A Bio-Info-Digital Universe Model (BIDUM version 1.1[1]) – a short summary of the essential equations (each briefly explained)

Author: Andrei-Lucian Drăgoi [2,3]

EXPLANATIONS / OBSERVATIONS / COMMENTS	EQUATIONS AND ADDITIONAL EXPLANATIONS
THE MAIN BINARY LOGARITHM VARIANT OF THE TELLER HYPOTHESIS (MBL-TH) AND THE PHYSICAL INFORMATION QUANTITY (PIq) SCALAR	
I have discovered an intriguing numerical coincidence that links the Fine Structure Constant (FSC) with the Gravitational Coupling Constant (GCC= α_G). I consider this coincidence too simple and elegant to be just a pure coincidence: most probably it "hides" a still undiscovered law of the Observable Universe (**OU**).	$\boxed{\alpha_G^{-1}/2=\bcancel{\hbar}/(Gm_e^2/c)\sim\alpha^{3/2}2^{\alpha}}$, $\log_2\left[\bcancel{\hbar}/(\alpha^{3/2}Gm_e^2/c)\right]\sim 137.0304\sim(99.996\%)\alpha,$ $\bcancel{\hbar}/(\alpha^{3/2}Gm_e^2/c)\sim 1.78\times10^{41}\sim(99.613\%)2^{\alpha}$ $with\ \bcancel{\hbar}=\frac{\hbar}{2\pi}=\frac{h}{4\pi},\alpha=FSC^{-1}\sim 137.036$ $and\ \alpha_G^{-1}=\hbar c/(Gm_e^2)=\hbar/(Gm_e^2/c)$
I have named this numerical (non-)coincidence as **BTH** (**the (main) Binary (Logarithm) Teller Hypothesis**) as it is a special variant of Teller's Large Number Hypothesis (**TLNH**), which is an alternative to Dirac's Large Number Hypothesis (**DLNH**). I consider that BTH is an exact equality generated by an undiscovered law of nature by which all adimensional physical constant probably have a double definition, like FSC and GCC may have. **BTH** can also offer an alternative quantum definition for the classical (Newtonian) G, as explained later.	For the simplicity of BTH, I have defined another variant of GCC as $\bcancel{\alpha}_G=\alpha_G^{-1}/2$, as α_G is also a G-based constant with a relatively arbitrary definition. $\boxed{\alpha_G^{-1}=2\alpha^{3/2}2^{\alpha}=\alpha^{3/2}2^{\alpha+1}}(BTH)$ $\boxed{\bcancel{\alpha}_G=\alpha^{3/2}2^{\alpha}}(BTH)$ $with\ \bcancel{\alpha}_G=\alpha_G^{-1}/2=\bcancel{\hbar}/(Gm_e^2/c)$
BTH proposes that both FSC and GCC have a double significance, both electromagnetic and gravitational and can be derived from a single (electrogravitational) constant $\boxed{N_a\left(=2^{\alpha}\right)\sim 1.8\times10^{41}}$ which I consider (most probably) a very large integer with an informational significance, as the maximum number of (**nof.**) (equally probable) states of a specific system. Both FSC and GCC have a two independent co-definitions in BIDUM: one (definition) of (each) may have an informational meaning. In this view, α is a logarithmic informational constant and $\bcancel{\alpha}_G$ is a linearithmic informational constant that both measure the same nof. states (N_a) of a specific system.	$FSC=\alpha^{-1}$ can be interpreted as a logarithmic probability of a specific state chosen from the N_a states of a specific system. $GCC=\left(2\bcancel{\alpha}_G\right)^{-1}$ can be interpreted as a linearithmic probability of a specific state chosen from the N_a states of the same specific system. $\alpha=FSC^{-1}=\log_2\left(N_a\right)=\hbar/(K_eq_e^2/c)$ $\alpha_G^{-1}=2\left[\log_2\left(N_a\right)\right]^{3/2}N_a=\hbar/(Gm_e^2/c)$ $\bcancel{\alpha}_G=\left[\log_2\left(N_a\right)\right]^{3/2}N_a=\bcancel{\hbar}/(Gm_e^2/c)$

