The Cosmos as a Quantum System

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Arthur Haas explained the Hydrogen spectra, 3 years before Niels Bohr, by extending the virial theorem to the Planck energy formula. This suggests the *holographic coherence principle*: energy conservation means frequency unicity, i.e. the coherence condition for Holography. This is applied to an Hydrogen molecule model, in a black-hole sphere of horizon $R = 2GM/c^2$: this critical condition being seen as a *general holographic conservation*, and tied to the Non-Doppler cosmic period t_{cc}. So R/c appears as a period $2G_F t_{cc}^2/\hbar\lambda\!\!\!^{-}_e{}^3 \approx$ 13.8123(1) Gyr, while $R = 2\hbar^2/Gm_e m_p m_H \approx$ 13.812(1) Glyr confirms Eddington's Theory. These two formulas displays a G-G_F symmetry between Newton and Fermi constants and are compatible with the so-called 'Universe age' 13.81(5) Gyr of standard cosmology.

The *cosmic microwave background* (*CMB*) wavelength enters an associated special holographic conservation, confirming a come-back to the steady-state cosmology, for which the factor $\Omega_m = 3/10$ for matter density is trivial, eliminating the 'dark energy problem', and confirming the Eddington prediction $M/m_H = 136 \times 2^{256}$, while the *real* Hydrogen density is $\sqrt{(m_e/m_H)} \approx 0.0233$, nearly compatible with the Helium density and *CMB* temperature, and connected to Ω_m. From Sanchez-Maruani matter-antimatter vibration viewpoint, dark matter would be *usual matter vibrating in quadrature*. A *cosmic Hydrogen atom model* relates directly R, $\lambda\!\!\!^{-}_e$ and the Bohr radius r_B with $R' = 2r_e^3/l_P^2 \approx 4R/3$, seen as the radius of a sphere representing a Grandcosmos. This rules out several common conjectures: 1) the Primordial Big-Bang, 2) the Planck Wall, 3) the Cosmic Anthropic Principle, 4) the Multiverse.

The holographic relations can be represented in a *topological axis*, involving a double exponential function, and showing the special *string dimension* series $n = 2 + 4p$. It yields R and r_B for the canonic values $n = 26$ (tachyo-bosonic) and 10 (superstring), with a non-standard Gluon mass for $p = 1$. The Grandcosmos is the lacking concept in 1) the CMB interpretation (not a fossil radiation) 2) the steady-state model (no need for an internal thermostat) 3) the lacking point $p = 7$. The physical parameters are shown to connect with music numbers, economic numbers and biological parameters, pointing to a *Grand Theory.*

Keywords Quantum Theory, Steady-state Cosmology, Holographic Principle, Eddington Theory, Cosmic Oscillation, Antimatter, Dark matter, Combinatorial Physics, String Theory.

1. Introduction : the Holographic Coherence Principle

According to the 'Poincaré Principle', the laws of physics must be invariant [1]. There are two kinds of laws : local or global. The first ones are of differential type, so sensible to boundary conditions, and thus cannot be applied successfully to Cosmology, since the observable Universe is unique, as Poincaré remarked, because free parameters would be involved [1]. The second type of laws is of conservation nature, so without free parameters. For example, the energy conservation in a closed system. This is not really understood. But if one consider that *a closed system is vibrating with an invariant frequency f* (for instance a vibration matter-antimatter [2]), then the meaning of energy conservation is that energy is associated with a more basic concept : frequency. Now an invariant frequency is the essential requirement to practice holography. This technique is, by far, the more efficient way to deal with information, and corresponds to global conservation laws. Indeed, independently of the present Coherence Principle, theoretical physicists introduced a reduced 'Holographic Principle', but limited to the consideration of the Planck length as single holographic unit. We will show that other lengths, in particular the particle wavelengths, enter such conservation relations [2].

2. The basic Hydrogen spectra

Three years before Bohr, see [3], Arthur Haas have equalized three forms of energy, the kinetic, the potential and the quantum forms, in a 2D circular model of an electron orbiting around a proton with the speed v_e on a circle of radius *r*. In fact, from the virial theorem, twice the kinetic energy must be considered, and the quantum form *nhf* uses the frequency of the electron rotation, so writes $nhv_e/2\pi r = n\hbar v_e/r$; *s*o, neglecting at first the equivalent mass problem in this two-body system:

$$m_e v_e^2 = \hbar c/ar = n\hbar v_e/r_n \qquad (2.1)$$

Where $a \approx 137.036$ is directly involved in the electric force between two elementary charges $(q/r)^2 = \hbar c/ar^2$ meaning $a = \hbar c/q^2$ (its inverse is called 'structure-fine constant', a completly misleading term. Indeed, as any electric force is a whole multiple of this unitary force, a choice of a specific unit for an electric charge is not necessary: so an electric charge is directly related to a whole quantum number. The so-called 'electric permittivity of vacuum' is also completly misleading). The above relations contains the Bohr quantum relation $n\hbar = r_n m_e v_e$, and gives :

$$v_{en} = c/an \tag{2.2}$$

$$r_n^{(0)} = n^2 a\hbar/cm_e \equiv n^2 a\lambda\!\!\!^{-}_{\mathrm{e}} \tag{2.3}$$

Note that Haas used the true kinetic energy, so obtained in fact twice the correct value for r_n in particular for the bare Bohr radius $r_B^{(0)} = a\lambda\!\!\!^{-}_{\mathrm{e}}$. Note that with the mass correction, the real Bohr radius is $r_B = r_B^{(0)} \times (1+ m_e/m_p) \approx r_B^{(0)} \times (H/p)$, with p and H the electron and Hydrogen masses, by respect to the electron one.

3. The *Gravitational* Hydrogen Molecule

Now, consider a Hydrogen-proton couple, orbiting by gravitation on a circle of *invariant radius R*, where an electron is also circulating with speed v_e. The gravitational potential energy is $Gm_H m_p/2R$, but can be written in the same form as above by introducing the 'gravitational interaction constant' $a_G = \hbar c/Gm_H m_p$. In this three-body system, the Coherence Principle gives, for n = 1:

$$v_e = c/2a_G \tag{3.1}$$

$$R = 2a_G \lambda\!\!\!^{-}_{\mathrm{e}} = 2\hbar^2/Gm_e m_H m_p \approx 13.812 \text{ Glyr} \tag{3.2}$$

which is compatible with the so-called 'Universe age' 13.81(5) Giga-years of standard cosmology [4].

By adding the critical condition, or, equivalently, the Schwarschild radius formula of a black hole horizon $R = 2GM/c^2$, this can be written, using the reduced mass $m_e' = m_e m_p/(m_p+m_e)$:

$$R/2\lambda\!\!\!^{-}_H = \sqrt{(M/m_e')} = \hbar c/Gm_e m_p \tag{3.3}$$

which is the Eddington's statistical formula [5][6] $R/2\sigma = \sqrt{(M/m)}$, with the identification $\sigma = \lambda\!\!\!^{-}_{\mathrm{H}} \equiv \hbar/m_H c$ and $m = m_e$. Note that Eddington had not reckognized this very symmetric identification because, at his epoch, the Hubble radius was unerestimated by an order of magnitude. Let us recall the basic argument in the Eddington approach: in a black hole of radius R, the position of a particle is uncertain by the length $R/2$. If one consider N particles,

this is reduced by the statistical factor $\sqrt{N}$, giving a reduced length $R/2\sqrt{N}$, a length Eddington associated with the nuclear force range. But the surprise comes from N, the *equivalent number* of electrons, as if there is only one electron whose sweep defines all the rest, see Section 10.

Note that, in function of the Planck mass $m_P = (\hbar c/G)^{1/2}$ the above relation leads to the 'machian' formula:

$$M\, m_e\, m_H\, m_p = m_P^4 \tag{3.4}$$

Note that the Carr and Rees [7] relation $a_G \sim W^8$, with W the boson mass relative to the electron, leads to the discovery of the very symmetric following ones, involving also the boson Z, the Planck length and the Fermi wavelength, which is recalled below:

$$\lambda\!\!\!^{-}_H (WZ)^4 \approx 13.817(10)\ \text{Glyr} \tag{3.5}$$

$$(\lambda\!\!\!^{-}_e \lambda\!\!\!^{-}_F / l_P) W^2 \approx 13.832(5)\ \text{Glyr} \tag{3.6}$$

This confirms the intimate relation between micro and macro-physics, and a central role to these gauge bosons. So, cosmic consideration leads to the discovery of undetected coeficient-free relations between particle physics parameters, such a:

$$m_W^2\, m_Z^4 \approx\ m_P\, m_F\, m_p m_e^3 \tag{3.7}$$

illustrating the Immergence Principle: local relations can be deduced from cosmic one. It is the reverse of Emergence, which appears in a reductionnist approach, which is generaly sterile.

