as the **$\alpha_f(h_x)$ function** can also pe considered (meta) PIqua. Analogously, GCC is essentially ALSO a PIqua (expressed as probability or as an inverse probability, 1/ α_G). As a consequence, MBL-TH is in fact an important relation between two PIqua: FSC and GCC. The fact that α=1/FSC appears in MBL-TH both as α and 2^{α} strongly suggests that $N_a=2^{\alpha}$ is the nof. states of an EM-PIqua and is more fundamental that α which is the base-2 logarithm (derived) measure of N_a. FSC and GCC may be both considered two different ways to measure the same N_a, such as:

$$\boxed{N_a \sim 1.8\times10^{41}(=2^{\alpha})} \; AND \; \left\{\begin{array}{l}\boxed{\alpha=\log_2(N_a)}\\ FSC=1/\log_2(N_a)\end{array}\right\} \Rightarrow \left[FSC^{-1}=\log_2(N_a)=\frac{\hbar}{E_e(q_e,q_e,\lambda)\cdot\Delta t_{\lambda/c}}\right]$$

$$\boxed{\alpha_G=\frac{1}{2\cdot GCC}\sim\alpha^{3/2}2^{\alpha}\sim\left[\log_2(N_a)\right]^{3/2}N_a} \Leftrightarrow \boxed{GCC^{-1}\sim 2\left[\log_2(N_a)\right]^{3/2}N_a=\frac{\hbar}{E_g(m_e,m_e,\lambda)\cdot\Delta t_{\lambda/c}}}$$

As the definition of GCC is essentially a convention (as there is no discovered and demonstrated quantum scalar for G), it is convenient to redefine GCC as GCCr (GCC redefined) so that GCCr=N_a and the FSC-GCCr equivalence to be more obvious:

$$\left\{\begin{array}{l}\boxed{GCC_r^{-1}\sim N_a}\\ GCC_r\sim 1/N_a\end{array}\right\} \Leftrightarrow \boxed{GCCr\sim 2\left[\log_2(N_a)\right]^{3/2}/GCC^{-1}=(G/K_e)\cdot(m_e/q_e)^2\sqrt{4\alpha}}$$

$$\boxed{FSC^{-1}=\alpha=\log_2(N_a)}$$

The rest mass of the electron (m_e) is the smallest charged rest mass known in the WU, so that the ratio (m_e/q_e) is a minimum mass-to-charge quantity ratio of the nature (inversely, the ratio q_e/m_e is a maximum charge-to-mass quantity ratio of the nature) and so the derived composed EGF/EMF ratio $Gm_e^2/(K_eq_e^2)$: that is why the inclusion of this ratio in this proposed GCCr may help as an indirect argument for FSC-GCCr common interpretation.

There is another (apparent probably non-)coincidence complementary to MBL-TH that may help understand the significance of the new (large number) constant N_a that unifies FSC and GCC(GCCr): it's the base-2 logarithm measure of the nof. peps in the WU (N_P)

$$\boxed{\log_2(N_P)/2=\log_2(\sqrt{N_P})\sim 132.8\sim(96.9\%)\alpha\sim(96.9\%)\log_2(N_a)} \Leftrightarrow \boxed{N_a^{\,2}/N_P\sim 368}$$

Based on the relative closeness between Na^2 and N_P one can hypothesize that FSC/GCC/GCCr (as measures of N_a) measure in fact the real nof of peps in our universe, that is surely much larger than the N_P from the (visible) WU. Based on this speculative but very appealing hypothesis, one can estimate the real nof. of peps in the universe as a corrected N_P (N_{Pc}):

$$\boxed{N_{Pc}\sim N_a^{\,2}\sim 368N_P}$$

A part of (N_{Pc}-N_P) difference may explain the DU-hypothesis in which dark energy and dark matter (composing the dark universe [DU]) have a ~19 to 1 (~95% to ~5%) preponderance. The rest of (N_{Pc}-N_P) difference may be explained by the energy and matter that expand beyond the ray of our visible WU with speeds that probably close to the speed of light and possible with a larger acceleration than the acceleration of the WU expansion measured in the present using the Hubble constant.

This hypothesis may explain and predict the small variations of FSC when measured in different hemi-spaces **[21,22]**, as the universe isn't perfectly homogenous and isotropic in the distribution of N_{Pc}. This hypothesis may also explain and predict why FSC doesn't seem to vary in the last 7 billion years when measured longitudinally in time**[23]**, as the real total nof. pep hasn't varied in this time frame.

As N_{pepc} is over 2 orders of magnitude larger than N_{pep}, this hypothesis may also explain/predict why the universe doesn't seem to form larger "clumps" of matter at scales comparable to the ray of the **WU** (R_{WU})**[24]** as the universe its self may be a huge clump of matter with ~368 more matter the (directly and indirectly [by FSC/GCC]) observable universe (**OU**): this sustains the hypothesis that the universe may be still a fractal at those scales despite the recent evidence**[24]** that refute the fractal-universe hypothesis at larger scales.

It is also true that there is a similarity between this hypothesis and Eddington's conjecture **[25]** connecting FSC with N_P (also called the Eddington's number), but this similarity is just a superficial one, as this hypothesis proposes a completely different type of (informational) connection between α(=1/FSC) and N_{Pc} than that proposed by Eddington (which is now considered obsolete)**.** However, the Eddington hypothesis remains partially open as, in the context of a finite universe (finite information/energy/matter) both FSC and N_{Pc} are important in defining that type universe, even they may vary in different historical time frames at different energies.

An important consequence of this speculative hypothesis is that, if FSC and GCC are finite numbers (that estimate the total PIq of the OU), then the total PIq of the OU is ALSO FINITE.

Based on the N_{Pc} value and m_{pep}, new corrected I_{ctOU}, M_{ctOU} and E_{ctOU} can be precisely calculated as:

$$\boxed{I_{ctOU} = N_{Pc} \cdot \left(h_p + h_e\right) \sim 283 I_{tWU} \sim 622 qbits \sim lo\,g_2\left(V_{OU} / V_{Pl}\right) \Leftrightarrow \left(V_{OU} / V_{Pl}\right) \sim \frac{2^{2\alpha}}{(2\pi)\alpha} \cdot \left(h_p + h_e\right) \sim 10^{184}}$$

$$\boxed{M_{ctOU} = N_{Pc} \cdot m_{pep} \sim 5.3 \times 10^{55} kg} \; and \; \boxed{E_{ctOU} = M_{ctOU} \cdot c^2 \sim 4.8 \times 10^{72} J}$$

$$\boxed{E_{ctOU} / E_{tWU} = M_{ctOU} / M_{tWU} = N_{Pc} / N_P \sim 368.3}$$

The additional mass ($\Delta M = M_{ctOU} - M_{rWU}$) predicted by this hypothesis is very probable organized in 2 sectors:

(1) a part of the same ΔM (called $\Delta M_{int} \sim 19 M_{arWU}$) may be localized (internally) in our V_{OU}, but cannot be directly observed because it may organized as dark energy (DE) and dark matter (DM) interacting with the white matter/energy (WU) just by WNF and EGF and not by EMF and SNF (as WIMPs, the main candidate for the dark matter composition, do); dark matter may also be composed of quarks bound together by a new and yet-unobserved strong interaction, a dark[26] form of QCD or SGF as it will be discussed later on)

(2) the other part of this ΔM (called $\Delta M_{ext} \sim M_{ctOU} - (\Delta M_{int} + M_{arWU}) \sim 347 M_{arWU}$) may be composed by peps external to the present observed volume of the observable universe $V_{OU} = (4\pi/3) R_{OU}^3$ and cannot be directly observed (other but indirectly measured by FSC and GCC), but it may have measurable influence on our V_{OU} (as FSC and GCC may be determined by N_{Pc} and implicitly by ΔM_{ext}), as a the accelerated inflation of the observable **WU** may be partially generated by the ΔM_{ext} sector that may strongly attract the mass left behind in our V_{OU} (a gravitational traction effect that can explain the Hubble law/observation): this ΔM can also lessen the percent of dark energy needed to explain the present acceleration **[27,28**] of the WU.

(3) However, it is much more probable that all the M_{ctOU} to be localized (but mostly hidden) in the interior of the present observed volume of the observable universe $V_{OU}=(4\pi/3)R_{OU}^3$ as all the N_{Pc} can far more easily interconnect to each other using speeds ≤c (determining the values of FSC and GCC): as the (partially empty) space external to the V_{OU} surely expands at speeds higher than c, these faster-than-light speeds can alter (to totally disruption) the capacity of the (possible) energy-matter external to V_{OU} to influence FSC and GCC measured in the interior of the V_{OU} (and supposed that FSC and GCC are the measure of the nof. peps from the interior of the V_{OU}), at least not by using the four known FFs that are supposed to be limited by c.