[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

<table>
<tr><td>The (electrostatic/EM) Coulomb constant (K_e) may be considered a scalar function that indirectly measures (and "hides") the Planck constant ($h_{ph} = h$]): this scalar function can be expressed using the inverse of the FSC as co-defined (theoretically independent of h) as: $\left(\alpha = FSC^{-1}\right) = \log_2\left(N_a\right)$</td><td>$\boxed{K_e = f(h) = k_C \cdot h}, with\ k_C = \dfrac{c}{q_e^{\,2}(2\pi\alpha)}$
$and\ \boxed{\alpha = \log_2\left(N_a\right)\left(\sim 137.036\right)}$
$\boxed{E_{ph}(\nu) = h\nu}$</td></tr>
<tr><td>Analogously, the Newtonian universal gravitational constant (G) may "hide" a quantum scalar that indirectly measures a hypothetical (electro)gravitational (EGF) Plank-like constant (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 α_G^{-1} as co-defined (theoretically independent of h) as $\alpha_G^{-1} = 2\left[\log_2\left(N_a\right)\right]^{3/2} N_a$. The eg-energy quanta (Eq) can be defined analogously to the photon energy quanta.</td><td>This equation is also a potential candidate for the hypothetical quantum ("big") G scalar, in which G is defined as a function of quantum physical constants.
$\boxed{G = f\left(h_{eg}\right) = k_G \cdot h_{eg}}, with\ \boxed{k_G = \dfrac{c}{m_e^{\,2}(2\pi\alpha)}}$
$and\ \boxed{h_{eg} = \dfrac{h}{\alpha_G^{-1}/\alpha} = \dfrac{h}{2\left[\log_2\left(N_a\right)\right]^{1/2} N_a}\left(\sim 1.58\times10^{-76}\,Js\right)}$
$\boxed{E_{eg}(\nu) = h_{eg}\nu}$</td></tr>
<tr><td>As gravity cannot be shielded (at least to the present), all the physical systems (PSs) permanently receive (hypothetical) egs from all the OU. Each eg absorbed by a quantum particle (QP) may increase the intrinsic physical information quantity (PIq) of that QP: the intrinsic PIq is defined as the nof. maximum subquantum states of that QP. The total increase in the intrinsic PIq of a QP is directly proportional (dp) to the nof. egs absorbed by that QP which can be quantized as a product between: nof. egs absorbed per unit of time (which imply an energy quantity [Eq] [per time unit]) AND classical linear time interval (dt=t₂-t₁ measured in the same arbitrary classical time units). For the purpose of simplicity, the constant of direct proportionality (K_{PI})between PIq and Eq(dt)·dt is considered 1 (by hypothesis H-I of BIDUM): the scalar of the PIq becomes identical to the scalar of (quantum) angular momentum (QAM): the difference to the QAM is that (intrinsic) PIq also has a co-definition as the nof. maximum states (N_S) of that QP, which is the product between the maximum nof. quantum states (QS) (N_Q) and the maximum nof. subquantum states (N_{SQ}).</td><td>$\boxed{PIq = K_{PI} \cdot E(dt) \cdot dt}, with\ \boxed{K_{PI} = 1\left(H - I\right)}$
$AND\ \boxed{PIq = N_S = N_Q \times N_{SQ}\left[= E(dt)\cdot dt\right]},$
$with\ dt = t_2 - t_1$
<hr>Both the Electromagnetic Force (EMF) and (Electro)Gravitational Force (EGF) scalars imply products of masses (which also imply products of Eqs and products of linear/angular momentums by classical definition). The PIq scalar informational co-definition may alternatively explain these products of masses/energies/momentums as a combination of two N_S (N_{S1} and N_{S2}) of two or more QPs.
<hr>$\boxed{N_{S1}\cdot N_{S2}} \equiv \boxed{E_1 \cdot E_2} \equiv \boxed{\left(G\right) m_1 \cdot m_2} \equiv \boxed{\left(K_e\right) q_1 \cdot q_2}$
<hr>As N_S may take large values, PIq can also be measured using the binary logarithm as $I(N_S)=\log_2(N_S)$
$\boxed{I = I(N_S) = \log_2(N_S) = \log_2(N_Q \times N_{SQ}) = \log_2(N_Q) + \log_2(N_{SQ})}$</td></tr>
<tr><td>The (EMF) Planck constant (h) and the (EGF) Planck-like constant (h_{eg}) are PIqs that measure the additional nof. (quantum and/or subquantum) states that a QP gains when it absorbs that photon or that specific eg. The PIq scalar is obvious in both photon-energy scalar and in eg-energy scalar if converting frequency to the inverse of dt.</td><td>$\nu = c/\lambda = 1/dt \Rightarrow \begin{bmatrix} E_{ph}(dt) = h/dt \equiv PIq = N_{S(ph)} \\ E_{eg}(dt) = h_{eg}/dt \equiv PIq = N_{S(eg)} \end{bmatrix}$</td></tr>
</table>

In BIDUM, I argue that energy is indissolubly related to a classical linear time frame of measurement, so that Einstein's (mass-energy) equivalence principle (**EEP**) should be rewritten to include the time frame **dt(=t$_2$-t$_1$)**. The **Energy Conservation Principle** (**ECP**) becomes the consequence of the more profound and general **PIq Conservation Principle** (**PICP**).	$E = mc^2 \Leftrightarrow E\cdot dt = (mc^2)\cdot dt \Leftrightarrow \boxed{PIq(dt) = (mc^2)\cdot dt}$ or $\boxed{I_E = I_{mc^2}}$
The *total PIq (I_T)* of a non-gauge QP (NGP) is obviously related to a (classical linear) time interval (**dt**) of measurement (in a specific reference frame) and can be defined (and generalized) as a function of an *intrinsic (internal) PIq (I_{int})* (as measured in dt interval or previously), an *input (received) PIq (I_{in})* and an *output (emitted) PIq (I_{out})* of that NGP: this is the most general form of **PICP** that can be also applied to the EEP as any QP probably emits and/or receives undetectable (hypothetical) egs independently to any possible additional electromagnetic (**EM**) radiation when it transforms into energy (and egs are hypothesized to generally have the same speed **c** as the real/virtual photons).	$\boxed{I_T(dt) = I_{int}(dt) + I_{in}(dt) - I_{out}(dt)}$ $\boxed{I_E(dt) = E\cdot dt + I_{E(in)}(dt) - I_{E(out)}(dt)}$ $\boxed{I_{mc^2}(dt) = (mc^2\cdot dt) + I_{mc^2(in)}(dt) - I_{mc^2(out)}(dt)}$ $\boxed{\begin{aligned}&E\cdot dt + I_{E(in)}(dt) - I_{E(out)}(dt) =\\ &= (mc^2\cdot dt) + I_{mc^2(in)}(dt) - I_{mc^2(out)}(dt)\end{aligned}}$
As the (hypothetical) egs cannot be shielded, it is inevitable that any form of matter emits and receives egs in the time interval in which it converts to energy, so that EEP scalar is not an exact mathematical equality but just a very accurate approximate equality (as the hypothetical practically undetectable egs may also be closed strings that may escape the 5th dimension as the Super String Theories [**SSTs**] and M-theory [**MT**] predict).	In the next equations, $\mathbf{N_{gr(in)(out/esc)}}$ is the nof. hypothetical input/output (including escaped) hypothetical egs in the dt interval and $\mathbf{E_{gr}}$ is the average energy of these egs. $\left.\begin{aligned}&E(dt) = E + \left(N_{gr(in)(dt)} - N_{gr(out/esc)(dt)}\right)\cdot E_{gr}\\ &mc^2(dt) = mc^2 + \left(N_{gr(in)(dt)} - N_{gr(out/esc)(dt)}\right)\cdot E_{gr}\\ &\left(N_{gr(in)(dt)} - N_{gr(out)(dt)}\right)\cdot E_{gr} << E\end{aligned}\right\} \Rightarrow$ $\Rightarrow \boxed{E(dt) = mc^2(dt)}\ AND\ \boxed{E \sim mc^2}$
THE INTRINSIC PIqs OF THE MAIN QPs	
As the graviton has a very small intrinsic PIq, it can be simplified as associated with just 2 quantum states (which may become two additional subquantum states of the QP that absorbs that eg).	$\boxed{h_{eg} \equiv 2([Sub]Quantum)states \Leftrightarrow \log_2(h_{eg}) = 1qbit}$
The ratio between h and h$_{eg}$ was named K$_{eg}$ (electrogravitational constant) as it relates the EMF-PIq (h) to EGF-PIq(h$_{eg}$). K$_{eg}$ helps measuring h in qbits and also helps measuring the Js (Joule·second) in qbits. In BIDUM, I've alternatively named the Js unit as "pit" (from "physical bit" [**pbit** or briefly **pit**], as Js (=pit) measure the N$_S$ of a **QP**: $\mathbf{k_{pit}}$ is the constant that relates the **pit** with the **qbit** quantitatively.	$K_{eg} = h/h_{eg} = \alpha_G^{-1}/\alpha = 2\left[\log_2(N_a)\right]^{1/2} N_a \sim 4.166\times10^{42}$ $h = 6.626\times10^{-34}\,Js = K_{eg}\cdot h_{eg} \Leftrightarrow$ $\Leftrightarrow \boxed{h \sim 8.4\times10^{42}\,states \sim 143qbits} \Rightarrow$ $\Rightarrow Js \sim 8.4\times10^{42}/\left(6.626\times10^{-34}\right) states \Rightarrow$ $\Rightarrow \boxed{pit = Js \sim 1.26\times10^{76}\,states \sim 253qbits}$ $\boxed{h_{eg} \sim 1.6\times10^{-76}\,pits = 2(states) = 1qbit}$ $\boxed{k_{pit} = 1.26\times10^{76}\,(states\ per\ pit) \sim 253(qbits\ per\ pit)}$
BIDUM emits the hypothesis that the PIq scalar can also be used to approximate the intrinsic PIq (at rest) of the other QPs as the product between the intrinsic Eq at rest of those QPs and their mean lifetime.	$\boxed{I_{intrisic(rest)(mean)} = E_{rest}\cdot t_{mean\_lifetime} = \left(m_{rest}\cdot c^2\right)\cdot t_{mean\_lifetime}}$