4. The Quantum Universe and *Real* Matter

The above section was limited to the case $n = m_e R v_e/\hbar = 1$, but seems to product the real radius of Universe. Moreover, the leading large number which appears in the above Eddington statistical formula (4.1) is M/m_e, as remarker above, the *equivalent* number of electrons in the Universe, as if a single electron was describing the whole Universe. This would justify the principle of identity between electrons. This idea of an Universe described by the sweep of a

single electron was advanced by Feynman [8], based on the possibility for the sweep to go backwards in time by transforming in positron. Wheeler argued 'in that case there would be the same quantity of matter and antimatter'. So, Feynman abandonned this idea. But the objection of Wheeler was not valid, since it suffices that ordinary matter is in fact a matter-antimatter oscillation. So we suppose now that the single equivalent electron is associated with a large celerity V_e which obeys the Holographic Coherence Principle applied to (see [9]) the Poincaré-Einstein-Planck energy Mc^2:

$$m_e V_e^2 = Mc^2 \tag{4.1}$$

the question is 'what is the corresponding quantum number n = $m_e R V_e/\hbar$?' This writes, taking account of the Eddington statistical relation (3.3):

$$(n\hbar/m_e R)^2 = c^2 M/m_e = (\hbar c^2/G m_e m_p)^2 \tag{4.2}$$

so expressing *the double solution matter-antimatter*:

$$n\hbar/m_e R = \pm \hbar c^2/G m_e m_p \tag{4.3}$$

Limiting to positive values, this leads to

$$n = Rc^2/Gm_H = 2M/m_H \tag{4.4}$$

which is the overall number of 'particules' electrons + atoms in the sphere of radius R, which is a natural quantum number, widely used by Eddington [5] [6]. This is a validation of the Coherence Principle justifying (4.1), for which an equipartition of the energy $m_e V_e^2$ among the M/m_H electrons leads to an elementary kinetic term:

$$m_e v_e^2 = m_H c^2 \tag{4.5}$$

implying

$$v_e = c\sqrt{(m_H/m_e)} \tag{4.6}$$

But this is not permitted by Relativity to *real* electrons. As the liberation celerity is c at the periphery of a black hole, one would have rather $v_e \approx c$, i.e. a replacement of (4.1) by:

$$m_H V_e^{(r)2} \approx Mc^2 \tag{4.7}$$

showing the way the above model must be adjusted. So, consider a reduced number of real Hydrogen atoms, with density $\Omega^{(r)}_H$, the corresponding quantum number is $n^{(r)} = 2\Omega^{(r)}_H M/m_H = m_e R V_e/\hbar$, corresponding to $V_e = 2\Omega^{(r)}_H M\hbar/Rm_e m_H$ and the kinetic term becomes:

$$m_e V_e^2 = \Omega^{(r)}{}_H^2 Mc^2 \tag{4.9}$$

In order to satisfy the above condition $m_H V_e^2 \approx Mc^2$, this implies

$$\Omega^{(r)}_H \approx \sqrt{(m_e/m_H)} \approx 0.0233 \tag{4.10}$$

So the apparently strange fact that the Universe is only scarcely occupied by ordinary matter comes from the rather large ratio of the Hydrogen-electron ratio.

Note that the above density is about half the standard 'baryonic' density value, but confirms the steady-state cosmology (SSC) [10] [11]. Indeed, the later model have predicted a thermal background, resulting from a thermalization of stellar radiation. Taking for the Helium mass density the standard value 0.252, this means a total Helium mass of $0.252 \times 0.0233 \times M \approx 5.172 \times 10^{50}$ kg, or 7.726×10^{76} Helium atoms. For each Helium atom, the released energy is $(4m_H - m_{He})c^2 \approx 4.283 \times 10^{-12}$ Joule. Thus, the total energy is 3.309×10^{65} J, corresponding to an energy density, in the volume of the R-sphere : 3.541×10^{-14} J m^{-3}. By equalizing this with a black body energy density $(\pi^2/15)(kT)^4/(\hbar c)^3$, this leads to $\mathbf{T} \approx 2.616$ K, which is sufficiently close to the CMB measured temperature 2.7255 K to confirm the above real matter density.

Note also that in the SSC model, the real matter density being invariant, there must be a regenetration of mass, in order to compensate the loss through the Hubble sphere. The simplest hypothesis is that an external Grandcosmos inject neutrons in the real Universe. Each neutron desintegrate to produce an Hydrogen atom, with a release of $(m_n - m_H)c^2 \approx 1.2534 \times$

10^{-13} Joule. Assuming the above value 0.0233 for real Hydrogen atom density, corresponding to a real Hydrogen atom number $0.0233 \times P^4/H^3 \approx 1.226 \times 10^{78}$, this corresponds to a released energy : $1.226 \times 10^{78} \times 1.2534 \times 10^{-13}$ Joule, $\approx 1.514\ 10^{65}$ Joule, which is about (to 8%) the half of the above value 3.309×10^{65} J. Note that this 2 factor would corresponds to a real matter density 0.0466, compatible with the standard 'baryonic density' 0.045(3). A future theory must explain where this 2 factor comes from.

5. A come-back of the Steady-State Cosmology and *Dark Matter*

The Steady-State Cosmology (SSC), proposed by Bondi, Gold and Hoyle, is the main rival of the standard PBB (Primordial Big Bang) cosmology. It have predicted the presence of a black body Cosmic Microwave Background (CMB), with a far better estimation of its temperature than the PBB model, through the above calculation, starting from the Oort determination of real matter density. On this point, official cosmology books are completely misleading when they state that the discovery of the CMB was the proof of the PBB. It is rather a proof for the steady-state cosmology. It was proposed that such a thermalization could be due to metallic or graphite whiskers, and the non-detection of the latter was a pretext to reject SSC! Of course another thermalizing agent would be far better, as shown below: a Grandcosmos, external to our observable Universe of radius *R* (see Section 11). Contrary to the unscientific Multiverse hypothesis (a multitude of unobservable Universes), this Grandcosmos would be observable, precisely throught the CMB.

Another decisive avantage of SSC is that it predicted an acceleration of the galaxy recession. When this was observed, around the year 2000, all the textbooks were predicting rather a deceleration. This was rapidly corrected, with generally no mention of the SSC prediction. Indeed, in the later model a Perfect Cosmological Principle applies, stating an homogeneity, not only in Space (the standar 'reduced' cosmological principle), but also in time, meaning an invariance of the cosmic parameter, so coming back to the above Poincaré principle. In particular the Lemaître-Hubble invariant *R* describing the galactic redshift, which writes :

$$v = dr/dt = cr/R \qquad (5.1)$$

the *R* invariance is confirmed by the above formula, related to universal constants. This means there is an *exponential* galaxy recession:

$$r = r(0)e^{t/T} \qquad (5.2)$$

with $T = R/c$, with no relation with any 'age' in a no-beginning, no-ending Universe. The time T would be rather a whole submultiple of fundamental period : indeed, as physics is only concerned with finite quantities, an infinite number of events is excluded.

A third avantage of the SSC: it is a one-parameter theory, while the standard one has 6 or so parameters, implying the distinction between the Hubble radius and c times the so-called Universe age.

Another avantage of the SSC is that it has correctly predicted the 'critical condition', which is the standard relation used above, and which now can be justified directly as follows (the standard cosmology is unable to justify this critical condition without adding an ad-hoc inflation).

The gravitational potential energy in a homogeneous spher is the classical result: $E_{pot} = -(3/5)GM^2/R$, which gives, with the above critical condition $R = 2GM/c^2$:

$$-E_{pot} = (3/10)\, Mc^2 \quad \Rightarrow \quad \Omega_m = 3/10 \qquad (5.3)$$

This energy $(3/10)\, Mc^2$ is compatible with the Eddington's prediction [5] for the number of atom $N_{Ed} = 136 \times 2^{256}$. Indeed, the corresponding value for the Hubble radius is:

$$R_{Ed} = (2G/c^2)(10/3)N_{Ed}m_H \approx 13.940 \text{ Glyr} \approx (p/n)\ 13.813 \text{ Glyr} \qquad (5.4)$$

$$R_{Ed} = 2\hbar^2/Gm_e m_H m_n \qquad (5.5)$$

where a correction neutron/proton is clearly visible, corresponding to a 3-body (hydrogen-neutron-electron) gravitational molecule, a variante of the above hydrogene molecule, for which there is no electric force and following the isospin symmetry Hydrogen-neutron. This corresponds to:

$$N_{Ed}\, m_e\, m_H\, m_n = (3/10)m_P^4 \Rightarrow G \approx 6.67532 \times 10^{-11}\ \text{kg}^{-1}\text{m}^3\text{s}^{-2} \qquad (5.6)$$

a value 1.9 sigma larger than the official one $G \approx 6.6738(8) \times 10^{-11}$ $\text{kg}^{-1}\text{m}^3\text{s}^{-2}$, which is a

compromise between discordant measurements.

Note that this energy is compatible with the standard [4] so-called 'pressureless matter density of the Universe', showing that its complement to 1, the ratio 7/10, which is said to corresponds to a 'repulsive dark energy', is simply tied to the above recession law. So it is a trivial constant, not a 'variable dilema' as presented in standard cosmology. Note that the difference between the natural density 3/10 and the above real density 0.0233 would be attributed to a 'dark matter', but as it enters the Eddington's prediction for matter, it would be ordinary matter of a special kind. The simplest hypothesis is it is *a matter vibrating in quadrature with the ordinary matter-antimatter oscillation*, as it is expressed in Eq (4.3).