Based on ΔM_{int} and V_{OU}, one can calculate the density of all white and dark energy/matter in our OU (ρ_{OU}). A (first) maximum density for (all) the OU($\rho_{max[1]OU}$) can be also calculated if supposing that all M_{ctOU} is localized in a volume of a sphere with a ray (R_{xOU}) at least 10^3 times larger that R_{OU} (V_{tOU}) (as predicted by SSTs). **A (second) maximum density for (all) the OU($\rho_{max[2]OU}$) can be also calculated if supposing that all M_{ctOU} is localized (even if mostly hidden) in the interior of the present V_{OU} (as estimated in the last previous paragraph: the possibility with the highest probability of all).** As it can be observed next, $\rho_{max[1]OU} << \rho_{OU} < 1$ BUT $\rho_{max[2]OU} > 1 > \rho_{OU}$ (with over an order of magnitude larger than 1)

$$\boxed{V_{tOU} = V_{WU} = (4\pi/3) R_{WU}{}^3 \sim 3.6\times10^{80} m^3} \Rightarrow \boxed{\rho_{WU} = M_{arWU} / V_{OU} \sim 4\times10^{-28} \left(kg / m^3\right)}$$

$$AND \boxed{\rho_{OU} = \left(M_{arWU} + \Delta M_{\text{int}}\right) / V_{OU} \sim 8.5\times10^{-27} \left(kg / m^3\right) \sim 21\rho_{WU}}$$

$$\boxed{R_{xOU} > 10^3 R_{OU}} \Rightarrow \boxed{V_{tOU} > (4\pi/3) R_{xOU}{}^3 \sim 3.6\times10^{89} m^3} \Rightarrow \boxed{\rho_{\max[1]OU} < M_{ctOU} / V_{tOU} \sim 1.5\times10^{-34} \left(kg / m^3\right)}$$

$$\boxed{\rho_{\max[1]OU} < \rho_{WU} << \left[\rho_{OU} \sim 21\rho_{WU}\right]}$$

$$\boxed{\rho_{\max[2]OU} = M_{ctOU} / V_{OU} \sim 1.5\times10^{-25} \left(kg / m^3\right) \sim 368\rho_{WU} \sim 17.5\rho_{OU}}$$

Based on each of the OU densities previously calculated (ρ_{WU}, ρ_{OU}, $\rho_{max[1]OU}$, $\rho_{max[2]OU}$), a value for each density parameter function (Ω_f) (the ratio between a specific density and the Friedmann critical density [ρ_c] which is a function of the Hubble constant [H_0]) can be calculated, such as::

$$\boxed{\rho_c = \frac{3H_0{}^2}{8\pi G} \sim 8.7\times10^{-27} \left(kg / m^3\right)} \; and \; \boxed{\Omega_f(\rho) = \rho / \rho_c} \Rightarrow$$

$$\Rightarrow \begin{cases} \boxed{\Omega_f(\rho_{WU}) \sim 0.05} \\ \boxed{\Omega_f(\rho_{OU}) \sim 0.982} \\ \boxed{\Omega_f(\rho_{\max[1]OU}) < 1.7\times10^{-8} << \Omega_f(\rho_{WU}) << \Omega_f(\rho_{OU})} \\ \boxed{\boxed{\Omega_f(\rho_{\max[2]OU}) \sim 13.5}\,(the\ most\ probable\ possibility)} \\ M_{arWU} / M_{ctOU} \sim 0.27\% << \left[\frac{white\ energy\ \&\ matter}{total(including\ dark)\ energy\ \&\ matter} \sim 4.9\%(present\ estimation)\right] \end{cases}$$

$\Omega_f(\rho_{\max[1]OU}) \sim 1.7\cdot10^{-8}$ is much lower than 1 which corresponds to a universe that may expand forever (ONLY if SGC will be proved to NOT exist: with NO strong quantum gravity acting neither in the nucleus of atoms or in black-holes). However, BIDUM considers $\Omega_f(\rho_{\max[2]OU}) \sim 13.5 > 1$ as the possibility with the larger probability: this corresponds to a universe that will eventually collapse. BIDUM predicts that at the moment of deflation $t_d >> t_{WU}$ the WU (OU) ($t_d >> t_{WU}$ because the universe still has a positive acceleration which marks that it is still a young universe when compared to a hypothetical maximum inflation-deflation cycle measured in classical linear time units) will start to deflate similar to a Phoenix universe **[29,30]**: singular inflation theory **[31]** and Turok's Cyclic Model of the Universe **[32]** / M-Theory Model of a Big Crunch/Big Bang Transition **[33]** also sustains this possibility. The most recent measurements [**34**] of top quark mass will surely bring more answers on whether our universe resides in a stable or metastable region of the electroweak theory (**EWT**) of the Standard Model (**SM**). However, it is sure that, if the universe is expanded by a form of gravitational spring (with a behavior similar to a common metallic spring), then our universe is the younger with the larger the positive acceleration: studies than determine other positive acceleration than the ones before may be translated as the universe is younger or older than thought and not necessarily that the universe will "die faster or slower".

In a check-point conclusion, BIDUM essentially marks the possibility that FSC and GCC may be indirect measures for both dark and white energy/matter (as expressed in nof. real/equivalent peps) AND also predicts that it is most probable that the white energy and matter to have a preponderance of at least 10 times smaller than is estimated today (~0.27% versus present estimation of ~4.9%)

As FSC (and its inverse α=1/FSC) is in fact a (meta)PIqua it can also be used as a relative informational measure-unit for large PIqua (**the alpha-PIq-unit or the alpha-unit [α]**). There are some arguments that BOMs may use this alpha-PIq-unit when reconstructing space-time and energy-matter from the perceived PIqua, as FSC is the main propriety/constant of the electron-photon system, a system which is mainly used by the visual system of the BO to analyze/decompose and imagine/reconstruct/recompose the environment/any target of interest from the environment.

It is convenient to express binary logarithms of the large PIqs ratios (the global PIq to each of the four FFs PIqua) using alpha-PIq-units (α).

A very interesting (probably non-) coincidence emerges when comparing the global I_{tWU} and I_{ctOU} to the 4 PIqua of the four FFs (h_{eg}, h_{ph}=h, $h_{W(Z)}$, h_{gl}) using not only simple ratios, but also binary logarithms of those ratios and their reciprocal base-2 exponentials expressed in alpha-units, such as:

$$\boxed{I_{tWU} / h_{eg} > 3.4\times10^{184}} \Leftrightarrow \boxed{d_{eg} > \left[\log_2(I_{tWU} / h_{eg}) \sim 4.473\alpha\right]} \Leftrightarrow \boxed{h_{eg} < I_{tWU} / 2^{d_{eg}}}$$

$$\boxed{I_{tWU} / h_{ph} > 8.1\times10^{141}} \Leftrightarrow \boxed{d_{ph} > \left[\log_2(I_{tWU} / h_{ph}) \sim 3.44\alpha\right]} \Leftrightarrow \boxed{h_{ph} < I_{tWU} / 2^{d_{ph}}}$$

$$\boxed{I_{tWU} / h_{WZ} > 1.3\times10^{141}} \Leftrightarrow \boxed{d_{WZ} > \left[\log_2(I_{tWU} / h_{WZ}) \sim 3.421\alpha\right]} \Leftrightarrow \boxed{h_{WZ} < I_{tWU} / 2^{d_{WZ}}}$$

$$\boxed{I_{tWU}/h_{gl} > 1.1\times10^{144}} \Leftrightarrow \boxed{d_{gl} > \left[\log_2\left(I_{tWU}/h_{gl}\right) \sim 3.492\alpha\right]} \Leftrightarrow \boxed{h_{gl} < I_{tWU}/2^{d_{gl}}}$$

$$\boxed{I_{ctOU}/h_{eg} > 9.5\times10^{186}} \Leftrightarrow \boxed{d_{eg(c)} > \left[\log_2\left(I_{ctOU}/h_{eg}\right) \sim 4.533\alpha\right]} \Leftrightarrow \boxed{h_{eg} < I_{ctOU}/2^{d_{eg(c)}}}$$

$$\boxed{I_{ctOU}/h_{ph} > 2.3\times10^{144}} \Leftrightarrow \boxed{d_{ph(c)} > \left[\log_2(I_{ctOU}/h_{ph}) \sim 3.499\alpha\right]} \Leftrightarrow \boxed{h_{ph} < I_{ctOU}/2^{d_{ph(c)}}}$$

$$\boxed{I_{ctOU}/h_{WZ} > 3.7\times10^{143}} \Leftrightarrow \boxed{d_{WZ(c)} > \left[\log_2\left(I_{ctOU}/h_{WZ}\right) \sim 3.48\alpha\right]} \Leftrightarrow \boxed{h_{WZ} < I_{ctOU}/2^{d_{WZ(c)}}}$$

$$\boxed{I_{ctOU}/h_{gl} > 3.1\times10^{146}} \Leftrightarrow \boxed{d_{gl(c)} > \left[\log_2\left(I_{ctOU}/h_{gl}\right) \sim 3.551\alpha\right]} \Leftrightarrow \boxed{h_{gl} < I_{ctOU}/2^{d_{gl(c)}}}$$

The relative closeness of the (fractal) alpha-dimensions d-sets (d_{eg}, d_{ph}, d_{WZ}, d_{gl}) and ($d_{eg(c)}$, $d_{ph(c)}$, $d_{WZ(c)}$, $d_{gl(c)}$) from the previous equations to the positive fractional ~4.5(α-D) and ~3.5(α-D) respectively is probably a non-coincidence generated by a more profound law of nature, and may explain why our WU appears to our senses/perception (together with their extensions: our measurement tools) as a 3D space with an additional half-dimension (unidirectional time) attached to it. However, the fact that $d_{eg(p)}$ ~4.5D is larger than 4(D) suggests at least one additional 5th dimension (a hyper-time) as SSTs also predict.