The intrinsic PIq at rest of a single W^+/W^- boson (**h_W**) is a function of its rest mass (**$m_W \sim 80.385 \pm 0.015 GeV/c^2$**) and its half-life (**$t_W \sim 3 \cdot 10^{-25} s$**)	$h_W = (m_W c^2) \cdot t_W \left[\sim 4.9 \times 10^{43} states \sim 145 qbits \right]; \boxed{h_W / h_{ph} \sim 5.8*}$ *as W-boson is considered a "heavy" photon, it carries almost 6 times more PIq (at rest) than a photon
The intrinsic PIq at rest of a single Z boson (**h_Z**) is also a function of its rest mass (**$m_Z \sim 91.1876 \pm 0.0021 GeV/c$**) and its half-life (**$t_Z \sim 3 \cdot 10^{-25} s$**)	$h_Z = (m_Z c^2) \cdot t_Z \left[\sim 5.5 \times 10^{43} states \sim 145 qbits \right]; \boxed{h_Z / h_{ph} \sim 6.6*}$ *as Z-boson is also considered a "heavy" photon, it carries almost 7 times more PIq (at rest) than a photon
For the Strong Nuclear Force (**SNF**), the intrinsic PIq of a single gluon (**h_{gl}**) cannot be measured directly using the PIq scalar definition (such as the W and Z bosons which have non-0 rest masses), but can be measured indirectly (inversely) based on the known *SNF coupling constant* (**α_S**) which has a value close to 1 (practically ~137 times larger than FSC at rest)	$h_{gl} = (\alpha_S \cdot FSC) \cdot h_{ph} \sim FSC \cdot h_{ph} \left[\sim 6.1 \times 10^{40} states \sim 135 qbits \right]$ $with \boxed{h_{gl} / h_{ph} \sim FSC \sim 1/137*} and \boxed{h_{gl} / h_{eg} \sim 3 \times 10^{40}}$ *when compared to the photons and the W/Z-bosons, the gluons may be considered "(very) light" (special) photons, as a gluon carries ~137 times less intrinsic PIq (at rest) than a photon
The intrinsic PIq at rest of a single proton (**h_p**) is as a function of its rest mass (**$m_p \sim 0.938 GeV/c^2$**) and its mean lifetime (with an experimental lower bound **$t_p > 10^{31}$ years**)	$h_p > \left[(m_p c^2) \cdot t_p \sim 6 \times 10^{104} states \sim 348 qbits \right],$ $with \boxed{h_p / h_{ph} > 7.2 \times 10^{61}} and \boxed{h_p / h_{eg} > 3 \times 10^{104}}$
The intrinsic PIq at rest of a single up quark (**h_{qu}**) (which is the most stable of all types of quarks, with a mean lifetime probably comparable to that of the proton) is as a function of its rest mass (**$m_{qu} \sim 2.3 MeV/c^2$**) and its mean lifetime (with an experimental lower bound comparable to that of the proton **$t_{qu} \sim t_p > 10^{31}$ years**)	$h_{qu} > \left[(m_{qu} c^2) \cdot t_p \sim 1.5 \times 10^{102} states \sim 339 qbits \right],$ $with \boxed{h_{qu} / h_{ph} > 1.8 \times 10^{59}} and \boxed{h_{qu} / h_{eg} > 7.3 \times 10^{101}}$
The intrinsic PIq at rest of a single electron (**h_e**) is a function of its rest mass (**$m_e \sim 0.511 MeV/c^2$**) and its mean lifetime (with an experimental lower bound **$t_e > 6.6 \cdot 10^{28}$ years**).	Electrons can be considered "hyper" photons, with $h_e > 10^{54} h$ (this h_e gives them a non-0 rest mass and some common photon-electron proprieties) $h_e > \left[(m_e c^2) \cdot t_e \sim 1.5 \times 10^{97} states \sim 323 qbits \right],$ $with \boxed{h_e / h_{ph} > 1.8 \times 10^{54}} and \boxed{h_e / h_{eg} > 7.5 \times 10^{96}}$
CHECKPOINT CONCLUSIONS	
BIDUM is centered on these four PIqs [$h_{(ph)}=h$, h_{eg}, $h_{W/Z}$ and h_{gl}] of the four gauge bosons (**GBs**) which mediate the four fundamental (physical) forces (**FFs**). I consider these four PIqua as more important that the energy-quanta (**Eq**) and mass-quanta (**Mq**) of the four GBs, that is why I argue that energy, force, mass and all their derivatives (together with their SI units of measurement which are essentially based on the kilogram) should be "inversely" redefined from this PIq-scalar of the angular momentum.	For the simplicity of notation, PIq is denoted as "I", time is denoted as "t" and linear/circular lengths/distances (denoted as "d"): $\boxed{PIq \equiv (I = E \cdot t)} \Rightarrow pit = Js = k_{pit} \cdot qbit$ $\boxed{E(energy) = I/t} \Rightarrow J = pit/s = k_{pit} \cdot qbit/s$ $\boxed{P(power) = I/t^2} \Rightarrow W = pit/s^2 = k_{pit} \cdot qbit/s^2$ $\boxed{F(force) = I/(d \cdot t)} \Rightarrow N = pit/(m \cdot s) = k_{pit} \cdot qbit/(m \cdot s)$ $\boxed{M(mass) = (I \cdot t)/d^2} \Rightarrow kg = (pit \cdot s)/m^2 = (k_{pit} \cdot qbit \cdot s)/m^2$
As seen, BIDUM offers *a new (informational) hypothetical definition for energy as the PIq transfer speed (qbits transferred in [unit of] a time interval [s]).*	