Now, taking $n_m = \Omega_m M/m_e$, this defines a reduced energy in Eq(4.1), by respect to Mc^2 :

$$(n_m\hbar/R)^2/m_e = (\Omega_m/2)^2 Mc^2 \quad => \quad \Omega_m' = (\Omega_m/2)^2 \approx 0.0225 \qquad (5.7)$$

which differs from the above value $\Omega^{(r)}_H \approx \sqrt{(m_e/m_H)} \approx 0.0233$ for *real* matter density by 3.7%. For a pure mathematician this deviation would be a refutation, but not for a physicist, which considers that the Grand Theory which is behind all this is so special that it can be aborded by successive approximations. This may be called the '*Approach Principle*': 'one can know something usefull, without the necessity to understand everything'. Note that, without this principle, Science would be untractable. This means that the approximation:

$$m_H/m_e \approx (20/3)^4 \qquad (5.8)$$

precise to 7.5 %, must be taken seriously, opening the way for further study.

Note that the general concept of a 'space expansion' is ruled out simply by the obsevation of galaxy groups. It is far simpler to speak of a general galaxy recession, produced by a repulsive force proportional to distance, being effective for a distance superior to 10^4 lyr [11]. So, at short distance, this force could be too small to be detected. But the Pionner abnormal deceleration [12] could be tied with this force (note that while it is repulsive for far galaxies, it could be attactive for small distance, due to an absence of dephasage in matter-antimatter oscillation. So the final explanation of the galaxy recession would involve directly this matter-antimatter oscillation.

6. The General Holographic Principle

By introducing the Planck length $l_P \equiv (\hbar G/c^3)^{1/2}$ and the 'topon', $d = \hbar/Mc$ the wavelength corresponding to the total mass M of the observable Universe, the above critical condition $R = 2GM/c^2$ can be written as an holographic conservation [12]:

$$\pi(R/l_P)^2 = 2\pi R/d \qquad (6.1)$$

this is known as the Bekeinstein-Hawking entropy [13], but the above reduction 2D-1D is not reckognized because it involves the length $d \approx 4.00\times10^{-96}$ m, very smaller than $l_P \approx 1.62 \times10^{-35}$ m, which is genarally considered as an inferior spatial limit. Note that d appears directly in the central above relation (4.5) $m_eV_e^2 = (n\hbar/R)^2/m_e = Mc^2$ which writes:

$$R/\sqrt{(\lambda\!\!\!^{-}_e\, d)} = n \qquad (6.2)$$

The General Holographic Principle [12] states that any particle of mass m is associated to the wavelength $\lambda\!\!\!^{-}_m$ which is a whole multiple N_m of d. This permits to extend the above holographic conservation in this manner:

$$\pi(R/l_P)^2 = 2\pi R/d = 2\pi N_m R/\lambda\!\!\!^{-}_m \qquad (6.3)$$

this collection of circles generates the approximation of a sphere. But, for this approach to be acceptable, N_m must be large numbers. So the considerable vastness of the Universe receives a justification, far better than the standard one, which states that the initial conditions for the Primordial Big Bang was ajusted to 10^{-60} or so.

Of course, one must examine the 3D extension of the above, and recognize $r_e = \lambda\!\!\!^{-}_e/a$ the electron classical radius in the half-sphere whose periphery is the circle of radius R:

$$2\pi R/d = \pi(R/l_P)^2 = (\pi/k)(R/r_e)^3 \approx (2\pi/3)(R/r_e)^3 \qquad (6.4)$$

with $k = 2a^3m_e^2/m_pm_H \approx 3/2$, a 'central constant', of primary importance, as shown below. Note that r_e is of order the nuclear dimension, and was chosen by Dirac to specify the Weyl's observed 'large number correlation' [15] about the number $10^{40} \approx R/r_e$. This motivated the

famous Dirac's conjecture [16], stating that the characteristic large numbers of micro and macro physics are connected. But, instead of following Eddington [5], for which these correlations means an invariance of the Hubble radius *R,*, Dirac embarked in a hasardous variation of *G*, in violation with the Poincaré's principle (the PBB myth is so strong that others followed this sterile path, such as Gamow, who tried to vary *a*). It is fair to recall that at this epoch, the holographic technique has not been discovered. Indeed, it is only in 1948 that an obscure engeneer, Dennis Gabor, discovered this idea [17], while waiting for his turn in a tennis court. The reason for this incredible delay in the holography discovery is partly due to the general belief on the light ray concept, due to Newton, and confirmed by the unfortunate 'propagating photon' of Einstein. It seems that nobody realized, apart Feynman [18], that light or matter propagate by wave and is receptioned by energy quantum. This means of course that matter is in fact an oscillation disintegration-reintegration, opening the way for a matter-antimatter oscillation..

But, independently of hologtraphy, the main reason why such a remarkable geometric relation was overcome, is that the measurement of *R* by Hubble was underestimated by an order of magnitude. The most stunning fact is that the scientific communauty took seriously a measurement supported by a single very far galaxy, made by Humason [19], the mule driver of the Wilson observatory, (the famous historic Hubble article [20] shows anything but a straigth line because this included many galaxies of the Local Group which do not participe to the so-called 'universe expansion', a fallacious concept, as explained above). Hubble produced a value of *R* with 3 digits! and, moreover, close to the rough Lemaître estimation, also presented with 3 digits! [21].

Now, with *R* measured in the % range, and more precisely with its above calculated value, one can check that the above *3D* expression is only an approximation, valid to 1.7 %.

Now, taking into account the above value for *R*, gravitation constant eliminates, and one deduces the following holographic relation involving the bare Bohr radius and the mass ratio Hydrogen-electron:

$$\pi\lambda\!\!\!^{-}_{e}{}^{2}/\lambda\!\!\!^{-}_{p}\lambda\!\!\!^{-}_{H} = (2\pi/k)(r_B^{(0)}/\lambda\!\!\!^{-}_{e})^3 \approx (4\pi/3)(r_B^{(0)}/\lambda\!\!\!^{-}_{e})^3 \qquad (6.5)$$

this is an example of 'cosmical immergence', a relation deduced from macrophysics towards microphysics. Generally, due to an excsess of reductionism, only emergent phenomena are considered, and generally not understood. Concerning the relations between the characteristic

physical ratioes, relations between large numbers are very much simpler to detect than those connecting smaller numbers as shown above. One obtains for the Hydrogen-electron mass ratio the value $p_{hol} \approx 1853.856244$, which seems very different from the real value 1837.152645, but is encountered with high precision (8×10^{-5}) in the DNA codon mass, (Eq 15.2).

7. The holographic properties of the non-Doppler Coherent Cosmic Oscillation (CCO)

A major observation is the single period $t_{cc} \approx 9600.61(2)$ s, observed in several quasars and the sun, since decades [22]. While standard physicists say they are looking for every new phenomena, they reject it when it is *too* new. Indeed, such a non-Doppler phenomena is stricly excluded, even in classical dynamics.

However it is not a completly non-local effect, since there are dephasages from one quasar to the other, but each phase is constant over decades, providing an universal clock, while the CMB provide an universal spatial reference system by respect to which we can mesure our absolute speed (for instance the absolute solar velocity is 369(1) km/s). So, one must look for a relation between this period and the CMB characteristics.

In fact, stricyly speaking, Relativity defines two domains: one with spedd always inferioir or equal to *c*, and a 'tachyonic' domain where it is the contrary. But as light is tied to ths speed *c*, it is a phenomena which belong to the two domains, so xould betray the tachyonic domain existence, by some mechanism to be detailed in the future.

In fact, it is exactly the type of phenomena predicted by the Coherence Principle. So, one must look for dramatic holographic conservations involving the corresponding length $l_{cc} = ct_{cc}$.