A similar but more striking (probably non-) coincidence emerges when expressing in alpha-units the binary logarithmic ratio between the partial global PIqua related to the present estimated age of WU (t_{pWU}) $I_{pWU}=E_{tWU}\cdot t_{pWU}$ to each of the four PIqua of the four FFs (h_{eg}, $h_{ph}=h$, $h_{W(Z)}$, h_{gl}), such as:

$$\boxed{I_{pWU} = E_{tWU}\cdot t_{pWU} \sim I_{tWU}/\left(7.2\cdot10^{20}\right) \sim 4.6\times10^{163}\,qbits}$$

$$\boxed{I_{pWU}/h_{eg} \sim 4.6\times10^{163}} \Leftrightarrow \boxed{d_{eg(p)} = \log_2\left(I_{pWU}/h_{eg}\right) \sim 3.967\alpha} \Leftrightarrow \boxed{h_{eg} \sim I_{pWU}/2^{d_{eg(p)}}}$$

$$\boxed{I_{pWU}/h_{ph} \sim 1.1\times10^{121}} \Leftrightarrow \boxed{d_{ph(p)} = \log_2(I_{pWU}/h_{ph}) \sim 2.934\alpha} \Leftrightarrow \boxed{h_{ph} \sim I_{pWU}/2^{d_{ph(p)}}}$$

$$\boxed{I_{pWU}/h_{W(Z)} \sim 1.8\times10^{120}} \Leftrightarrow \boxed{d_{WZ(p)} = \log_2\left(I_{pWU}/h_{W(Z)}\right) \sim 2.915\alpha} \Leftrightarrow \boxed{h_{W(Z)} \sim I_{pWU}/2^{d_{WZ(p)}}}$$

$$\boxed{I_{pWU}/h_{gl} \sim 1.5\times10^{123}} \Leftrightarrow \boxed{d_{gl(p)} = \log_2\left(I_{pWU}/h_{gl}\right) \sim 2.986\alpha} \Leftrightarrow \boxed{h_{gl} \sim I_{pWU}/2^{d_{gl(p)}}}$$

The relative closeness of the (fractal) alpha-dimensions (present) d-set ($d_{eg(p)}$, $d_{ph(p)}$, $d_{WZ(p)}$, $d_{gl(p)}$) from the previous equations to the positive integer ~4(α-D) and 3(α-D) respectively is probably a non-coincidence generated by a more profound law of nature, and may explain why our WU appears to our senses/perception/intuition (together with their extensions: our measurement tools) as a 3D space with an additional 4th dimension (time) attached to it. This may also partially explain the striking power of prediction that GR has, as it is based on a 4D spacetime model of the WU.

FSC and GCCr can also be redefined (double redefined GCC or GCCdr) as derived form N_{Pc} (independently of h_{eg} and h) and can be used to re-express the Ke, G and Gqe quantum scalars, such as:

$$\left\{\begin{array}{l}\boxed{GCCdr^{-1} = N_{Pc} = {N_a}^2 = 2^{2\alpha} \sim 3.2\times10^{82}} \\ GCCdr = {N_{Pc}}^{-1} = {N_a}^{-2} = 2^{-2\alpha} \sim 1/\left(3.2\times10^{82}\right)\end{array}\right\} \Leftrightarrow \left\{\begin{array}{l}\boxed{{GCC_{dr}}^{-1} = GCCr^{-2} \sim 4\left[\log_2\left(N_a\right)\right]^3/GCC^{-2}} \Leftrightarrow \\ \Leftrightarrow {GCC_{dr}}^{-1} = \left(G/K_e\right)^2\cdot\left(m_e/q_e\right)^4(4\alpha)\end{array}\right\}$$

$$\boxed{FSCr^{-1} = \log_2(N_{Pc}) = 2\log_2\left(N_a\right) = 2\alpha}\; and\; A = 2\alpha\,(by\; definition)$$

Another interesting (probably non-) coincidence emerges when comparing the global I_{tWU} and I_{ctOU} to the four PIqua of the four FFs (h_{eg}, $h_{ph}=h$, $h_{W(Z)}$, h_{gl}) using the binary logarithms of their simple ratios expressed in A-units (double alpha-units), such as:

$$\boxed{d_{eg} > \left[\log_2\left(I_{tWU} / h_{eg}\right) \sim 2.23A\right]}; \boxed{d_{eg(c)} > \left[\log_2\left(I_{ctOU} / h_{eg}\right) \sim 2.26A\right]}$$

$$\boxed{d_{ph} > \left[\log_2(I_{tWU} / h_{ph}) \sim 1.72A\right]}; \boxed{d_{ph(c)} > \left[\log_2(I_{ctOU} / h_{ph}) \sim 1.78A\right]}$$

$$\boxed{d_{WZ} > \left[\log_2\left(I_{tWU} / h_{WZ}\right) \sim 1.71A\right]}; \boxed{d_{WZ(c)} > \left[\log_2\left(I_{ctOU} / h_{WZ}\right) \sim 1.74A\right]}$$

$$\boxed{d_{gl} > \left[\log_2\left(I_{tWU} / h_{gl}\right) \sim 1.78A\right]}; \boxed{d_{gl(c)} > \left[\log_2\left(I_{ctOU} / h_{gl}\right) \sim 1.77A\right]}$$

When interpreted in A-dimensions, both global I_{tWU} and I_{ctOU} (what BIDUM interprets as OU) appear as a ~2D hologram where all the non-eg GBs move in ~1.75(A)D as dusts/swarms of 1(A)D-string AND egs being the only QP that can escape the 2D brane/display and/or can create the illusion of a 3rd dimension. BIDUM sustains this holographic principle (first proposed by Gerard't Hooft and then given a precise interpretation in SST by Leonard Susskind **[35]**), as the global PIqua (I_{tWU} and I_{ctOU}) need only a collection of multilayered 2(A)D (~2.26D) matrices to organize as an UOS and generate all reality as an apparent moving 3D (multilayer) image on a hypothetical WU/OU-2(A)D display.

BIDUM also presents another series of observations that are also considered non-coincidences generated by a more profound law of nature. This non-coincidences series links the ray of the observable universe (R_{OU}) and N_a with:

(1) the real (maximum) ray of the (supposed point-like) electron $R_{re} \sim Rp/(m_p/m_e)^{1/3} \sim 0.72 \cdot 10^{-16}$m (calculated based on the hypothesis that the proton and the electron have similar average energy-matter densities)

(2) the classical ray/diameter of the electron ($R_e \sim 2.8 \cdot 10^{-15}$m, $D_e = 2R_e \sim 2.8 \cdot 10^{-15}$m)

(3) the ray/diameter of the proton/neutron ($R_p \sim R_n \sim 0.88 \cdot 10^{-15}$m and $D_p = 2R_p \sim D_n = 2R_n \sim 1.75 \cdot 10^{-15}$ m)

(4) the Bohr ray/diameter of the hydrogen atom with its electron in the lowest energetic level ($R_B \sim 5.3 \cdot 10^{-11}$m and $D_B = 2R_B \sim 1.1 \cdot 10^{-10}$ m)

Table T5-2. The BL-TH applied to the ratios between R_{OU} (ray of the OU) and the dimensions of the main atomic/subatomic entities/particles
$\log_2(R_{OU} / R_{re}) \sim 142.1 \sim (103.7\%)\alpha$ $\log_2(R_{OU} / D_{re}) \sim 141.1 \sim (103\%)\alpha$
$\log_2(R_{OU} / R_{e}) \sim 136.85 \sim (99.86\%)\alpha$ $\log_2(R_{OU} / D_{e}) \sim 135.85 \sim (99.1\%)\alpha$
$\log_2(R_{OU} / R_{p}) \sim 138.53 \sim (101.09\%)\alpha$ $\log_2(R_{OU} / D_{p}) \sim 137.53 \sim (100.36\%)\alpha$
$\log_2(R_{OU} / R_{B}) \sim 122.65 \sim (89.5\%)\alpha$ $\log_2(R_{OU} / D_{B}) \sim 121.65 \sim (88.8\%)\alpha$

Another (considered non-)coincidence (that are related to the ones presented in the **Table T5-3)** regards the binary logarithmic ratios between the density of the proton/neutron ($\rho_n \sim [\rho_p = m_p/V_p] \sim m_n/V_n$, with $V_n \sim V_p = (4\pi/3)R_p^3$) and the densities of OU (ρ_{OU} and ρ_{maxOU} calculated previously)

Table T-X-2. The BL-TH applied to the ratios between the density of the proton/neutron and the densities of WU and OU
$\log_2(\rho_p / \rho_{OU}) \sim 145.6 \sim (106.3\%)\alpha, with\ \rho_p = m_p / V_p \sim 5.9\times10^{17}\ kg/m^3$
$\log_2(\rho_p / \rho_{WU}) \sim 150 \sim (109.5\%)\alpha$
$\log_2(\rho_p / \rho_{\max[1]OU}) \sim 171.4 \sim (125\%)\alpha$
$\log_2(\rho_p / \rho_{\max[2]OU}) \sim 141.5 \sim (103.3\%)\alpha$

The (considered non-)coincidences presented in tables **T5-2** and **T5-3** were also remarked by other authors (like Recami E.**[**60**]**) who considered them indirect arguments for the possibility of considering all NGPs as micro-universes and/or hadronic/leptonic micro-black-holes similar to our cosmos in a specific sense specified by those authors. However, these (considered non-)coincidences were never interpreted in the view of MBL-TH, using binary logarithms and α-units. In this category of (considered non-) coincidences (presented in **T5-2** and **T5-3)** there is also the observation first published by Barrow J. that the ratio between the age of the universe (t_{pWU}) and the mean-life of a proton expressed by its lower bound (t_p) is about the same order of magnitude as Eddington's number (the nof. peps directly detectable in the WU)**[2]**