In this view, *energy and matter are NOT fundamental as PI is, but they are just the result of measuring (in various ways) the PIq interchanged between the observer (including his measuring tools) and the physical system observed, but also the PIq transferred between the subcomponents of that system, both types of measurement being undertaken in a specific chosen time interval ($dt=t_2-t_1$).* What is perceived physically as the “energy/matter of an observed system” (and/or through measuring tools which are the observer’s body extensions) is the result of the capacity of the observed system (including the spacetime [vacuum] it occupies) to transfer a specific PIq to the observer OR the capacity of the observed subcomponents (of that system) to interchange a specific PIq per unit of (subjective and/or objective) (classical linear) time interval time. In conclusion, *energy and matter are generated by PIq flows of different types.*

In my BIDUM, I argue that many physical constants support co-definitions (additional independent interpretation), as if all the physical constants (of the OU) are double-connected and support two parallel definitions: one energetic and one informational.

In my BIDUM, I also push further the possibility of (at least qualitative) interconversion between classical SI units using the equivalence principles of BIDUM (**EPB**). (for the simplicity of notation) As c is an universal constant (verified as constant in all the WU), BIDUM ALSO interprets its constancy as a first rank EPB between the distance quanta (**dqua**) and time-quanta (**tqua**) so that dqua≡tqua (or **d≡t**) and **dqua/tqua=K_c≡c** (apparently dimensional but essentially adimensional) so that c actually hides a more profound adimensional constant K_c which may be any arbitrary number (including 1 or π multiples). This distance-time equivalence also predicts the energy-mass EEP.

$$\boxed{d_{qua} \equiv t_{qua}\left(d \equiv t\right)} \Leftrightarrow \boxed{t_{Pl} \equiv l_{Pl}} \ (\textit{first rank EPB})$$

$$\left(E = I/t\right) \equiv I/d$$

$$\left(P = I/t^2\right) \equiv I/\left(d\cdot t\right) \equiv I/d^2\left(\equiv E/t \equiv E/d\right)$$

$$\left[F = I/\left(d\cdot t\right)\right] \equiv I/t^2 \equiv I/d^2 \equiv P\left(\equiv E/t \equiv E/d\right)$$

$$\left(M = I\cdot t/d^2\right) \equiv I/t \equiv I/d\left(\equiv E\right)$$

As G and $K_eQ_e^2$ (scalars) are also universal constants (verified as constants in all the WU), BIDUM ALSO interprets their constancy as a first rank equivalence principle between the PIq and area-quanta (**aq**) so that **PIq≡aq** (**$I\equiv d^2\equiv t^2\equiv d\cdot t$**) and PIq/aq=$K_G$(≡G)≡ K_Q (≡ $K_eQ_e^2$) (apparently dimensional but essentially adimensional) so that G and $K_eQ_e^2$ actually hide the more profound adimensional constants K_G and K_Q which may also be any arbitrary numbers (including 1 or π multiples). **This first-rank EPB predicts that energy and mass are both equivalent to linear space/time (possibly represented by strings that generate spacetime vacuum appearance: a SST prediction).** The PIq-aq equivalence principle may be stated as “PI is essentially (equivalent) area and area is essentially (equivalent) PI”: as it can be observed, this is an alternative formulation of the ‘t Hooft’s holographic principle (subsequently developed by Leonard Susskind)

$$\boxed{I \equiv d^2} \xRightarrow{as\, d\equiv t} \boxed{I \equiv d^2 \equiv d\cdot t \equiv t^2} \ (\textit{first rank EPB})$$

$$\left(E = I/t\right) \equiv I/d \equiv d \equiv t$$

$$\left(P = I/t^2\right) \equiv d^2/t^2 \equiv t^2/d^2\left(\equiv 1\right)$$

$$\left[F = I/\left(d\cdot t\right)\right] \equiv I/t^2 \equiv I/d^2 \equiv 1\left(\equiv P\right)$$

$$\left(M = I\cdot t/d^2\right) \equiv t \equiv d\left(\equiv E\right)$$

As the Planck constant (h) is also an universal constant (verified as constant in all the WU), BIDUM ALSO interprets its constancy as a first-rank EPB between the (quantum/classical) angular momentum (measured in Joule·second) and pure information (measured in pure numbers of bits and/or qbits) so that: **QAM≡PIq≡nof. states (N_S= N_Q•N_{SQ})**

$$\boxed{I \equiv d^2 \equiv t^2 \equiv d\cdot t \equiv \left[N_S\left(=N_Q\cdot N_{SQ}\right)\right]}$$