An holographic connexion with the CMB wavelength $\lambda\!\!\!^{-}_{CMB} = \hbar c/k_B \mathbf{T}_{CMB}$ is immediate (to 0.3%):

$$\pi l_{cc}/\lambda\!\!\!^{-}_{H} \approx (4\pi/3)\,(\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_{e})^3 \qquad (7.1)$$

Moreover, the above relation (6.3) concerning a half-sphere: $\pi(R/l_P)^2 \approx (2\pi/3)(R/r_e)^3$ is equivalent to the following system, involving the full sphere, by use of a *length which identifies with* l_{cc}:

$$\pi l_{cc}/r_e \approx \pi(R/l_{cc})^2 \qquad (7.2)$$

$$4\pi(r_e/l_P)^2 \approx (4\pi/3)(R/l_{cc})^3 \qquad (7.3)$$

the characteristic property of l_{cc} summarizes in:

$$l_{cc}^3 \approx R^2 r_e/2 \approx l_P^2 R^3/3r_e^2 \qquad (7.4)$$

relations precise to - 0.903% and -2.63 %. Now, in the hypothesis that t_{cc} and $T = R/c$ are absolute periods, their ratio R/l_c would show dramatic properties. This is indeed the central ratio in the above holographic system, and a comparaison with the main physical ratioes such as *H,* the hydrogen-electron mass ratio and a_w the weak interaction constant $a_w = (m_F/m_e)^3$ where m_F is the Fermi mass, whose associated energy $E_F = m_F c^2$ is tied to the Fermi constant $G_F = (\hbar c)^3 /E_F^2 \approx 1.435851 \times 10^{-62}$ J.m^3. One observes:

$$R/l_{cc} \approx a a_w \approx 4H^4 \qquad (7.5)$$

precise to 0.903% and – 0.364 %. Once more, the study of cosmic numbers leads to relations between microphysical mass ratioes (Immergence Principle). Moreover, the deviations of the first relations in the two above relations are compatibles, so there is a very precise relation: $l_{cc}^2 \approx a_w l_e R/2$, or:

$$t_{cc}^2 \approx a_w t_e T/2 \qquad (7.6)$$

which is a non-linear beat between three periodicities : $t_e = \hbar/m_e c^2$, t_{cc} and *T.* Now $T/2 = a_G t_e$ so that :

$$t_{cc}/t_e \approx \sqrt{(a_G\, a_w)} \qquad (7.7)$$

Note that this corresponds to an elimination of *c* betwwen the formula $a_G = \hbar c/Gm_p m_H$, and $a_w = \hbar^3/G_F m_e^2 c$. This is significative of a symmetry between the electron mass, associated with G_F and the mean mass $\sqrt{m_p m_H}$, associated with G. This may be written, by introducing the electroweak electron wavelength $t_{eF} = \hbar l_e^3/G_F = a_w l_e$:

$$t_{cc} \approx (t_{eF}\, T/2)^{1/2} \tag{7.8}$$

This corresponds to a value for T independant of G

$$2G_F t_{cc}^2/\hbar\lambda\!\!\!^{-}_e{}^3 \approx 13.8123 \text{ Gyr} \tag{7.9}$$

As t_c and G_F are measured with a precision about 100 times better than G, the identification permits to predict two more decimals for G:

$$G \approx 6.67543 \times 10^{-11} \text{ kg}^{-1}\text{m}^3\text{s}^{-2} \tag{7.10}$$

this means a 2 sigma deviation from the official value $G \approx 6.6738(8) \times 10^{-11}$ kg^{-1}m^{3}s^{-2}, selected among disparate measurements.

Note that the second part of Eq (7.5) will rely the cosmic period to the DNA codon mass (section 15).

8. The tachyonic elimination of *c* and the Combinational Hierarchy

It is remarkable to reckognize a common point in the following three main relations [12]:

$$r_B^{(0)} = a\, \lambda\!\!\!^{-}_e \tag{8.1}$$

$$T/2 = a_G\, t_e \tag{8.2}$$

$$t_{cc} \approx \sqrt{(a_G\, a_w)}\, t_e \tag{8.3}$$

In each case c is eliminated. Now it is exactly what is expected in a Coherent Universe. Indeed, the speed c is clearly too small to connect a so vast Universe. For this reason, the standard cosmology invokes again an ad-hoc super-rapid inflation to explain the homogeneity of CMB. It is of course more logical to invoke *quantum non-locality*.

In fact the c-free elecricity-gravitation symmetry (8.1) and (8.2) has been suggested as soon as 1998, but rejected by the Orsay University and French Academy of Science, on the basis of anonymous expertise stating that Primordial Big-Bang is certified, but Jean-Claude Pecker

takes it seriously, and, on his recommendation, a closed draft was deposed at the French Academy of Science in March 1998. So, interestingly enough, a formula predicting *R*/2, 18 years before its present 1% precision value, was deduced from *c*-free dimensional analysis, in the three first minutes of a sabbatical year (September 1997). This means that *a simple mandatory calculation was not made during nearly a century*, containing more scientists than in all History. Recall that dimensional analysis is the very foundation of physics, and must be used in any case, using the three most pertinent universal constant, but *c, as noted above, is clearly not such a pertinent constant, too small a speed to connect a so vast Universe*. This *c*-free dimensional analysis calculating a length (which is that is *directly* measured in the red-shift galaxy law) in function of the Newton constant *G*, the angular momentum quantum $\hbar$ and the product of masses of the three main particles of Atomic physics electron-proton-neutron. If this had been done, this would have been no Primordial Big-Bang dilemna and no associated Large Number Problem. This conandrum is simply due to the fact that putting $c = 1$ in formula, (even Eddington did so), any *c*-free dimensional analysis was excluded. Note that this catastrophic identification of Time and Space, so different concepts, was denonced, in advance. by Poincaré, the true discoverer of Relativity theory with its 4D formulation, genarally attributed to Minkowski.

Note that, by introducing the Fermi time $t_F = t_e/\sqrt{a_w}$, this leads to

$$t_{cc}\, t_F \approx \sqrt{((t_e^{\,3}\, T/2)} \approx \mathrm{t}_{CMB}^{\,2} \times (11/4) \qquad (8.4)$$

where $t_{CMB} = \hbar/k_B T$ and 11/4 is the statistical ratio defining the cube ot the temperature ratio between the CMB and the neutrino field (CNB). This would mean the statistical part of the present official cosmology is pertinent. This suggests the idea of a *permanent* Big Bang-Big Crunch rapid osciallation [11], a kind of synthesis between the two main cosmologies. The deviation of the above relation is compatible with the canonic ratio *p/H*, This means, by using one of the electron masses is the reduced one:

$$\sqrt{(\mathrm{R}/2\lambda\!\!\!^{-}_{e})} = \sqrt{a_G} \approx \lambda\!\!\!^{-}_{CNB}{}^{3}/\lambda\!\!\!^{-}_{CMB}\lambda\!\!\!^{-}_{e}\lambda\!\!\!^{-}_{e'} \quad \Rightarrow \quad \mathbf{T} \approx 2.72583\ \mathrm{K} \qquad (8.5)$$

compatible with the measured value 2.7255 (6) K. Note that the simple elimination of *c* between the Planck length $l\mathrm{Pl} \equiv \sqrt{(\hbar G/c^3)}$, and the classical electron radius $r_e \equiv \hbar/ca\, m_e$ leads

to a length *R', close to the Hubble length*:

$$R' = 2\, r_e{}^3/l_P{}^2 \;\; = 2R/k \;\approx (4/3)R \qquad (8.6)$$

where *k* is the constant appearing in the General Holographic Principle (6.4). In the above elementary dimensional analysis, this means a replacement of the mass product electron-proton-neutron by the cube of the Nambu mass *am*e, which is of central importance in Particle Physics, a point which is confirmed by the proximity of *k* with the Maruani constant, see Section 10. This means a relation between the Nambu mass and the main particle masses, implying a quasi holographic relation involving the Bohr radius:

$$\pi(\lambda\!\!\!^{-}_e/\lambda\!\!\!^{-}_{pH})^2 \;= k\pi a^3 = \;k\pi(\lambda\!\!\!^{-}_e/r_e)^3 \;\approx\; (4\pi/3)(r_B/\lambda\!\!\!^{-}_e)^3 \qquad (8.7)$$

using the proton-Hydrogen mean wavelength $\lambda\!\!\!^{-}_{pH}$. This is another flagrant example of the Immergence Principle, stating that Cosmology is the first basic science, from which Particle physics may progress, see Section 15 for Biology. This explains why Emergent phenomena are inexplicable via the current reductionist approach.

Eqs (8.1-2-3) raise a question: is there a direct relation between these 3 interaction constants, *a, a_w ,a_G?* An interesting point here is the remarkable 0.56% property of a_G:

$$a_G \approx 2^{127} - 1 \qquad (8.8)$$

which is a Mersenne prime number, with a very special property, indeed 127 = 2^7 – 1, then 7 = 2^3 - 1, and finally 3 = 2^2 – 1 are also prime Mersenne numbers. Now their sum is 3 + 7 + 127 = 137, which is the entire value of *a*, the whole number 137 justified by Eddington. Note that his Fundamental Theory was rejected as soon as *a* appeared to be slightly distinct from 137. Such a rejection is of course not justified, according to the Approch Principle recalled above.