BIDUM predicts that there are no absolute Euclidean dimensions of spacetime because spacetime is NOT absolute NOR Euclidean, but an emergent phenomena of the four PIqua flows from one mPI-gene to another mPI-gene (generating the fours FFs and their spacetime "scene"). The alpha-dimensions of the WU are the only relative (abstract)(dimensions, as (both objectively and subjectively) generated (as dimensionality perception) by the ratios between the global PIqua and the four PIqua of the four FPFs. In this way, BIDUM proposes the resolution of the apparent paradox that strings cannot generate spacetime without implying spacetime in their inner structure (one of the greatest problems of SSTs): BIDUM considers strings that abstract string-like PI flows that have NO spacetime, but only generate spacetime "sensation" by their flows between different mPI-genes: these PI-flows also interact with BOMs generating the perceptual impression /illusion of space and time. In this way, BIDUM proposes an alpha-dimensional explanation for the hierarchy problem as the EGF PI-flow appears to generate the 4th alpha-dimensional frame/illusion of the global PIqua (I_{tWU}) (and not vice versa how GR predicts [that gravity is generated by the curvature of the 4D spacetime]) and the other non-EGFs appear to generate the ~3D alpha-dimensional frame: as α~137 is more than 2 orders of magnitude larger than 1 and that explains the huge ratio of non-EGF to EGF strengths of about $2^{\alpha} \sim 10^{40}$ (40 orders of magnitude). BIDUM predicts five abstract alpha-dimensions generated by the four layers of the FF-internodes: this prediction is also contained in Randall-Sundrum universe models (RS-1 and RS-2) which propose a (4+1)D brane-based universe. **[36,37]. Although the spatial/temporal dimensions are redefined in BIDUM as alpha-dimensions**

(spatial or temporal), I have chosen the common abbreviation "D" for the concept "alpha-(abstract-PI)-dimension" for simplicity (instead of alpha-D or αD). Note that an α-dimension is the logarithmic form of a GCCr-dimension, as GCCr=N_a and α=$\log_2(N_a)$: α-dimension is the equivalent of a GCCr dimension.

The ratio between h_{eg} and the other non-EGF PIqua (h_{gl}, h_{ph} and h_{WZ}) is so small (40 orders of magnitude smaller that 1) such as the egs (the EGF-layer of OU/WU-internodes) tend to behave like a "liquid" spacetime in contrast to all the other GBs and NGPs that behave as if immersed and as if they may bend the so-called (eg/egic)spacetime (which is probably formed by a quantum sea/ocean/foam of free "sub-eg" strings and egs) bringing more close GR and QFT, as it may also explain the thermodynamics of the black-holes.

Essentially, BIDUM sustains the Simulation Hypothesis (SH) [38] by which OU/WU and HC are parts of simulated reality based on PIq gradients measurable in alpha-units (also measured in qbits): BIDUM also rebrings into attention the soul theory promoted by the majority of the faiths and religions in the world (products of the human intuition/revelation in which mind [BOM] and body[BOB] are considered simulated realities of the soul [bio-observer soul or BOS**]). BIDUM co-sustains (as most of religions do) that PO and BO are only software: energy, matter, spacetime, BOM and BOB are all subroutines of this main software (universal operating system [UOS])**

The fact that the universe is essentially (with high probability) pure software (organized as an UOS and containing both mPI-genes and mBI-genes) governed by the laws of mathematics (essentially the theory of information) is a fact that may also explain why mathematics offers such a good support in expressing the laws of physics which often use additions, extractions, products and exponentials (together with logarithms): "At this point an enigma presents itself which in all ages has agitated inquiring minds. How can it be that mathematics, being after all a product of human thought which is independent of experience, is so admirably appropriate to the objects of reality?" (Albert Einstein [39])

In the absence of a mature theory to explain the existence and functioning of the human consciousness (HC), all the TOE-models produced by this HC may be flaws generated by incomplete self-knowledge.

The (probably apparent non-) coincidence that [$\log_2(R_{OU}/R_e)$=$\log_2(R_{OU}/R_e)$]~[α=$\log_2(N_a)$~137] with N_a becoming an alpha-measure of the R_{OU} (by R_{OU}/Re ratio), ALSO opens the possibility that all ΔM to be actually "hidden" in the WU(OU) volume. Supposing that all ΔM is (may be) localized in $V_{WU(OU)}$ ("hidden" as dark matter and energy), BIDUM can predict the minimum percent of white energy-matter from the total energy-matter of this hypothetical universe of M_{ctOU} mass, such as:

$$\boxed{\%_{\min}(M_{arWU}) = M_{arWU} / M_{ctOU} = N_P / N_{Pc} = 1/368.2 \sim 0.27\%}$$

A corrected density of the OU (ρ_{cOU}) can be calculated as:

$$\boxed{\rho_{cOU} = M_{ctOU} / V_{WU(OU)} \sim 1.5\times10^{-25}\left(kg/m^3\right) \sim 368\rho_{WU} \sim 17.5\rho_{OU}} \Rightarrow$$

$$\Rightarrow \boxed{\Omega_f\left(\rho_{cOU}\right) \sim \left(17.2 > 1\right) \sim 17.5\Omega_f\left(\rho_{OU}\right) \sim 368\Omega_f\left(\rho_{WU}\right)}$$

As it can be observed from the previous equations, Ωf(ρ_{cOU})=17.2 is one order of magnitude higher than 1, which corresponds to a universe that will start to deflate and collapse as a Big-Crunch in the (probably) distant future, which is similar to a Phoenix universe **[40,41]**. The Barrow's Singular inflation theory **[42]** and Turok's Cyclic Model of the Universe (M-Theory Model of a Big Crunch/Big Bang Transition) **[43,44]** also sustain this possibility. The most recent measurements of top quark mass will surely bring more answers on whether our universe resides in a stable or metastable region of the electroweak theory (**EWT**) of the Standard Model (**SM**) **[45]**. If the global corrected PIqua of the OU (I_{ctOU}) and the global (corrected) mass of the OU (M_{ctOU}) take minimal values, then the cyclic inflate-collapse time interval of the OU expressed in units of classical linear time will the lower bound of the mean lifetime of the proton (also using the hypothesis that [t_{OU}= t_{WU}]>t_p)

Part 6.4. A 5D simulation of the OU and the prediction of all the main SGCs pre-calculated by different authors

OU (as measured indirectly by FSC and GCCr) can also be simulated by a 5D hyper spherical phase space (**5D-HSPS**) similar to the 3D-graph previous simulation of the WU. This 5D-HSPS can be represented as a 5D ball-graph in which the up/down quark-nodes are close to each other in triads (quark triangulation) super-organized in clusters/swarms (as most of WU is composed of hydrogen atoms clustered in stars) and the internodes (the 4FFs and their specific PI-quanta) are organized in 4 layers, one per each FF, each internode with a specific PI-quanta (h_{gl}, h_{ph}, h_W and h_{eg}) attached to it (that may be represented in different colors). Gravity is the basic layer of internodes: as this layer has ~4.5D, it is clear that it doesn't interconnect all the nodes from the 5D-HSPS, but only a ~4.5D dust of nodes that can be uniformly (but sparse) distributed in the 5D-HSPS, but also in the proximity of our 4D spacetime as if our 4D brane is attracting the egs and concentrates them in its vicinity. **[46,47]**. However, there is a high probability that this graph has a (quasi-)fractal character, as the nodes and internodes may be (relatively) uniformly distributed in the 5D-HSPS: the 3-non gravity FFs webs surely have a (quasi) fractal (quasi)uniform global distribution. The 4th and the 5th dimensions can be physical dimensions but ALSO pure informational/abstract dimensions in which the ~3.5D/ ~4.5D configurations of the 4 FFs are recorded/pre-designed. The SNF-EWF-EMF webs (of internodes) interconnects ~3.5D swarms of quarks from the global 5D-HSPS. The EGF webs (of internodes) interconnects ~4.5D swarms of quarks from the same global 5D-HSPS.