The Planck constant ($h=h_{ph}$) is also the (central) PIqua unit in the (natural) Planck Units System (**PUS**) a system which *can be generalized for any other Planck-like (PIq) constant* (h_{gl}, $h_{W/Z}$ and h_{eg}) and called Planck-Like Units System (**PLUS**[h_x], such as PSU is the private case PLUS[h_{ph}]).	$PLUS(h_x), with \boxed{h_x \in \{h_{eg}, h_{ph}(=h), h_{W/Z}, h_{gl}\}},$ $with\, PUS = PLUS(\hbar_{ph})$ $h_{Pl}(\hbar_x)=\hbar_x,\ v_{Pl}(\hbar_x)=c,\ m_{Pl}(\hbar_x)=\sqrt{\hbar_x c/G}$ $t_{Pl}(\hbar_x)=\sqrt{\hbar_x G/c^5},\ l_{Pl}(\hbar_x)=\sqrt{\hbar_x G/c^3}\ and\ AS_{Pl}(\hbar_x)=\left[l_{Pl}(\hbar_x)\right]^2,$ $q_{Pl}(\hbar_x)=\sqrt{4\pi\varepsilon_0\hbar_x c}=q_e\sqrt{\alpha}$
The coupling (α) constants (at rest) for the three non-EGF FFs can be generalized as a PIq-function (in analogy to FSC definition, but expressed as ratio of two different PIqs), as GCC is not a function of the $K_e q_e^2$, but is conventionally expressed as a function of Gm_e^2/c and h only.	$\alpha_f(\hbar_x)=\left[K_e q_e^2/c\right]/\hbar_x, with \boxed{\hbar_x \in \{\hbar_{gl}, \hbar_{ph}(=\hbar), \hbar_{W/Z}\}}$ $\alpha_G=\left[Gm_e^2/c\right]/\hbar$
The *Bekenstein bound (**BB**)* (defined as the maximum amount of information [I] [measurable in qbits or in the equivalent bits extracted from those qbits] contained in all the quantum states (N_Q) of a sphere that has a finite ray R and contains a finite energy E, when/if assumed that the perfect vacuum carries NO [additional] PIq) can be reformulated as a two PIqs ratio using an additional adimensional constant $\mathbf{k_{BB}=(2\pi)^2/\ln(2)}$	$I \le \frac{2\pi ER}{\hbar c \ln(2)} \Leftrightarrow I \le \frac{\frac{(2\pi)^2}{\ln(2)} E \frac{R}{c}}{h_{ph}} \Leftrightarrow I \le \frac{k_{BB}\cdot(E\cdot dt_{R,c})}{h_{ph}} \Leftrightarrow$ $\Leftrightarrow \boxed{I \le \left[\frac{k_{BB}\cdot I_{(E,dt_{R,c})}}{h_{ph}} = \frac{(2\pi)^2\cdot\log_2(N_Q)}{h_{ph}}\right]}, I_{(E,dt_{R,c})}=\ln(N_Q)$
Analogously to PLUS(h_x) generalization, BB can be also generalized for any PIqua of the four FFs, including h_{eg} which counts the total number of quantum and subquantum [micro]states $N_s=N_Q \times N_{SQ}$ (as the emission/reception of egs may generate all the possible subquantum energetic/momentum [micro]states [N_{SQ}] that can be "hidden" in a single quantum state of a QP).	$\boxed{I(E, dt_{c,R}, h_x) \le \frac{k_{BB}\cdot I_{(E,dt_{c,R})}}{h_x}},$ $with \boxed{h_x \in \{h_{eg}, h_{ph}(=h), h_{W/Z}, h_{gl}\}}$
The Planck constant (h) has also an other important significance, as it can be considered a fundamental cutoff for which any QP with intrinsic PIqua > h will have a non-0 rest mass (as in the case of W/Z bosons, the leptons, the quarks, the nucleons etc.) and all the QPs with intrinsic PIq ≤ h will have 0-rest mass (the photons, the gluons, and the hypothetical egs). By this h-cutoff, EMF (with its specific h PIqua) is profoundly related in fact to the triad of indissolubly related concepts: rest mass, classical linear time and gravity.	If the intrinsic PIq of all QP are pre-considered finite, an important consequence is that all QPs will finally decay (by finite lifetimes). $\boxed{m_x \cdot t_x \le \frac{h}{c^2}}\ for\ photons, gluons\ and\ egs$ $\boxed{m_x \cdot t_x > \frac{h}{c^2}}\ for\ W/Z\ bosons, Higgs\ boson,$ $neutrinos, leptons\ and\ quarks$