The above series is known as the 'Combinatoriel Hierarchy', which ends at the 127^{th} power [23]. Now 137 and *a* are clearly related by:

$$(137^2 + \pi^2)^{1/2} \approx 137.0360157 \qquad (8.9)$$

a 0.12 ppm approximation for *a*. Now π appears also in the Lenz-Wyler approximation for the proton-electron mass ratio $p \approx 6\pi^5$. Eliminating π between these two relations leads to the discovery of

$$(137^2 + (1834/6)^{2/5})^{1/2} \approx 137.035999097586 \qquad (8.10)$$

which is compatible with the measured value 137.035999074(44). This seems to imply that the Cosmos is calculating π, via physical numbers.
Note in this respect the remarkable 23ppm Ptolémée approximation for π :

$$\pi \approx 377/120 = 2 + 137/120 \qquad (8.11)$$

while the harmonic series of order 5 is involved :

$$1+1/2+1/3+1/4+1/5= 137/60 \qquad (8.12)$$

Here is the harmonic numbers progression:

$$1+1/2 = 3/2$$
$$1+1/2 +1/3 = 11/6$$
$$1+1/2 +1/3 +1/4 = 5^2/12$$
$$1+1/2 +1/3 +1/4 + 1/5 = 137/60$$
$$1+1/2 +1/3 +1/4 + 1/5 + 1/6 = 7^2/20$$
$$1+1/2 + 1/3 +1/4 + 1/5 + 1/6 + 1/7 = 3^2 \times 11^2/420 \qquad (8.13)$$

there is an astounding property. If one let apart the 3, the maximùal prime numbers in this series shows a symmetry, with 137 as the central number:

$$11; 5; 137; 7; 11 \qquad (8.14)$$

with the 7^{th} harmonic number being 11 = 7 + 4, which is precisely the decomposition of the

supergravity dimension number between 7 hidden dimensions and the 4 of space-time. Moreover:

$$11^2 + 4^2 = 137 \tag{8.15}$$

As ancian egyptians used only unitary fractions $1/n$, they were probably aware of the special character of 137 (as shown above the harmonic series of order 6 and 7 produce respectively maximal prime numbers 7 and 11). Indeed, it seems that the Hypostyle Room, located between the second and third pillars of the Amon Temple in Karnak represents numbers characteristic of the above Combinatorial Hierarchy and harmonic series. On each side, there is a square of seven by seven columns, (the square of 7 is present in the 6^{th} term of the above series), separated as 4×7 and 3× 7 groups by a transverse axis (called the royal one), which makes a group of 28 columns (the second perfect number) and a group of 21, which, with another group of 12 colums, makes 33, while 137 is the 33^{th} prime number (the square of 33 is also present in the 7^{th} term of the above series). So the total on each side is, by adding the 6 (the first perfect number entral columns: 28 + 33 + 6 = 67, so the total number is 134 = 7 + 127, which added with the pillar number 3 makes 137.

What is also fascinating is that the two extremal huge columns are partially immersed in the wall, as if the architech was representing the square root 11.7 of 137.

This architecture is so special that there is little doubt it represents the Combinatorial Hierarchy and the above harmonic series. Moreover, the pharaon was acustomed to pray at the intersection of the two axes, the divin one and the royal one, as if *the egypytians have devined that the following term involves a vast Universe.* Of course, egyptians could not know by themselves the law giving the order of a prime P , which is $P/\ln P$, so they probably ignored the fact that 137/ln137 is close to 28. So this number have been represented only because it is a perfect number. Also the difference between these numbers 33 and 28 is 5, which was sacred, and corresponds to the number of the free huge columns on each side. So their total is the famous tetractys 10 = 3 + 7, the precurseur of 137 in the Combinatorial Hierarchy, Indeed, the sum 3 +7 + 127 is the natural prolongation of the famous tetractys 1 + 2 + 3 + 4 = 10 = 3 + 7. Recall that Pytagoras lived 13 years in Egypt, so it is possible that this was the origin for his fascination for the tetractys:

$$3 + 7 = 10 \tag{8.16}$$

which is the precursor of:

$$3 + 7 + 127 = 137 \tag{8.17}$$

Now, a direct relation is found involving the three large numbers directly implying the elec tron: a, a_w, and $P = m_e/m_P = \sqrt{(a_G m_p m_H)}\,/m_e$. This is:

$$P^{10} \approx a_w{}^7\,(\sqrt{a})^{134} \tag{8.18}$$

precise to 50 ppm. One reckognize the characteristic numbers of the CH in the exposants. Now, separating 10 = 3+7, and 134 = 7+127, one gets:

$$P^3\,(P/\sqrt{a}a_w)^7 \approx (\sqrt{a})^{134} \tag{8.19}$$

where the neutron-electron mass ratio n appears,

$$P/a_w\sqrt{a} \approx n^3 \tag{8.20}$$

precise to 90 ppm. So the neutron appears after the above elimination of the proton and Hydrogen ratioes. This is a dramatic coefficient-free relation, undetected by standard model, but encountered already by a systematic elimination of c involving the CCO period [12].

9. Special Holographic conservations

The above formula $R = 2\hbar^2/Gm_e m_p m_H$ may be written in terms of a 1D-2D holographic conservation [12]:

$$2\pi R/\lambda\!\!\!^{-}_e \equiv 4\pi\lambda\!\!\!^{-}_H\lambda\!\!\!^{-}_p/l_P{}^2 \tag{9.1}$$

while the formula permits to add a 4D term implying both the Fermi wavelength and the CCO one, which imply the CMB and neutrino wavelength as shown above, see Eq. (8.4):

$$2\pi R/\lambda\!\!\!^{-}_e \equiv 4\pi\lambda\!\!\!^{-}_H\lambda\!\!\!^{-}_p/l_P{}^2 \approx 4\pi((\lambda\!\!\!^{-}_F l_{cc})^{1/2}/\lambda\!\!\!^{-}_e)^4 \tag{9.2}$$

This calls for a 3D term, which is dramatic, giving the CMB nominal wavelength alone in function of the Hydrogen molecule one (which was a starting point),

$$2\pi R/\lambda\!\!\!^{-}_{e} \equiv 4\pi\lambda\!\!\!^{-}_{H}\lambda\!\!\!^{-}_{p}/l_P^{\,2} \approx (4\pi/3)(\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_{H2})^3 \qquad (9.3)$$

The 3D term shows a precision 0.617 %, close to the departure of a_G with 2^{127}. Analysis shows that the *G*-independent following formula gives a temperature compatible with the measured one $\mathbf{T}_{CMB} \approx 2.7255(6)$ K, by the geometric formula:

$$2^{127} \approx 2\pi^2 (\lambda_{CMB}/\lambda\!\!\!^{-}_{H})^2 (\lambda_{CMB}/\lambda\!\!\!^{-}_{e}) \quad => \quad \mathbf{T}_{CMB} \approx 2.7258204 \text{ K} \qquad (9.4)$$

which is the area of the 4D sphere of radius $\lambda_{CMB}/\lambda\!\!\!^{-}_{0}$ with $\lambda\!\!\!^{-}_{0}{}^3 = \lambda\!\!\!^{-}_{H}{}^2\lambda\!\!\!^{-}_{e}$, and which specifies the value deduced from the 4D term (Eq. 8.5), or, equivalently :

$$2^{128} \approx (\lambda_{CMB}/\lambda\!\!\!^{-}_{e})^3 (\lambda_e/\lambda\!\!\!^{-}_{H})^2 \quad => \quad \mathbf{T}_{CMB} \approx 2.7258204 \text{ K} \qquad (9.4bis)$$

This is confirmed by the following formula involving the Fermi wavelength:

$$(\lambda\!\!\!^{-}_{e}/\lambda\!\!\!^{-}_{F})^5 \approx 6\,(\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_{e})^3 \quad => \mathbf{T}_{CMB} \approx 2.725820(1) \text{ K} \qquad (9.5)$$

the correspondance is such that, if a theory valids this, this would permit to precise $G_F \approx 1.435850902 \times 10^{-62}$ Jm^3, corresponding to the mass ratio Fermi-electron

$$F \approx 573007.325 \qquad (9.6)$$

while the measured value is $F = 573007.33(14)$.

Note that eliminating $\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_{e}$ between the holographic relations (7.1) and (9.3) implies the second part of (7.5): $R/l_{cc} \approx 4H^4$ while R/l_{cc} is compatible with 2P/F$\sqrt{}$(pH). Eliminating the numerical factors, this leads to a coefficient-free formula where the neutron-electron mass ratio *n* appears neatly:

$$P \approx \sqrt{a a_w n^3} \tag{9.7}$$

Looking for a coefficient free relation with the other main physical parameters, one finds

$$P a^{2/3} \approx a_w^{3/2} H^2 (p/6\pi^5)^{1/2} \tag{9.8}$$

Eliminating P between the two last relations leads to the discovery of the 0.2 ppm one:

$$a_w^{1/2}/a^{7/6} \approx (n^3/H^2)(H\text{-}p)(p/6\pi^5)^{-4} \tag{9.9}$$

Looking for a 5D term leads to the discovery of the dramatic relation:

$$R/\lambda\!\!\!^{-}_e \approx (2\pi^2 a^3)^5 H/6\pi^5 \tag{9.10}$$

where $2\pi^2 a^3$ is the area of the 4-sphere of radius *a,* which is also the product of the perimeter by the area of a disk of radius *a*, which is a characteristic of 4D space. The dramatic correcting factor, involving the Hydrogen-electron mass ratio *H* and the Lenz-Wyler approximation $6\pi^5$ for the proton-electron mass ratio confirms the above specified value for *G* defined by (9.8), to 0.3 ppm. According to the Holic principle the 210D term could be pertinent. Indeed with *k* the central constant $2a^3/pH$:

$$R/\lambda\!\!\!^{-}_e \approx (k)^{2\times3\times5\times7} \tag{9.11}$$

with a deviation of 15 ppm on *k*. Another geometric dramatic property is:

$$\pi R R_{Ed}/\lambda\!\!\!^{-}_e{}^2 \approx \pi^{12\times13} \tag{9.12}$$

precise to 4.5 ppm. As $(R/\lambda\!\!\!^{-}_e)^2 \approx 2^{256}$, this means a relation beween powers of 2 and π. In fact 137 appears in :

$$2^{1/155} \approx \pi^{1/256} \approx (2\pi)^{1/3\times137} \approx (2p)^{1/p} \tag{9.13}$$

in the last relation 137 is replaced by 137.0365, a good approximation for *a*. This example

shows how the considerations of cosmic quantities help to connect microphysical ones.