In the interior of a quark triad/triangulation (**QT**), all the 4 types of FF internodes superpose to each other such as the second layer is the EMF which has a theoretical infinite distance of action but which doesn't escape the 5th dimension (as the photons are considered open strings that remain in the ~3.5th dimension of our 4D brane). The EWF and SNF internodes are superposed to the EG and EMF webs, but their action is restrained in the interior of the **QT**. It is very probable that the egs interchanged in a QT to have a much larger intrinsic PI (a larger h_{eg} probably of the same order as h_{ph}) which implies a very large G (named Strong Gravity Constant [SGC abbreviated as Γ]). A quantum G (G_q) can also be generalized as a function of h_{eg} (which also may considered a function of I_{kWU} and the nof. (d) alpha-dimensions of the frame of reading). **If the OU phase space is considered a 5D hypersphere, then N_a ($=2^{\alpha}$) (the exponential alpha-unit measure) is the nof. NGP-nodes per each diameter of this hypersphere: if this OU phase space is considered a 5D hypercube, then N_a is the no. NGP-nodes per lateral edge of this 5D hypercube.** The (approximate) (fractional) nof. dimensions (d) corresponding to a specific value of Γ scalar (as predicted and calculated by different authors) can be generated using a simple logarithmic function with base N_a (it's obvious, however, that this function generates just an approximation of the real $d(\Gamma)$, as it is deducted [for simplicity of equations] from cubic volumes as in i(d) function, not spherical volumes).

$$G_q(d) = k_G \cdot \frac{I_{tWU}}{N_a^{\,d}}, with \quad k_G = \frac{c}{m_e^{\,2}(2\pi\alpha)}$$

$$d(\Gamma) = \log_{N_a}\left(\frac{I_{tWU}}{\Gamma / k_G}\right)$$

Table T-VI-1. The value of function $G_q(d)$ for different (fractional) nof. alpha-dimensions *d*
$G_q(\Gamma_{Seshavatharam-Avogadro} \sim 3.32^*) \sim 2.42\times10^{37} m^3kg^{-1}s^{-2} \sim \Gamma_{Seshavatharam-Avogadro} = N_A{}^2G \sim 3.6\times10^{47}G$ (*this frame predicts Γ as calculated by Seshavatharam and Lakshminarayana based on Avogadro Number (N_A) **[13,48,49,50,51]**)
$G_q(d_{Perng} \sim 3.44^*) \sim \Gamma_{Perng} = \frac{\hbar c}{m_e{}^2\alpha} \sim 2.78\times10^{32} m^3kg^{-1}s^{-2} \sim 4.2\times10^{42}G$ (*this frame predicts Γ as calculated by Perng**[13,14]**) ; Perng's Γ scalar is similar to the Fedosin's Γ scalar (see the last lines of this table)
$G_q(d_{Seshavatharam} \sim 3.455^*) \sim \Gamma_{Seshavatharam} \sim 6.94\times10^{31} m^3kg^{-1}s^{-2} \sim 1.04\times10^{42}G$ (*this frame predicts Γ as calculated by Seshavatharam and Lakshminarayana **[13,52])**
$G_q(d_{Fisenko} \sim 3.458^*) \sim \Gamma_{Fisenko} \sim 5.1\times10^{31} m^3kg^{-1}s^{-2} \sim 7.6\times10^{41}G$ (*this frame predicts Γ as calculated by Fisenko et al.**[13,53,54,55]** who found a spectrum of steady states of the electron in proper gravitational field (0.511 MeV …0.681 MeV) on the base of this value of Γ)
$G_q(d_{Recami} \sim 3.487^*) \sim \Gamma_{Recami} \sim 3.2\times10^{30} m^3kg^{-1}s^{-2} \sim 4.8\times10^{40}G$ (*this frame predicts Γ as calculated by Recami **[13,56,57,58,59,60]**)
$G_q(d_{Fedo\sin} \sim 3.519^*) \sim \Gamma_{Fedo\sin} = \frac{\hbar c}{m_p m_e \alpha} \sim 1.514\times10^{29} m^3kg^{-1}s^{-2} \sim 2.3\times10^{39}G$ (*this frame predicts Γ as calculated by Fedosin in 1999 on the basis of equality between the Coulomb electric force and gravitational force in the hydrogen atom on the Bohr radius **[13,61,62,63,64]**); Fedosin's Γ scalar is very similar to Perng's Γ scalar (see the first lines of this table)
$G_q(d_{Tennakone} \sim 3.533^*) \sim \Gamma_{Tennakone} \sim 3.9\times10^{28} m^3kg^{-1}s^{-2} \sim 5.8\times10^{38}G$ (*this frame predicts Γ as calculated by Tennakone **[13,65]**)
$G_q(d_{Stone} \sim 3.539^*) \sim \Gamma_{Stone} \sim 2.4\times10^{28} m^3kg^{-1}s^{-2} \sim 3.6\times10^{38}G$ (*this frame predicts Γ as calculated by Stone**[13,66]**)
$G_q(d_{Oldershaw} \sim 3.54^*) \sim \Gamma_{Oldershaw} \sim 2.18\times10^{28} m^3kg^{-1}s^{-2} \sim 3.3\times10^{38}G$ (*this frame predicts Γ as calculated by Oldershaw**[13,67]**)
$G_q(d_{Mongan} \sim 3.547^*) \sim \Gamma_{Mongan} \sim 1.1\times10^{28} m^3kg^{-1}s^{-2} \sim 1.6\times10^{38}G$ (*this frame predicts Γ as calculated by Mongan**[13,68]**)
$G_q(d_{Sivaram} \sim 3.552^*) \sim \Gamma_{Sivaram} \sim 6.7\times10^{27} m^3kg^{-1}s^{-2} \sim 1.004\times10^{38}G$ (*this frame predicts Γ as calculated by Sivaram and Sinha**[13,69]** based on the analogy**[13,70]** between hadrons and Kerr-Newman black holes; this value of Γ is also accepted by Raut and Usha**[13,71]**; $\Gamma_{Sivaram}$ also allowed estimating the strong spin-torsion interaction between spinning protons**[13,72]**)
$G_q(d_{Dufour} \sim 3.613^*) \sim \Gamma_{Dufour} \sim 2.06\times10^{25} m^3kg^{-1}s^{-2} \sim 3.1\times10^{35}G$ (*this frame predicts Γ as calculated by Dufour**[13,73]**)

As all the four FFs have dimensional frames with a fractal dimension d>3, BIDUM associates each elementary QP node in the graph (quark/lepton/neutrino) with a 3D-brane which may be considered a 3D (point-like) ball-branes (3D-bb) (and not 0D as adimensional points are) with a specific ray and a 2D spherical surface. ITMU distinguishes 3 major types of 3D-bbs: quark 3D-bbs (q3D-bbs, one per each type of quark, from which up/down Q3D-bbs are the most stable and implicitly most frequently present in the WU), lepton 3D-bbs (L3D-bbs, one per each type of lepton, from which the electron is the most stable and implicitly most frequently present in WU) and neutrino 3D-bbs (N3D-bbs, one per each type of neutrino, from which the electron neutrino is the most stable and implicitly most frequently present in the WU). The 4 GBs can be considered cylindrical surfaces (that may oscillate between cylindrical [wave] and spherical [particle] geometrical extreme states, generating the wavicle character of all NGPs [that permanently emit egs from their surfaces] and all GBs, as

conjectured by de Broglie's hypothesis) that have the capacity to interconnect the Q3D-bbs in the 4 different specific frames defined by the dimensional set (d_{eg}, d_{ph}, d_{WZ} and d_{gl}). The 5D-HSPS may be considered a swarm of Q/L/N3D-bbs interconnected by 2D cylindrical/spherical branes (the GBs). This may explain why the universe has a 3D appearance (as these elementary Q/L/N3D-bbs are), as each of these 3D nodes (the elementary QPs that are 3D-bb) emits GBs on a spherical surface and interchange PI (location-momentum) in pulses that creates PI gradients between different 3D-bbs. These 3D-bbs may have an multilayered internal structure (multiple concentric 2D-branes as spherical surfaces [2D-sb] superposed one to another, from the center to the peripheral region of those 3D-bbs).

Using the generalized G_q scalar we can estimate as $G_q(3)$ the minimal magnitude of the cohesion force between 2 adjacent concentric 2D-sb of the same 3D-bb: this hypothetical (but very probable to exist) may be called Very Strong (Quantum) Gravity (VSG) (analogous to Strong Gravity [SG] defined by the predicted SGC series [Γ]). The maximal magnitude of VSG may be defined by $G_q(2)$. The huge magnitude of the minimal-to-maximal interval of VSG may explain why the so-called elementary QPs appear as point-like unsplittable QPs in all the experiments conducted until now in the LHC. If we recursively consider that the 2D-bs are also formed by strings (1D-branes[1D-bs]) attached together, then we can estimate the cohesion force between those strings (1D-branes) in the interval $G_q(2)$ and $G_q(1)$. If we recursively consider that the 1D-bs (strings) are also swarms of adimensional points (0D-branes[0D-bs]) (with defined PI-gradients between adjacent points, PI-gradients that makes them distinguishable one from another on that strings: **only the points that have a PI-gradient with its adjacent points truly exist [a condition of existence based on non-uniform PI-distribution: a principle of absolute non-homogeneity/differentiation of the same mPI-gene "clone"-points of the OU (similar to clone cells role/function specialization/differentiation)]; in this view, a string can be considered swarms of points that can be analyzed with the tools of the swarm theory: the PI-gradient between the points of a swarm string of adimensional points creates the spacetime-energy-matter illusion, as ITMU considers spacetime and energy-matter as emergent from the intrinsic PI of each different adimensional point**) attached together, then we can estimate the cohesion force between those points (0D-branes) in the interval $G_q(1)$ and $G_q(0)$.

$$G_q(3) \sim 3.9\times10^{50} m^3 kg^{-1} s^{-2} \sim 5.9\times10^{60} G$$

$$G_q(2) \sim 6.98\times10^{91} m^3 kg^{-1} s^{-2} \sim 1.05\times10^{102} G$$

$$G_q(1) \sim 1.2\times10^{133} m^3 kg^{-1} s^{-2} \sim 1.9\times10^{143} G$$

$$G_q(0) \sim 2.2\times10^{174} m^3 kg^{-1} s^{-2} \sim 3.3\times10^{184} G$$

An important remark. Apparently N_P is the real number of QPs in the WU and the difference to $ND^{4.5D}$ is an imaginary number. In fact, these additional particles may be considered real QPs in other parallel 4D-branes equatorial plates of the 5D-HSPS: from this consideration it is also clear that the 4 FFs have not only a transverse action in space, but also a longitudinal action in the 4th and the 5th dimensions (time and hyper-time) connecting QPs with their own "clones" from the other parallel 4D-bs (in other words, the 4 FFs are ways in which each particle connect not only with the other, but also with themselves, alias their replicas from other parallel 4D-plates/branes).