THE GLOBAL PIqs OF THE OBSERVABLE UNIVERSE	
The (apparently) at rest energy of the White Universe (**WU**) (defined as directly observable and complementary to the dark energy and matter) (**E$_{arWU}$**) can be estimated using the recent measurements of the total (apparent rest) mass of WU (**M$_{arWU}$**)	$\boxed{M_{arWU} \sim 1.45\times10^{53} kg} \Rightarrow \boxed{E_{arWU} = M_{arWU}c^2 \sim 1.3\times10^{70} J}$
Based on **M$_{arWU}$** one may calculate an (Eddington's-number-like) hypothetical (maximum) number of proton-electron pairs (**pep**) (noted as **N$_P$**) that may (theoretically) compose/generate integrally **M$_{arWU}$** (including neutrons, as they can be considered compact forms of peps).	Each pep may be considered a spacetime atom (**STA**) as it includes not only matter and energy (the energetically charged pep) but also the spacetime (vacuum) the rest and dynamic pep may occupy (the BIDUM definition of pep/STA). $\boxed{m_{pep} = m_p + m_e} \Rightarrow$ $\Rightarrow \boxed{N_P \sim M_{arWU} / m_{pep} \sim 8.7\times10^{79} (peps)}$
By considering a (hypothetical) mean lifetime of the (apparently rest) WU (**t$_{arWU}$**) larger than the lower bound of the mean lifetime of the proton (t_p) [Error! Bookmark not defined.,Error! Bookmark not defined.] (**t$_{arWU}$** > t_p no matter if WU is cyclic or not), one can estimate the (apparently at rest) intrinsic PIq of the WU (as a hypothetical inequality) based on **E$_{arWU}$**	$t_{arWU} > \left[t_p > 10^{31} years\right] \Rightarrow$ $\left[I_{arWU} = E_{arWU} \cdot t_{arWU}\right] > \left[\sim 614 qbits\right]$
The (global expansion/inflation) apparent kinetic energy of WU (**E$_{akWU}$**) (which is mainly due to gravity as EM radiation only had a significant contribution to the global inflation only when the WU was [very] young) was estimated by Valev D.T in 2009* at ~3/10(0.3) of the (apparent) rest energy of the WU (**E$_{arWU}$**) and indicates an average overall speed of **$v_{aWU} \sim (E_{arWU}/M_{arWU})^{1/2} \sim 0.5c$**	$E_{akWU} = 0.3E_{arWU} \sim 3.9\times10^{69} J$ $v_{aWU} \sim \sqrt{E_{arWU} / M_{arWU}} \sim 1.6\times10^8 m/s \sim 0.5c$ *Valev D.T. (2009). Determination of total mechanical energy of the universe within the framework of Newtonian mechanics (URL: https://www.researchgate.net/publication/45872675_Determination_of_total_mechanical_energy_of_the_universe_within_the_framework_of_Newtonian_mechanics)
If the mean lifetime of the apparent (kinetic) WU (**t$_{akWU}$**) is (hypothetically) considered equal to the mean lifetime of the (apparent rest) WU (t_{akWU}) (no matter if WU is cyclic or not), one can estimate the apparent kinetic (global) PIq of WU (I_{akWU}) using the PIq scalar.	$\boxed{t_{akWU} = t_{arWU} = t_{WU}} > \left[t_p > 10^{31} years\right] \Rightarrow$ $\Rightarrow I_{akWU} = \left[E_{akWU} \cdot t_{WU}\right] > \left[\sim 612 qbits\right]$
The total (global) energy of WU (**E$_{tWU}$**) can be estimated as the sum of the (apparent) resting energy of the WU (**E$_{arWU}$**) and the (apparent) kinetic energy of the WU (**E$_{akWU}$**). The total (global) PIq of the WU (**I$_{tWU}$**) can be estimated as the sum of the (apparent) resting and kinetic PIqs of the WU (I_{arWU} and I_{akWU}).	$\boxed{E_{tWU} = E_{arWU} + E_{akWU}} \Rightarrow \left[I_{tWU} = E_{tWU} \cdot t_{WU}\right]$ $\Rightarrow \boxed{\left[I_{tWU} = I_{arWU} + I_{akWU}\right] > \left[\sim 614 qbits\right]}$
I have called the rest and kinetic mass/energy/PIq of the WU (just) "apparent" ($[M/E/I]_{arWU}$ and $[E/I]_{akWU}$) because it is proven that the sum of the (average) rest masses of the three protonic (up/down) quarks **m$_{pq}$(=2m$_{qu}$+m$_{qd}$)** is only ~1.002% of the total proton (nucleon) rest mass and **Φ=m$_{pq}$**/m_{pep}~1.001%. In conclusion, the real (global) rest PIq of the WU	$\boxed{m_{pq} / m_p \sim 1.002\%} \Rightarrow \boxed{\Phi = m_{pq} / m_{pep} \sim 1.001\%}$ $\boxed{I_{qeWU} = N_P\left[\left(m_{pq}c^2 \cdot t_{WU}\right) + h_e\right]}$ $\left(I_{rWU} = I_{qeWU}\right) \sim \left[(0.77\%) I_{tWU} \sim FSC \cdot I_{tWU}\right] > \left[\sim 607 qbits\right]$