10. The Hydrogen Atom Cosmical Model

Coming back to the atom model of section 1, but placed at the center of the black hole of invariant radius R. According to the *simplest* application of the exclusion principle, the number of electrons n would be limited by the condition

$$v_e = n\hbar/m_e R < c \qquad (10.1)$$

this means, with $\lambda\!\!\!^{-}_e = \hbar/cm_e$:

$$n < R/\lambda\!\!\!^{-}_e \qquad (10.2)$$

So consider a series of $R/\lambda\!\!\!^{-}_e$ spheres of radiuses $r_n = n\lambda\!\!\!^{-}_e$, each with the classical probability $P_n = 1/r_n^2$. In this manner, the quantum condition $m_e r_n v_n = \hbar$ is verified for electron speeds $v_n = c/n$, but means the exclusion of the circle $n = 1$, so cutting the sommation, which is described by the symbole Σ'. The mean distance of the electron is thus

$$\langle r\rangle = \Sigma' P_n r_n/\Sigma' P_n = \Sigma'(1/r_n)/\Sigma'(1/r_n^2) = \lambda\!\!\!^{-}_e \Sigma'(1/n)/\Sigma'(1/n^2) \qquad (10.3)$$

the sommation is limited by $n < R/\lambda\!\!\!^{-}_e$, leading, using the Euler constant $\gamma \approx 0.577215665$, to:

$$\langle r\rangle/\lambda\!\!\!^{-}_e = (\ln(R/\lambda\!\!\!^{-}_e) + \gamma - 1) / (\pi^2/6 - 1) \approx 136.9046 \qquad (10.4)$$

this is of course too close to a to be fortuitous [12]. Reversing the calculation, one deduces the radius corresponding to the Bohr radius ratio: $r_B/\lambda\!\!\!^{-}_e = aH/p \approx 137.1106$, to find, apart a deviation of 28 ppm on the later number, very close to the relativistic correction H-p, the mean ratio $(RR')^{1/2}$, where R' is the radius obtained by the suppression of the factor k in the

$$2\pi R/d = \pi(R/l_P)^2 = (\pi/k)(R/r_e)^3 \approx (2\pi/3)(R/r_e)^3 \qquad (6.3\text{-}10.5)$$

replaced by the following *exact* holographic relation:

$$4\pi(r_e/l_P)^2 = 2\pi R'/r_e \qquad (10.5)$$

so $R'/2 = r_e^3/l_P^2$ is the length obtained by suppressing c between the formula giving l_P and r_e. The definition of the 'central constant' k is thus

$$k = 2a^3/pH = 2R/R' \qquad (10.6)$$

Now the central constant is closed to the one introduced by Jean Maruani [14], showing a regularity in the mass ratioes μ, τ, s, by respect to the electron of the muon $\mu \approx 206.768279(0.3\text{ppm})$, the tau $\tau \approx 3477.15(90\text{ppm})$ and the *BEH* scalar boson $s \approx 134\ H$, with the dramatic series :

$$k \approx ln\tau/ln\mu \approx lns/ln\tau \approx lnp/lna \qquad (10.7)$$

with deviations -0.24%, 0.22%, -0.11%. So, there is a remarkable *geo-combinatorial* relation:

$$p\text{^}(p^2) \sim (a^2)\text{^}(a^3) \qquad (10.8)$$

So k must be a special mathematical constant. Elementary analysis shows that :

$$k \approx 2e^{-2/e^2} \approx 2 - 7/3ln137 \qquad (10.9)$$

precise to 1.6 ppm and -3.5 ppm respectively. In fact, the departure of k from 3/2 leads to the remarkable 0 ppb relation, obtained by successive approaches:

$$\pi(2k/3)^4 a/137 \approx 2^{7/4}(p/6\pi^5)^2 \qquad (10.10)$$

The pertinence of the ratio $a/137$ is confirmed by the following observation, implying the mass ratio Fermi-electron $F = 573007.33(0.25\text{ppm})$: $F\mu \approx (H\tau)^{5/3}$, and one observes:

$$(F\mu)^3/(H\tau)^5 \approx a/137 \qquad (10.11)$$

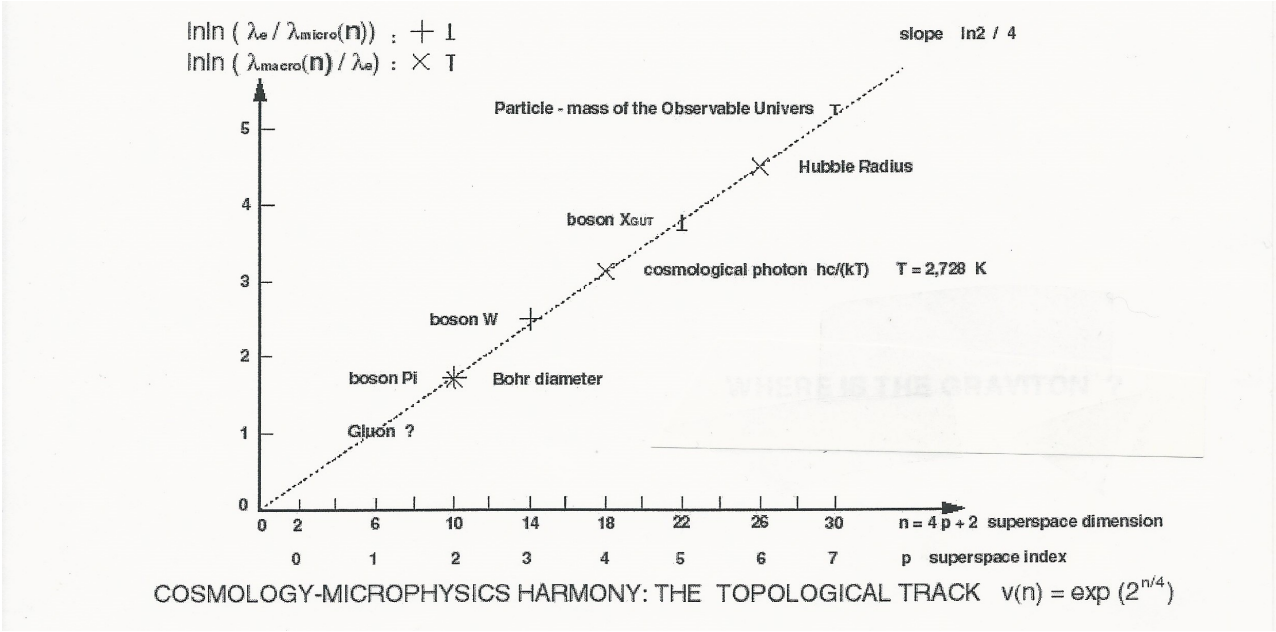
precise to 0.4 ppm, taking $\tau = 3477.44159$, the ratio given by the Koide formula:

$$p_K = (1+ \mu + \tau)/2 \approx (1 + \sqrt{\mu} + \sqrt{\tau})^2/3 \approx 1842.6049 \approx p(2ka/3\times137)^{1/5} \qquad (10.12)$$

Thus, this is a confirmation of Koide formula [24], *always unexplained by the standard model of Particle Physics*.

11. The Topological Axis

It is difficult to represent the large numbers of macro and microphysics on a single graph, with normal logarithmic scale. But double logarithmic representation leads to the following regularity, which resume the above hologtraphic conservations. The surprise is that the numerotation of the large numbers appears to be the special dimnsion series of string theory [12] :



By alterning micro and macrophysical numbers, the holographic relations show the series:

$$\lambda\!\!\!^{-}_e/\mathrm{d} \sim (R/\lambda\!\!\!^{-}_e)^2 \sim (\lambda\!\!\!^{-}_e/l_X)^4 \sim (\lambda/\lambda\!\!\!^{-}_e)^8 \sim (\lambda\!\!\!^{-}_e/l_W)^{16} \sim (l_{at}/\lambda\!\!\!^{-}_e)^{32} \sim (\lambda\!\!\!^{-}_e/l_{Gl})^{64} \sim (\mathit{l}\!\!\!^{-}_{string}/\lambda\!\!\!^{-}_e)^{128} \sim 2^{256}$$

The two first relations are classical (Weyl, Eddington, Dirac). The third one, implying the CMB is noted by Davies. The forth, implying the intermediry boson is signaled by Carr and

Rees. Note that the gauge bosons W and X have odd p-numbers. Extrapolating to p = 1, this predict a mass for the Gluon, about 10 m_e. For p = 7, the 'topon', whose mass is that of the Universe, would be a gauge boson, probably tied to the force that repel galaxies. The point n = 26, the characteristic dimension of bosonic string theory, relies with the Hubble radius, by : $\exp(2^{26/4}) \approx 6R/\lambda\!\!\!^{-}_e$ (0.066%). The point n = 10, characteristic of superstring theory shows a remarkable micro-macrophycal symmetry. Extending this to the point n = 30, this predict a Grandcosmos, correcting the general dissymetry of the scheme. Note that the point n = 24 = 6×4, corresponding to the 24 'transverse' dimensions of the bosonic string theory, interpreted as the priduct of the 4 space-time dimensions by the 6 hidden dimensions of superstring theory of total dimension 6 + 4 = 10. This corresponds to :

$$2\pi l_{cc}/r_e \approx exp(2^6) \tag{11.2}$$

to 3%, while

$$l_{cc}/r_e \approx (8\pi/3)\, exp(2\text{^}(e^{\pi}/4)) \tag{11.3}$$

to 0.04%. Note that the bosonic string theory has a definte tachyonic character, consistent with the evident tacyonic character of the CCO.