All the GBs except the egs can escape the 3Dbs in the 4th dimension (but not the 5th dimension), creating ~3.5D webs of the 3 non-EG FFs. ITMU considers that egs are close strings than are interchanged by 3D-bbs that can escape both the 4th and the 5th dimensions (as **SST** and M-Theory[**MT**] also predict): however, our 4D-b attracts the egs that escape from it in the 5th dimension and tends to concentrate those egs in its vicinity**[37,46,48]**.

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Part 6.5. The law of PIqua-emmision/reception can explain the EMF and EGF classical scalars

The granulated structure of any NGP (as a dust of identical/similar 3D-branes (**3Dbs**) with a fractional nof. alpha-dimensions between 3D and 4D, approximately ~3.5D located in a 4Db), the 3Db character of all EQPs and the quantum field theory (in which all the four FFs are generated by the interchange of virtual GBs including the eg) may also explain the gravity (as attractive force) and its inverse square law (the law of inverse proportionality to the square root of distance that characterizes EMF and EGF scalars). Large (hadronic-based) (rest and dynamic) masses emit many more egs with higher frequencies domain than small masses: egs contain PI about the emitter (larger) mass and are received in a much larger amount by the targeted small-masses than vice versa (as from the small-mass body to the large-mass body) AND that may explain why the small-masses are attracted by the larger-masses (by receiving a larger nof. messages). This is an informational explanation to the fact that the same attractive EGF induces a higher speed to the smaller mass.

The fact that scalar of the (Newtonian) gravitational force (F_g) is **dp** to the product of masses may be explained by each mass (m_1 and m_2) being a ~3.5D dust composed of n_1 and respectively n_2 elementary 3Dbs AND that each of those subcomponent 3Dbs (from the ~3.5D dust of m_1) communicates (by emission-reception of virtual/real egs) with all the subcomponent 3Dbs of m_2 and vice-versa, such as **F_g is dp to [$(n_1 \cdot n_2) \cdot m_{3Db}^2$] product** (with **$m_{3Db}$** being a minimal hypothetical elementary mass of a standard 3Db that composes both masses). Each mass (supposed point-like when compared to the distance d between those masses) scatters egs in all the 3D directions of space on a surface of a sphere with variable ray(r). For r=d, the first group of n_1 egs (at least 1 eg emitted by each of n_1 3Dbs) will be scattered on a spherical surface of area $A_1 = 4\pi d^2$ and the same type of spreading is generating by m_2 with $A_2=A_1=A=4\pi d^2$: the probability for each eg emitted by one mass (or the other) to target a subcomponent 3Db of the other mass is inversely proportional (**inp**) to A_1 and A_2 respectively and so F_g will be **inp** to the sum of the 2 areas ($A_1+A_2=2A=8\pi d^2$) such as $F_g=(8\pi G) \cdot [(n_1 \cdot n_2) \cdot m^2]/(8\pi d^2)$. That's why BIDUM considers $8\pi G$ (used to simplify the 8π sub-factor of $8\pi d^2$) a true corrected Newtonian G ($G_c=8\pi G$) offering an alternative additional explanation for the $8\pi G$ factor in the Einstein (gravitational) field equations (**EFE**) that may bring more close **GR** and **Quantum Field Theory** (**QFT).**

As egs may be considered closed strings scattered in both the 4th and the 5th dimension (SST hypothesis and prediction) there is a non-0 probability for each eg to target the other mass even if they are emitted in the opposite direction of the targeted-mass (as they may return from the 4Db/5Db/4th/5th dimensions back in the ~3.5D dust of the emitter-mass from another direction, which makes theoretically possible the targeting of the other mass): that's why, when formulating the F_g scalar, BIDUM considers the sum of 2 integral spherical areas $A_1+A_2=2A$ and not just the sum of 2 hemispheres strictly reciprocally oriented to the other mass). Analogously, as the virtual/real photons don't escape the 4Db of the emitter-mass (as predicted by SST), only the virtual/real photons emitted on the hemisphere oriented to the other charge (with both charges composed of n_1 and n_2 nof. 3Dbs, each with an elementary charge of **q_{3Db}**) will participate in generation of the electromagnetic/Coulomb force (F_e) and that's why the F_e scalar is **inp** to the sum of 2 hemispheric areas ($A_1/2+A_2/2 = (A_1+A_2)/2 = 2A/2 = 4\pi d^2$) and that's why BIDUM considers $4\pi K_e$ (used to simplify the 4π sub-factor of $4\pi d^2$) a true corrected Coulombian K_e ($K_{ec}=4\pi K_e$):

$$\boxed{G_c = 8\pi G} \; and \; \boxed{F_g = G_c \frac{(n_1 n_2) m_{3D-b}^{\;2}}{A_1 + A_2} = G_c \frac{(n_1 n_2) m_{3D-b}^{\;2}}{8\pi d^2}}$$

$$\boxed{K_{ec} = 4\pi Ke} \; and \; \boxed{F_e = K_{ec} \frac{(n_1 n_2) q_{3D-b}^{\;2}}{(A_1/2)+(A_2/2)} = K_{ec} \frac{(n_1 n_2) q_{3D-b}^{\;2}}{4\pi d^2}}$$

$$\boxed{G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}} \Leftrightarrow \boxed{G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{G_c}{c^4} T_{\mu\nu}} \; \textbf{(EFE)}$$

One may also speculate that the 3Dbs (which compose all the known NGPs) may also have an "onion"-like internal (sub)structure, being composed of concentric layers of 2Dbs kept in adhesion by Very Strong

Gravity (**VSG**) adhesion forces characterized by strengths between $G_q(3)\sim10^{61}G$ and $G_q(2)\sim10^{102}G$: these VSG forces may explain why the so-called EQP appear as point-like and almost perfectly spherical (as the electron was shown to be**[74]**) apparently elementary particles, as no experiment managed to split these EQPs in subcomponents until the present time. The 2Dbs may also have an "onion"-like internal (sub)structure, being composed of concentric layers of 1Dbs (strings) kept in adhesion by **VSG** adhesion forces characterized by strengths between $Gq(2)\sim10^{102}G$ and $Gq(1)\sim10^{143}G$. The 2Dbs may also have an internal (sub)structure, being composed of 0Dbs (PIqua points) kept in adhesion by **VSG** adhesion forces characterized by strengths between $Gq(1)\sim10^{143}G$ and $Gq(0)\sim10^{184}G$.

In conclusion, BIDUM also sustains the Preonic Models (PM) of the EQPs (including the Rishonic Model [**RM**]of EQPs) **[75]** that go far beyond the Standard Model (**SM**) with the hypothesis (for which there are a couple of suggestive experimental indications) that leptons, neutrinos, and quarks are composite QPs (built from confined fermionic subparticles called "rishons") and their structure is described by the quantum group SLq(2) **[76]**. Additionally., BIDUM also predicts the magnitudes of specific N<3 dimensional VSG huge adhesion forces with $G_q(N)$ strengths.

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Part 6.8. A h_{eg} series (hs_{eg}) prediction for any atom, based on the average nuclear binding energy per nucleon (E_{BN}) as a measure of ST level of contraction/"compression" at high nuclear internal „pressures"

The nof. egs emitted by a specific NGP is dp to the frequency of emision of egs (which is inp to its real spatial diameter) and to the relativistic energy-mass of that NGP (as a higher mass permits the firing of more co-phase egs per each pulse of emission). The nof. egs emitted by an atom is dp to nof. NGPs composing that atom and also dp to the sum of all masses/energies of those subatomic NGPs (proton, neutron and electron). The **protons/neutrons total rest mass (M_{ps} and M_{ns})** in a neutral (intact) atom can be aproximated as a function of the nof. (atomic, not-free) protons/neutrons (**N_{ap}/N_{an}**) and also considering the mass „defect"/**E_{BN}** of the protons/neutrons in the atom:

$$M_{ps}(N_{ap},E_{BN})=N_{ap}\cdot(m_p-E_{BN}/c^2);\quad M_{ns}(N_n,E_{BN})=N_n\cdot(m_n-E_{BN}/c^2)$$

The total (dynamic) mass of the electrons (**M_{es}**) in a neutral atom can be aproximated as a function of the **nof. (atomic, not-free) electrons** (**N_{ae}=N_{ap}**) and also considering the dynamic mass of the electrons in the atom's electronic shell as a function of an average speed of the electrons (v_e) from that shell:

$$M_{es}(N_{ae},v_e)=N_{ae}\cdot(m_e+m_e\cdot v_e^{\,2}/c^2)$$

The **atom's total (rest) mass** (**M_a**) (considering hyper-dynamic electrons and cvasi-static nucleons) is the sum of the 3 functions described before (**M_{ns}**, **M_{ps}** and **M_{es}**):

$$M_a(N_{ap},N_{an},E_{BN},v_e)=M_{ps}(N_{ap},E_{BN})+M_{ns}(N_{an},E_{BN})+M_{es}(N_{ae},v_e)$$