($\mathbf{I_{rWU}}$) is in fact only the real (global) rest PIqs of all the up/down quarks and electrons from the WU ($\mathbf{I_{qeWU}}$) (which is only Φ ~1.001% of $\mathbf{I_{arWU}}$) AND (1-Φ)~98.999% of $I_{ar\mathbf{WU}}$ is in fact (also) kinetic/dynamic PIq generated by the kinetic energy of the all the gluons of the WU ($\mathbf{I_{glWU}}$) (as gluons may also be considered white/WU radiation). In this context, the real kinetic (global) PIq of the WU ($\mathbf{I_{kWU}}$) is in fact $I_{kWU}(= I_{tWU} - I_{rWU})$ ~ 99.23% of I_{tWU}, which is significantly larger than I_{akWU} (~23.1% of I_{tWU}).	$\boxed{I_{glWU} = I_{arWU} - I_{rWU} = (1-\Phi)\cdot I_{arWU} \Leftrightarrow \Leftrightarrow I_{glWU} \sim (76.153\%) I_{tWU} > \left[\sim 614 qbits\right]}$ $\boxed{I_{kWU} = I_{tWU} - I_{rWU} \sim (99.23\%) I_{tWU} \sim 614 qbits}$
I_{kWU} and can be analyzed as the sum between: (**1**) I_{glWU}; (**2**) the sum of the kinetic PIqs of all the hypothetical egs from the WU ($\mathbf{I_{egWU}}$); (**3**) the sum of the (kinetic) PIqs of all the photons from the WU ($\mathbf{I_{phWU}}$);(**4**) the (hybrid) sum between rest and kinetic PIqs of all the W/Z ever emitted/received in the WU ($\mathbf{I_{wzWU}}$). Based on I_{glWU} and h_{gl}, the total nof. real gluons in the WU ($\mathbf{N_{glWU}}$) can also be estimated.	$\boxed{I_{kWU} = \left[I_{glWU} + I_{phWU} + I_{egWU}\right]} \pm I_{wzWU}$ $I_{glWU} \sim (76.8\%) I_{kWU}$ $N_{glWU} = I_{glWU} / h_{gl} > \left[\sim 8.42\times 10^{143}\, gluons\, in\, the\, WU\right]$
$\mathbf{I_{egWU}}$ is in fact ~ I_{akWU}, as I_{akWU} is mainly due to gravity in the majority of the epochs that followed the [hypothetical] Big Bang and gravity is mediated by [hypothetical] egs although generated by the baryonic mass [which mass is generated by the kinetic mass of all the gluons from the WU]). Based on I_{egWU} and h_{eg}, the total nof. real (hypothetical) egs in the WU ($\mathbf{N_{egWU}}$) can also be estimated. Interestingly, $\mathbf{N_{egWU} \sim N_{Pl(OU)} \sim 10^{184}}$, which can be interpreted in a dual way: (1) Each eg that generates the accelerated expansion of the OU has also generated a Planck volume ($\mathbf{V_{Pl}}$); (2) Each Planck volume ($\mathbf{V_{Pl}}$) has generated an eg that contributes to the accelerated expansion of the OU (as if dark energy [**DE**] and dark matter [**DM**] may be hidden at Planck scale). Both interpretations also mean that $\mathbf{I_{egWU}}$ has its lower bound of ~612qbits very close to the binary logarithm of the nof. of Planck volumes ($\mathbf{V_{Pl}}$) contained in the (total) Volume of the Observable Universe ($\mathbf{V_{OU}}$).	**In conclusion, the eg (as quantitatively defined by h_{eg} in BIDUM) counts the Planck 3D volumic "granulation" of the OU, as each eg corresponds to a volumic-Planck-pixel of the OU: in this way, BIDUM interprets that egs are the morpho-functional "lattice"/matrix of the (apparently) empty ST, a gravitonic quantum "foam".** $\boxed{I_{egWU} \sim I_{akWU} \sim (23.1\%) I_{kWU} \sim (23.3\%) I_{tWU}}$ $I_{egWU} > \left[\sim 612 qbits\right]$ $N_{egWU} = I_{egWU} / h_{eg} > \left[\sim 7.8\times 10^{183}\, egs\, in\, the\, WU\right]$ $R_{OU} \sim 4.4\times 10^{26} m \Rightarrow V_{OU} = \frac{4\pi}{3} R_{OU}{}^{3} \sim 3.6\times 10^{80} m^{3}$ $V_{Pl} = \frac{4\pi}{3}\left(\frac{l_{Pl}}{2}\right)^{3}$ $\boxed{N_{Pl(OU)} = \frac{V_{OU}}{V_{Pl}} \sim 10^{184} \sim 611 (volumic) qbits} \Rightarrow$ $N_{Pl(OU)} \sim N_{egWU} \sim 10^{184} \sim 611 (volumic / gravitonic) qbits$
The total nof. real photons in the WU ($\mathbf{N_{phWU}}$) can be approximated from the baryons-to-photons ratio in the present WU, which is constrained relatively tightly **as η ~ (5.7 - 6.7) x $\mathbf{10^{-10}}$ baryons/photon** given the primordial abundance of ^{7}Li inferred from the latest observations**.** Based on N_{phWU} and h_{ph}(=h), $\mathbf{I_{phWU}}$ can also be estimated.	$N_{phWU} = \left(\eta^{-1} N_{P}\right) \sim 1.4\times 10^{89}\, photons\, in\, the\, WU$ $\boxed{I_{phWU} \sim N_{phWU}\cdot h_{ph} \sim (1.8\times 10^{-53}) I_{kWU} \sim (1.79\times 10^{-53}) I_{tWU}}$ $I_{phWU} > \left[\sim 439 qbits\right]$
$\mathbf{I_{wzWU}}$ is a special case that cannot be determined exactly, because it depends on the frequency of the beta-decay (number of beta-decays per nucleon and per unit of time) in the WU, which is not known	$\boxed{I_{wzWU} \sim^{?} \left(I_{tWU} - I_{qeWU}\right) - \left(I_{glWU} + I_{phWU} + I_{egWU}\right)}$ $\boxed{N_{wzWU} << N_{phWU} <<^{?} 1.4\times 10^{89}\, WZ\, bosons\, in\, the\, WU}$