12. The Grandcosmos

The presence of two nearby universe radius R and R' could appear as a weakness of this approach. It is quite the contrary, because R' could be the holographic sphere representing a Grandcosmos behind [12]. As such, the first question is asking if R' is related to CMB, considered as the Grandcosms emanation (otherwise the Grandcosmos would be unobservable, so no-scientific). Indeed, the CMB Wien wavelength enters the relation:

$$4\pi(R'/l_{Wien})^2 \approx e^{a} \approx 16\pi(PpH)^2 \tag{12.1}$$

where *P, p, H* are the mass ratioes by respect of electron of Planck mass, proton, Hydrogen. Now, a thermal bath is reputed to be in complete disorder, while the above formula is clearly holographic, so *manifesting a coherence of CMB radiation*, suggesting a conservation of information. There is the same debate concerning the loss of information for an object falling in a Black Hole. In fact, in the cyclic cosmology we consider, an accumulation of mass in the black holes (in particular the giant ones at the heart of galaxies) must be limited to a maximal

value, with recyclage of information towards external regions (may be situed in the Grandcosmos). So the 'whorm hole' hypothesis must be taken seriously.
Note the Wien wavelength itself shows a dramatic singularity :

$$l_{\text{Wien}}/l_P \approx \pi^{64} \tag{12.2}$$

Note also the dramaticaly symmetric relation, precise to 1.34 ppm, involving the proton, neutron and electron masses:

$$\lambda_{CMB}\lambda\!\!\!^{-}_{CMB}/l_P(RR')^{1/2} \approx m_p^2/m_e m_n \Rightarrow \mathbf{T}_{\text{CMB}} \approx 2.725818\ \text{K} \tag{12.3}$$

matching, in the ppm range, the above value for the CMB temperature. With the Eddington radius, tied to the neutron, and Maruani constant, this writes :

$$\lambda\!\!\!^{-}_p\lambda_{CMB}\lambda\!\!\!^{-}_{CMB} \approx \lambda\!\!\!^{-}_e R_{Ed} l_P(2/k)^{1/2} \tag{12.4}$$

Now, the simplest way to define a Grandcosmos is to extend the Bekeinstein-Hawking entropy towards 1D holographic conservation [12]:

$$\pi(R'/l_P)^2 \approx 2\pi R_{\text{GC}}/l_P \tag{12.5}$$

this value $R_{\text{GC}} \approx 9.076 \times 10^{86}$ m *s*hows a dramatic correlation with l_{cc}:, prolonging Eq.()

$$l_{cc}^3 \approx R^2 r_e/2 \approx l_P^2 R^3/3r_e^2 \approx l_P R_{\text{GC}} r_e/\sqrt{3} \tag{12.6}$$

The resulting elimination of $l_P/\sqrt{3}$ leads to :

$$4\pi(R_{\text{GC}}/l_P)^2 \approx (R/r_e)^6 \tag{12.7}$$

whose deviation is very close to the cube of the reduced Maruani constant $2k/3$. Its elimination shows that the mean value $\sqrt{(RR')}$ appears in the following canonic holographic

relation involving the full Bekeinstein-Hawking entropy of Grandcosmos:

$$4\pi(R_{GC}/l_P)^2 \approx (1+1/p)^2(4\pi/3)(3RR'/4r_e^2)^3 \qquad (12.8)$$

meaning that *the Grandcosmos permits to get a better holographic conservation by the elimination of* the central constant *k.* This is independent of *G* and resume, since $R_{GC} = R'^2/2l_P$ to a remarkable property of $R'/R = 2/k$:

$$2\pi(1+1/p) \approx (4\pi/3)(R'/R)^{3/2} \qquad (12.9)$$

precise to 6.177 ppm, close to $(p/6\pi^5)^{1/3}$: this would mean that the values of π in the two sides of the above Eq. (12.7) are not exactly the same, *conforting the holographic character of these equations*. One must realize that the mathematical value of π with an infinity of decimals cannot be of ultimate pertinence in physics. The sign that this is the right track is that :

$$1836/6 = 306 = 17 \times 18 \approx (\pi/((p/6\pi^5)^{2/3}))^5 \qquad (12.10)$$

precise to 1.5 ppm. Recall that David Hilbert himself stated [25]: *'the infinite is nowhere to be found in reality. It neither exists in nature nor provides a legitimate basis for rational thought. The role that remains for the infinite to play is solely that of an idea'.* Such a prophetic sentence is surprizing, coming from a leader of formalist school, it would be rather in the mood of intuitionnists as Poincaré or Bouguers.

Detailed analysis, starting by the elimination of r_e in Eq.(12.5) permits to relates in a symmetric manner the full Universe Bekenstein-Hawking entropy with l_{cc}, R_{GC}, R, R', $R_{Ed} = Rp/n$, and $R_H = Rp/H$, the later corresponding to the three-body Hydrogen-hydrogen-electron:

$$4\pi(R_H/l_P)^2 \approx (\pi R_{GC}R'/RR_{Ed})^2 \approx (R/l_{cc})^9 (p/6\pi^5)^2(H/p)(a/137)^2 \qquad (12.11)$$

precise respectively to 1.44 ppm and -1.43 ppm, meaning this involves a more precise relation. By eliminating F^9 throught Eq. (9.7), $Pa^{2/3} \approx F^3H^2(p/6\pi^5)^{1/2}$, this leads to the 42 ppb relation:

$$4H\times 6\pi^5 \approx (137a^9p^2/nH^7)^4 \qquad (12.12)$$

The holographic Eq. (12.10) is more precise that the starting one Eq. (6.3), and use R as a wavelength, as suggested by the Topological Axis. The term $(R/l_{cc})^9$ could mean that the *9D* space of superstring theory is involved here. The gravitation constant eliminates in the first relation, meaning a relation implying the Maruani constant :

$$k \equiv 2R/R' \equiv 2a^3/pH \approx (2Hn\sqrt{\pi}/p^2)^{1/3} \qquad (12.13)$$

precise to 0.7 pm, a deviation probably imputable, as above, to a special π approximation. This evaluation of k is a confirmation of the Immergence Principle.

Another test for the Grandcoamos hypothesis is to rely R_{GC} with the CMB wavelength. Indeed :

$$((1+1/\sqrt{a})R_{GC}/\lambda_{CMB})^{2/3} \approx e^{a} \qquad (12.14)$$

Also remarkable is the Grandcosmos volume, with unit length the Bohr radius, involving the Shannon information unity 1/ln2:

$$V/r_{Bohr}^3 \approx a^a/\pi \approx (1/ln2)^{p+1/e} \qquad (12.15)$$

which prolongates in a π-*e* symmetry:

$$V/r_{Bohr}^3 \approx \pi^{3+\sqrt{(Hn)/\pi}} \approx e^{\sqrt{(Hn)/e-3}} \approx e^{3((\pi+e)/((\pi/ln\pi)-e)} \qquad (12.16)$$

This would imply that the Grandcosmos is an optimal calculator.