As the NGP-nodes „rest" on the four webs of GB-internodes layers (from which EGF-layers is the most „deformable" as gravity is the most weak force of the 4 FFs), the rest and kinetic masses of the NGP-nodes can produce the firing of more egs with higher eg in the EGF-web-layer of (GB-)internodes. For simplicity, BIDUM proposes a plausible simple grade-I function to describe the relationship between E_{BN} and the informational quanta / energy of a single emitted eg (E_{eg}=function(heg_n); **BIDUM** considers hs_{eg} as dp to the ST level of compression which is also relative to the initial free masses of the proton and neutron at rest, which differ slightly from one another). E_{BN} measures the level of the SNF exerted on a nucleon in a specific nucleus, and the ST compression/quantum pressure**[77,78]** is dp to that level of force (measured by E_{BN}). The level of the ST compression in a particle can be measured supra-unitary by the (inverse) ratio between a particle rest mass and the compressed particle mass (the rest mass - mass defect): see **P_{CR} (proton compression ratio), N_{CR} (neutron compression ratio)** and **E_{CR} (electron compression ratio)** functions (E_{CR} is sub-unitary as the electrons have negative mass „defects" generated by their high relativistic average speed[v_e] in the atom)

$$P_{CR}(E_{BN})=m_p/(m_p-E_{BN}/c^2);\quad N_{CR}(E_{BN})=m_n/(m_n-E_{BN}/c^2);$$
$$E_{CR}(v_e)=m_e/(m_e+m_e\cdot v_e^{\,2}/c^2)$$

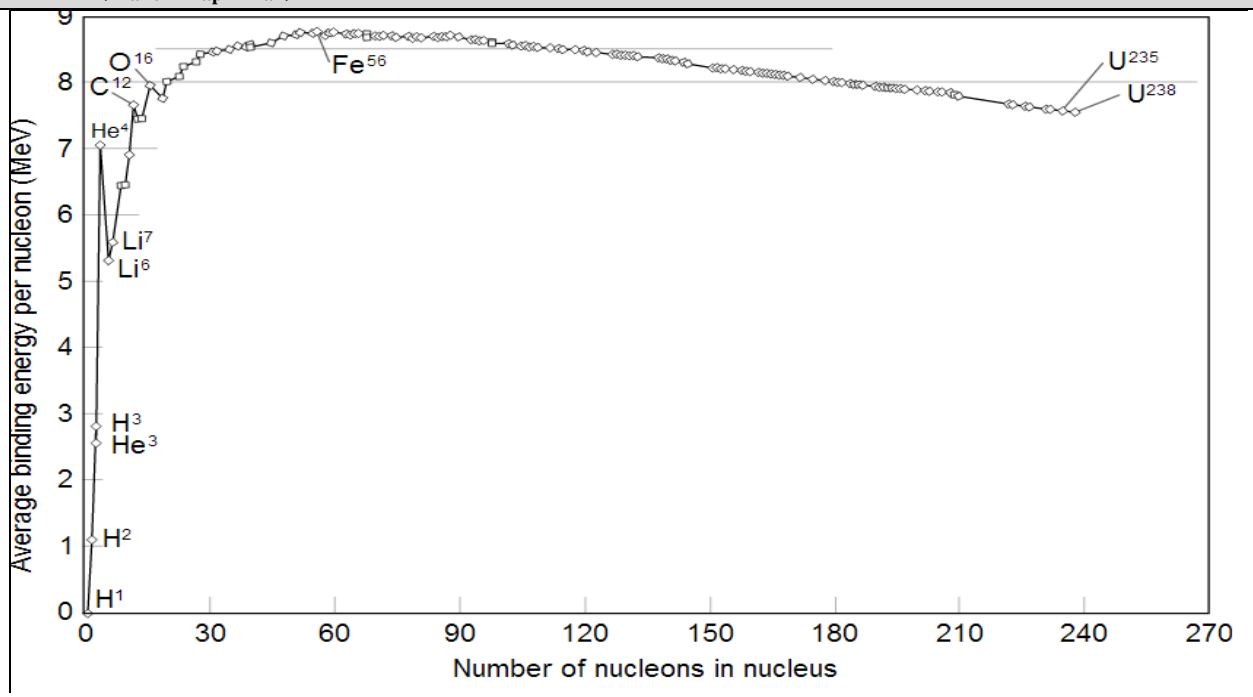
In any atom, the standard h_{eg} (and the single eg energy: $E_{eg}[\lambda]$) may have a specific grade-I function type distorsion for any type of subatomic particle from that atom, as function of **P_{CR}**, **N_{CR}** and **E_{CR}**: **h_{egP}** (intranuclear proton specific h_{eg} of emission), **h_{egN}** (intranuclear neutron specific h_{eg} of emission) and **h_{egE}** (atom's electrons specific h_{eg} of emission, when moving with an average speed [**v_e**])**:**

$$h_{egP}=h_{eg}\cdot P_{CR}(E_{BN});\quad h_{egN}=h_{eg}\cdot N_{CR}(E_{BN});\quad h_{egE}=h_{eg}\cdot E_{CR}(v_e)$$

In fact, what it is measured (indirectly) as h_{eg} (by measuring G in different experiments) is (very plausibly) the weighted mean between these 3 separate specific h_{eg} in any atom: h_{egP}, h_{egN} and h_{egE}. That's why BIDUM considers a h_{eg} series (named hs_{eg}) for all types of atoms in which each element ($hs_{eg(n)}$) is a weighted mean of all the 3 specific h_{eg} (h_{egP}, h_{egN} and h_{egE}) of each subatomic particle in each type of atom:

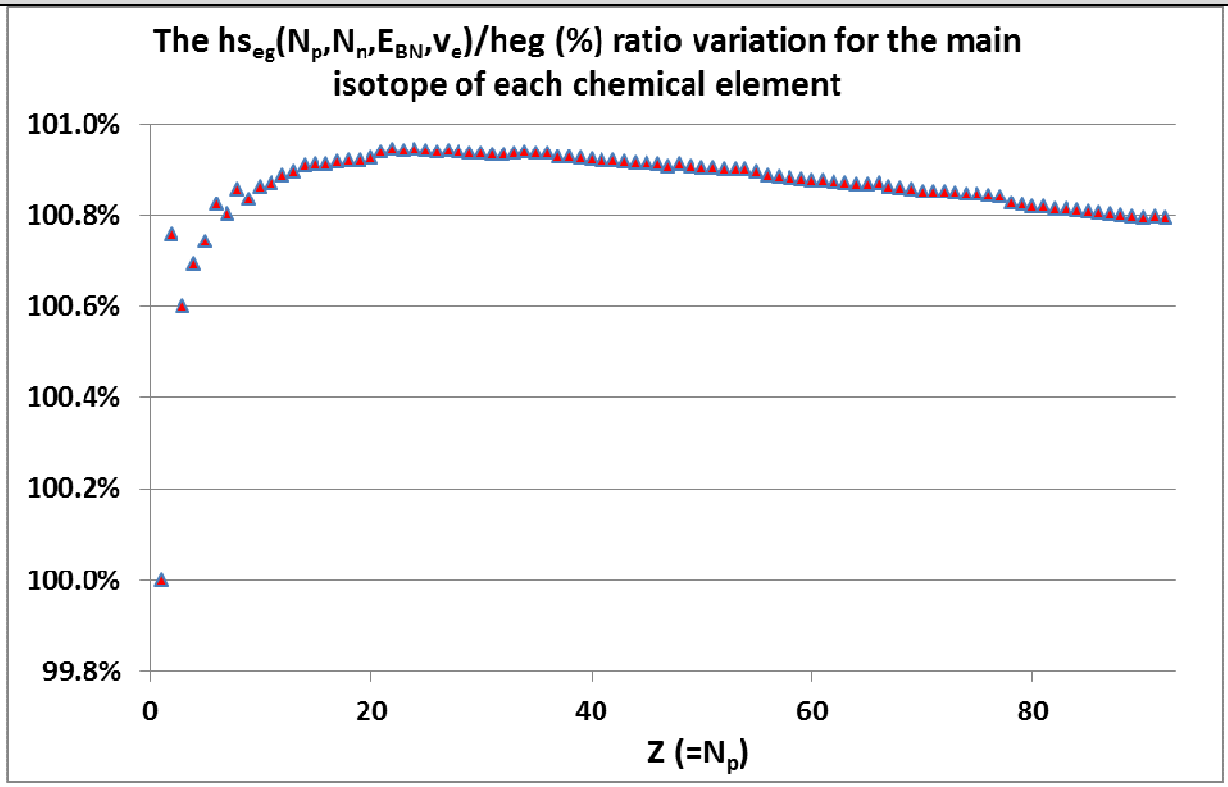
$$hs_{eg}(N_{ap},N_{an},E_{BN},v_e)=h_{egP}\cdot\frac{M_{ps}(N_{ap},E_{BN})}{M_a(N_{ap},N_{an},E_{BN},v_e)}+h_{egN}\cdot\frac{M_{ns}(N_{an},E_{BN})}{M_a(N_{ap},N_{an},E_{BN},v_e)}+h_{egE}\cdot\frac{M_{es}(N_{ap},v_e)}{M_a(N_{ap},N_{an},E_{BN},v$$

Figure F5-1. E_{BN} ([average] nuclear binding energy [per each nucleon]) variation with the nof. nucleons ($N_{anc}=N_{ap}+N_{an}$)[6]



[6] URL (figure source): upload.wikimedia.org/wikipedia/commons/5/53/Binding_energy_curve_-_common_isotopes.svg