exactly, as it depends on the unknown frequency of the beta-radioactive isotopes in the WU. However, even if the W/Z bosons have an intrinsic PIq with about one order of magnitude larger than the photon ($h_{W/Z}$~7·h_{ph}), it's obvious that beta-decay frequency is many orders of magnitudes smaller than the photon emission frequency (so that the nof. W/Z bosons [$\mathbf{N_{wzWU}}$] in the WU is much lower than the nof. of photons in the same WU) and that is why $\mathbf{I_{kwzWU}}$ is very probably much (with many orders of magnitude) smaller than $\mathbf{I_{phWU}}$	$\boxed{I_{wzWU} << I_{phWU} <<^{?} 439qbits}$
THE FOUR LAYERS OF (WEBS OF) INTERNODES OF THE OU CORRESPONDING TO THE FOUR FFS	
The nof. up/down quark-nodes ($\mathbf{N_q}$) is 3 times the nof. peps (N_P). The nof. electron-nodes ($\mathbf{N_e}$) is equal to $\mathbf{N_P}$. The total nof. nodes is the sum between $\mathbf{N_q}$ and $\mathbf{N_e}$	$\boxed{N_q = 3N_P \sim 2.6\times10^{80}(up\,/\,down\,quarks)}$ $\boxed{N_e = N_P \sim 8.7\times10^{79}(electrons)}$ $\boxed{N_{qe} = N_q + N_e = 4N_P \sim 3.5\times10^{80}(NGP-nodes)}$
The basic EGF (real) web has a nof. $\mathbf{NI_{EGF}}$ internodes (populated by real egs interconnecting all the N_{qe} nodes by each-to-all type of connection so that $\mathbf{NI_{EGF}=N_{qe}^2}$). Using $\mathbf{I_{egWU}}$ and $\mathbf{NI_{EGF}}$, one can also calculate a flow of a maximum nof. real egs interchanged per EGF-internode and per unit of time (second) of t_{WU} ($\mathbf{F_{egWU}}$). (this is an apparent asymptotic maximum nof. egs, as many egs may be emitted in empty space without being ever received in the t_{WU} interval: on the other hand N_{egWU} is defined by an inequality to a minimum as I_{tWU} is also defined by a inequality to a minimum, and that why the minimum/maximum is aspect uncertain)	$\boxed{NI_{EGF} \sim N_{qe}^{\ 2} \sim 1.2\times10^{161}(EGF-internodes)}$ $\boxed{F_{egWU} = \left(N_{egWU}\,/\,NI_{EGF}\right)/\,t_{WU}(s) >^{?} (\sim 2.1\times10^{-16})*}$ (* the maximum/minimum(?) nof. [hypothetical] real egs interchanged per EGF-internode and per second in the t_{WU} interval)
The superimposed layer of **EMF** (formed by a web of $\mathbf{NI_{EMF}}$ internodes populated by real photons interconnecting all the $\mathbf{N_{qe}}$ nodes by each-to-all type of connection so that $\mathbf{NI_{EMF}=N_{qe}^2}$). Using I_{phWU} and $\mathbf{NI_{EMF}}$, one can also calculate a flow of a maximum nof. real photons interchanged per **EMF**-internode and per unit of time (second) of $\mathbf{t_{WU}}$ ($\mathbf{F_{phWU}}$). (this is an apparent asymptotic maximum nof. photons, as many photons may be emitted in empty space without being ever received in the $\mathbf{t_{WU}}$ interval: on the other hand $\mathbf{N_{phWU}}$ is defined by an inequality to a minimum as $\mathbf{I_{tWU}}$ is also defined by a inequality to a minimum, and that's why the minimum/maximum aspect is uncertain)	$\boxed{NI_{EMF} \sim N_{qe}^{\ 2} \sim 1.2\times10^{161}(EMF-internodes)}$ $\boxed{F_{phWU} = \left(N_{phWU}\,/\,NI_{EMF}\right)/\,t_{WU}(s) >^{?} \left(\sim 3.7\times10^{-111}\right)*}$ (* the maximum/minimum(?) nof. real photons interchanged per EMF-internode and per second in the t_{WU} interval)
The superimposed layer of **EWF** (formed by a web of WNF internodes populated by real and virtual W/Z bosons interconnecting theoretically all the N_{qe} nodes [as electrons have 3 common FFs with quarks in which they engage: **EWF**, **EMF** and **EGF**] by each-to-all type of connection so that $\mathbf{NI_{WNF}=N_{qe}^2}$). Using $\mathbf{I_{wzWU}}$ and $\mathbf{NI_{WNF}}$, one can also calculate a flow of a maximum nof. real W/Z bosons interchanged per	$\boxed{NI_{WNF} \sim N_{qe}^{\ 2} \sim 1.2\times10^{161}(WNF-internodes)}$ $\boxed{F_{wzWU} = \left(N_{wzWU}\,/\,NI_{WNF}\right)/\,t_{WU}(s) <<^{?} \left(\sim 3.7\times10^{-111}\right)*}$ (* the maximum/minimum(?) nof. real W/Z bosons interchanged per WNF-internode and per second in the t_{WU} interval)

WNF-internode and per unit of time (second) of t_{WU} (**F_{wzWU}**). (this is an apparent asymptotic maximum nof. W/Z bosons, as many W/Z bosons may be emitted in empty space without some of their daughter-particles (generated by the decay of the W/Z bosons) being ever received in the t_{WU} interval: on the other hand **N_{wzWU}**(<<**N_{phWU}**) is defined by an inequality to a maximum as **I_{tWU}** is also defined by a inequality to a minimum, and that's why the minimum/maximum aspect is uncertain)	
The superimposed layer of **SNF** (formed by a web of SNF-internodes populated by real gluons interconnecting only the **N_q** nodes in groups of three represented by the up/down quark triads [as not the electrons, but only the quarks couple with the SNF and most of WU is organized in stars composed mostly by simple hydrogen and ^4He atoms] so that **NI_{SNF}~N_q**). Using **I_{glWU}** and **NI_{SNF}**, one can also calculate a flow of a maximum nof. real gluons interchanged per SNF-internode and per unit of time (second) of t_{WU} (**F_{glWU}**). (this is an apparent asymptotic maximum nof. gluons, as some gluons may be emitted in empty space without being ever received in the t_{WU} interval: on the other hand N_{glWU} is defined by an inequality to a minimum as I_{tWU} is also defined by a inequality to a minimum, and that's why the minimum/maximum aspect is uncertain)	$\boxed{NI_{SNF} \sim N_q \sim 2.6\times10^{80}(SNF\ internodes)}$ $\boxed{F_{glWU} = \left(N_{glWU} / NI_{SNF}\right) / t_{WU}(s) >^{?} \left(\sim 1\times10^{25}\right)*}$ (* the maximum/minimum(?) nof. real gluons interchanged per SNF-internode and per second in the t_{WU} interval)
Interestingly, the ratio between the flow of real gluons (per SNF-internode and per unit of time) (F_{glWU}) and the flow of real (hypothetical) egs (per EGF-internode and per unit of time) (F_{egWU}) predicts quite accurately the ratio between the electrostatic force of attraction between a proton and an electron located at a distance d>>proton diameter>>electron diameter and the gravitational force of attraction between the same protons and electron in the same pep (**prediction**). The F_{glWU}/ F_{egWU} ratio is a function of three other ratios: I_{glWU}/I_{egWU}, h_{gl}/h_{eg} and NI_{SNF}/NI_{EGF}.	$\boxed{F_{glWU} / F_{egWU} \sim 5\times10^{40}}$ *and* $\boxed{\left(K_e q_e^{\ 2}\right) / \left(G m_p m_e\right) \sim 2.3\times10^{39}}$ $I_{glWU} / I_{egWU} \sim 3.3$ $h_{gl} / h_{eg} \sim 5.7\times10^{44}$ $NI_{SNF} / NI_{EGF} \sim 3/(4N_{qe}) \sim 2.1\times10^{-81}$