Figure F5-2. hs_{eg} as a function of each atom's specific E_{BN}: the hs_{eg}/h_{eg} ratio variation for the main isotope of each chemical element



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Part 6.9. The multiple G hypothesis (MGH): a G_{qe} series (Gs_{qe}) prediction for any atom, based on the h_{eg} series (hs_{eg})

In BIDUM, the quantum electronic/positronic G series (Gs_{qe}) generated by a single atom is defined as a function of heg series (**hs_{eg}**), such as:

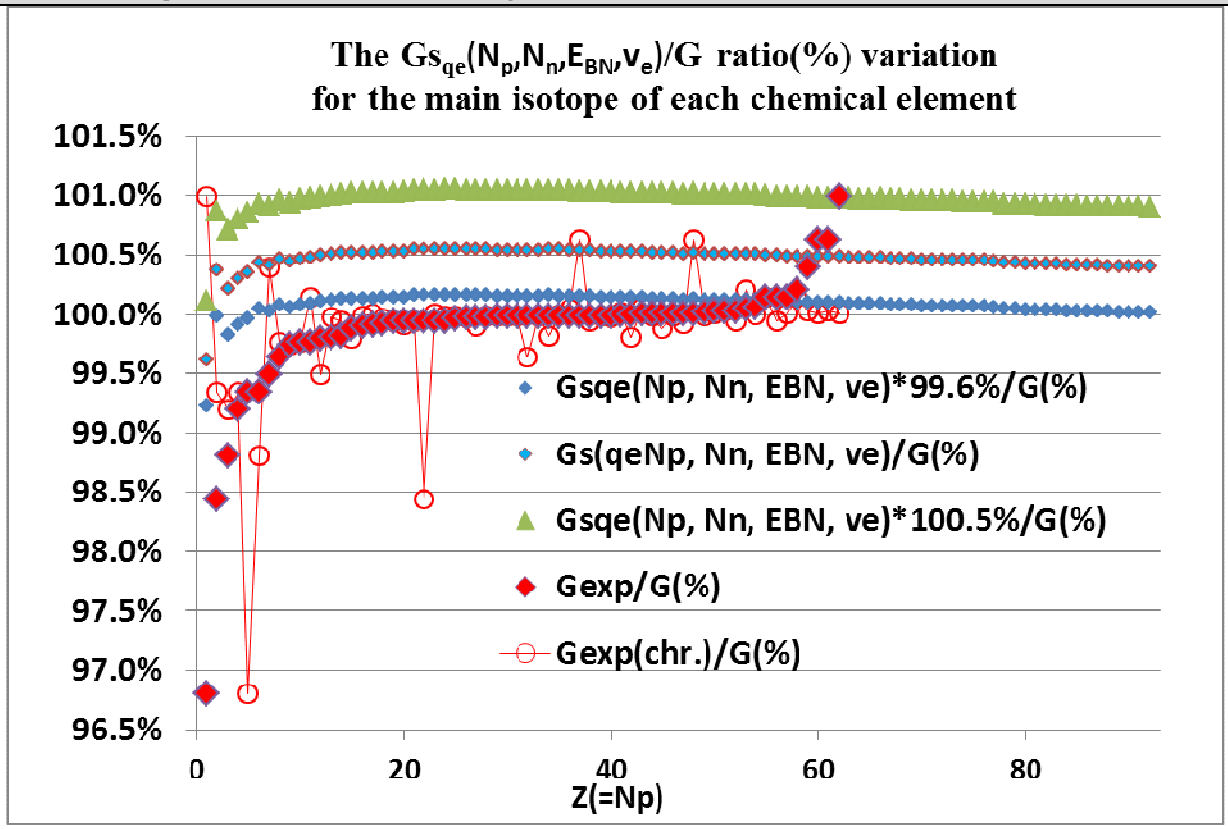
$$\boxed{Gs_{qe}(N_{ap},N_{an},E_{BN},v_e)=k_G\cdot hs_{eg}\left(N_{ap},N_{an},E_{BN},v_e\right)},\ with\ \boxed{*k_G=\frac{c}{m_e^{\,2}(2\pi\alpha)}}$$

BIDUM considers that experimental G (as measured between two atoms [a_1 and a_2]) is the result of measuring the interchange of two simultanously combined flows of egs (each characterized by $hs_{eg(1)}$ and $hs_{eg(2)}$, which are each defined as weighted means of **hegP**, **hegN** and **hegE**), each characterized by a specific quantum Gs_{qe} element (**$G_{sqe(1)}$** and **$G_{sqe(2)}$**): the resulting **$G_{sqe(1,2)}$** scalar can be defined as the geometric mean (not a arithmetic mean) of **$G_{sqe(1)}$** and **$G_{sqe(2)}$,** as multiplying two hs_{eg} elements (which are PIqs) means counting the nof. all the possible pair-combinations between all the (sub)quantum states of each of the two egs.

$$\boxed{\begin{aligned}&Gs_{qe}(N_{ap(1,2)},N_{an(1,2)},E_{BN(1,2)},v_{e(1,2)})=\sqrt{Gs_{qe(1)}\cdot Gs_{qe(2)}}=\\&=\sqrt{Gs_{qe}\left(N_{ap(1)},N_{an(1)},E_{BN(1)},v_{e(1)}\right)\cdot Gs_{qe}\left(N_{ap(2)},N_{an(2)},E_{BN(2)},v_{e(2)}\right)}=\\&=k_G\cdot\sqrt{hs_{eg}\left(N_{ap(1)},N_{an(1)},E_{BN(1)},v_{e(1)}\right)\cdot hs_{eg}\left(N_{ap(2)},N_{an(2)},E_{BN(2)},v_{e(2)}\right)}\end{aligned}},$$

As it can be seen in the next figure (**F5-3**), the theoretical Gs_{qe} triple variant graph approximates all the G measurements in the past over 200 years**[79,80,81,82,83]** (for clarity, the error limits for each determined value of G where not represented in the next graph) (**G_{exp}[red circle marks on figure F-XIV.B-1]**: a chronological order aproximating the rising accuracy of the devices used to determine G; **G_{exp}(chr.)[red rhomboidal marks with connecting lines on figure F-XIV.B-1]**: the experimental G values in a non-chronological but ascending order quite similar to the hs_{eg} graph curve from figure **F-XIV.A-2** used to determine Gs_{qe} series plotted in **figure F-XIV.B-1**). However, all the G results obtained on Earth are „contaminated" by the (already) curved ST/egs flow (by the Sun and the Earth) in which the experiments take place. BIDUM can aproximate Sun's and Earth's specific average Gs_{qe} based on their chemical composition. **Because of the abundance in hydrogen (H) (>70%)[84] (H is a chemical element with a specific Gs_{qe}~99.6%·G), the Sun's specific average Gs_{qe} is smaller than G [blue rhomboidal marks** in figure **F5-3]. Because of the abundance in oxygen (O) (>30%)**[**85**] **(O is a chemical element with a specific Gs_{qe}~100.5%·G), the Earth's crust's specific average Gs_{qe} is larger than G [green triangled marks** on figure **F-XIV.B-1]**. When experiments are conducted into space, exprimental G will tend to be smaller (due to the influence of the hydrogen-based Gs_{qe} of the Sun generated by the Sun's gobal flow of egs emitted towards the Earth). When the experiments are conducted deep in the Earth's layers (as one experiment that took place in ~1km deep mines) they tend to generate a larger experimental G. BIDUM predicts that the G determination will ALSO depend on the altitude and latitude at which the experiment takes place, will depend on the Sun/other Stars-Earth momentary distance/configuration, but also on the chemical composition of that specific Earth region in which the experiment takes place.

Figure F5-3. Gs_{qe} series (as function of hs_{eg} series) compared to G experimental values



This multiple G hypothesis is verifiable both retrospectively (by analyzing the negative/positive altitude/latitude, the Sun/Stas-Earth configuration, the chemical composition of that region and of all the materials**[79]** used in past 200 years G determination experiments) and in the future by using the same experimental device at different altitudes/latitudes **[86,87,88]** and in different regions and using metal spheres of different atoms or single various atoms and analyze the systematic differences**[89]** between the experimental G as function of all these chemical and physical variables. BIDUM recommends Gundlach's and Merkowitz's method**[90]** and *atom inferometry using cold atoms* **[91,92]**. BIDUM also predicts that any change in the relative position/distance between the Sun and the Earth in the interval of the experiment can slightly influence the results: in 2002 Mikhail Gershteyn and his colleagues have successfully demonstrated experimentally that the well-known force of gravity between 2 test bodies varies with their orientation in space, relative to a system of distant stars **[93]**.

BIDUM proposes a plausible explanation to the apparent paradox of the divergent variation of experimental G values („despite" constant improvements of the measurement systems) as these measurement systems can now better differentiate between different chemical structures combined G „imprints" and Sun-Earth-star systems configurations „imprints" (in 1999, CODATA decided to officially increase the uncertainty of the accepted value for G from 128 ppm to 1500 ppm). As gravity is the key problem of the millenium **[94,95,96]**, measuring G with higher accuracy at micropic (including atomic) distances is a priority.

The multiple G hypothesis of BIDUM can change the paradigm in quantum gravity theory demonstration/verification (as an indirect elegant proof of eg existence and quantum gravity: a right „under our nose" quantum gravity proof hidden/masked by the experimental G value relatively high variability and open an unexpected gate to a potential informational TOE (as BIDUM is).

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Part 7. References of BIDUM (listed in the order of their apparition in this paper)

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