The equivalent Hydrogen atom number $\boldsymbol{N}_H^{(eq)}$ in the Grandcosmos appeares in the following transendent relation, in function of the number in the observable Universe $N_H^{(eq)}$:

$$(137/a)^2 P^{\sqrt{a}} \approx (4\pi/3)(R_{GC}/2R)^3 N_H^{(eq)} = (\pi/6)\,\boldsymbol{N}_H^{(eq)} \qquad (12.17)$$

Assuming that the Grandcosmos obeys the same critical formula, with a supercelerity C :

$$R_{GC} = 2GM_{GC}/C^2 \qquad (12.18)$$

The equalisation of Universe density $3c^2/8\pi GR^2$ and the Grandcosmos one, means :

$$T = R/c = R_{GC}/C \qquad (12.19)$$

so the period T would be the central cosmic quantity. Noting

$$D = C/c \qquad (12.20)$$

analysis shows that, with

$$B = a^7/137 \qquad (12.21)$$

one observes the symmetric relations,with the ratioes $m_p/m_e \equiv p$, $m_n/m_e \equiv n$, $m_H/m_e \equiv H$, $m_P/m_e \equiv P$:

$$p \approx B^5/D \qquad (12.22)$$

$$n \approx (PH/B)^5/D \qquad (12.23)$$

with D $\equiv P^3pH/a^6$, this means:

$$a^{12} \approx Pn(p/H)^3 \qquad (12.24)$$

corresponding to $G \approx 6.67547478 \times 10^{-11}kg^{-1}m^33s^{-2}$, which is very close to the value noted in Eq. (9.8) $G \approx 6.675466882 \times 10^{-11}kg^{-1}m^3s^{-2}$, this last value was defined by $Pa^{2/3} \approx F^3H^2(p/6\pi^5)^{1/2}$ and corresponds to a value for $p_G = P/^{2127/}2$, such that a proto-neutron symmetry

emmerges:

$$p_G(a/137)^{12}(\mathrm{p}/6\pi^5)^3\, N_H^{(\mathrm{eq})} \approx (pn)^{1/2} \tag{12.25}$$

whith the dramatic following property : the precise value for $6\pi^5$ is the same, in the 0 ppb range, than the one in:

$$a/137 \approx (6\pi^5 H)^{1/2}/p \tag{12.26}$$

the elimination of $6\pi^5$ leads to,

$$(a/137)^2\, H/p \approx (\sqrt{(pn)}/p_G)^{1/3} \tag{12.27}$$

conforting the above *G* value, to the 0 ppb:

$$G \approx 6.67547478 \times 10^{-11}\mathrm{kg}^{-1}\mathrm{m}^3\mathrm{s}^{-2} \tag{12.28}$$

Note that such a relation between the main masses may not present any interest for standard physicists, arguing that proton and neutron are quark combinations. But, of course, this is a reductionist argument, with no pertinence in cosmology, for which the nucleon is represented by p_G. Indeed, a simple systematic reseach on computer shows that, precising an already noted holographic relation, resuming in $3P \approx H^7$:

$$3P \approx (p^2 Hn)^3/p_G^5 \tag{12.29}$$

or, equivalently :

$$2^{128} \approx (3/\sqrt{2})\, (R/\lambda\!\!\!^{-}_e pn2^{64})^3 \tag{12.30}$$

The corresponding G value is

$$G \approx 6.675466916 \times 10^{-11} \mathrm{kg}^{-1}\mathrm{m}^3\mathrm{s}^{-2} \qquad (12.31)$$

Note that the above Topological Axis reveals a symmetry between n = 18 (CMB), n = 24 (CCO), and n = 30 (Grandcosmos). This leads to the discovery of:

$$4\pi(R_{GC}/l_{cc})^3 \approx a(2\pi l_{cc}/r_e)^8 \approx \pi(\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_e)^{24} \qquad (12.32)$$

so confirming the central role of CCO. This suggest that the overall periodicity of events could be the period R_{GC}/c, about 10^{61} times larger than $T = R/c$. This is confirmed by the following relation, correct to 39 ppm :

$$\pi(R_{GC}/\pi R)^2 \approx (2\pi R_{Ed}/\sqrt{(\lambda\!\!\!^{-}_e r_e)})^3 \qquad (12.33)$$

where appears again $R_{Ed} = R(p/n)$, seen in section (7).

13. The Harmonic Principle

Following the old tradition of Pythagoras, the Harmonic Principle [12] states that there is a connection between canonical large numbers appearing in Music and the physical parameters. In the Jeans classification of best musical scales, obtained by the so-called 'continuous fraction' analysis, there are, following the 12 degrees of occidental music, the numbers of notes 41; 53; 306;... The first observation is that, in the hindouist scale with 53 notes, the perfect number 6 is obtained at the 137^{th} note:

$$2^{1/53} \approx 3^{1/84} \approx 6^{1/137} \qquad (13.1)$$

The connection with the occidental music results from the fact that $53 \approx 9 \times 6$. So a tone is divised in 9 'commas', 4 forming a minor semi-tone, 5 forming a major semi-tone. Thus, 137 is really present in advanced occidental music, where a 'comma' is distinguished by violonists. But the presence, in the following scale of the fatidic number $306 = 1836/6 \approx \pi^5$ is even more dramatic, when expressed by the associated large number 3^{306} :

$$3^{1836/3} \sim 137^{137} \sim \exp(e(2\pi)^3) \qquad (13.1)$$

Recall that a^a apears neatly in the Grandcosmos volume. Now the operational definition of the optimal base e is that $e^{1/e}$ is maximal, and 3 is the nearest whole number from e. It is known that the calculation base 3 would be far more efficient that the base 2, but there are many technical problems. Now:

$$\exp(e(2\pi)^3) \approx a^a \tag{13.2}$$

In a letter to Christian Goldbach, 17 april 1712, Gottfried Leibnitz writes "Musica est exercitium arithmeticae occultum nescientis se numerare animi" (Music is a secret exercice on numbers). Let us precise this by arguing that the brain is a multi-base computer, mainly using the bases 2, 3, 5 and 137, which appêars in the harmonic series of order 5. The above relation suggests that a is even a better base than 137.

Many authors have tried, without notable success, to connect the golden number $\phi = (1 + \sqrt{5})/2$ with musical scales. It is more direct to connect it with physical parameters. With $q = P/2^{127/2} \approx 1831.529$:

$$\phi^{6p5/pq} \approx a/137 \tag{13.3}$$

in the ppb range. This would correspond to:

$$G \approx 6.675461466 \times 10^{-11}\text{kg}^{-1}\text{m}^3\text{3s}^{-2} \tag{13.4}$$

Moreover:

$$\phi^{a^2} \approx a^{1836 + 1/\phi} \tag{13.5}$$

while $1836 + 1/\phi \approx 6\pi^5 + ½$, so that :

$$\pi \approx ((1836 + 1/\phi - 1/2)/6)^{1/5} \tag{13.6}$$

correct to 8 ppb. The approximation of π confirms to be a central cosmical task.

Note that physical parameters shows arithmetic properties which are of no direct musical pertinence. For instance consider the main large number in the above Exclusion Model ; $(RR')^{1/2}/\lambda\!\!\!^{-}_e$. One obersves:

$$R/\lambda\!\!\!^{-}_e \approx 2^{128} = 2\text{^}(2\text{^}7) \qquad (13.7)$$

$$R'/\lambda\!\!\!^{-}_e \approx 27\text{^}27 = (3\text{^}3)\text{^}(3\text{^}3) \qquad (13.8)$$

with deviations -0.56% and 0.033%, exhibiting 'economic numbers', i.e. large numbers depending only on one or two small numbers.
The canonic ratio R_{GC}/R shows also such a singularity, to 2% :

$$R_{GC}/R = C/c \approx 3\text{^}(2\text{^}7\text{-}1/2) \qquad (13.9)$$

all this cannot be due to chance, and call for further analysis.
Now, the direct analysis on the mysterious number P leads to the discovery :

$$(3/\sqrt{2})^{a/4} \approx P^{1/2}6\pi^5(\text{H-p})a/137p \qquad (13.10)$$

corresponding to

$$G \approx 6.675467305 \times 10^{-11}\text{kg}^{-1}\text{m}^3\text{s}^{-2} \qquad (13.11)$$

So, there is a number of confirmations that G must be augmented by 2 sigmas.

14. The Weak Bosons masses

The tabulated value for the W and Z mass-ratio to electron are W ≈ 157309(180ppm) and Z ≈ 178449 (23ppm). Detailed analysis leads to the following proposal:

$$\text{W} \approx 2(137p^3/a)^{1/2} \approx 157338.9065 \qquad (14.1)$$

$$\text{Z} \approx (a/137)^4\, anH/p\sqrt{2} \approx 178451.2342 \qquad (14.2)$$

The last value is compatible with the following G-dependent 0 ppb formula, with the G value Eq. (12.28) :

$$Z \approx a(p^2n^2/p_G)^{2/3}/H\sqrt{2} \approx 178451.2342 \qquad (14.3)$$

showing the following common term in the decomposition of the formula (12.27):

$$Z\sqrt{2}/a \approx p_K(p/6\pi^5)^{1/2}p/H \qquad (14.4)$$

where p_K is the above Koide ratio Eq. (10.12) :

$$G \approx 6.67547478 \times 10^{-11}\mathrm{kg}^{-1}\mathrm{m}^3\mathrm{s}^{-2} \qquad (14.5)$$

This value becoming the most probable one. This is confirmed by the following
Looking for a symmetry *pHn*, this leads to the following discovery, where appears the canonic Pythagoras number $6^3 = 3^3 + 4^3 + 5^3$, which enters the holographic relation $4\pi p_G^2 \approx (4\pi/3)(6^3)^3$, where $p_G = P/2^{127/2}$:

$$P^4(6^3p_G)^3 \approx (n^3p^4/H)^2 \approx (pnH)^4(a/137)^{-2}(H\text{-}p)^{-1/2} \qquad (14.6)$$

both in the ppm range. This induces the discovery of :

$$P \approx (n^3p^4/H)^2/(6^3p_G)^3 \approx a^{12}(H/p)^3/n \qquad (14.7)$$

with opposite ppm deviations, leading to the following *p-n* symmetry entering the above Eddingtonian numb (Eq. 4.11) : $R/2\lambda\!\!\!^{-}_H = \sqrt{(M/m_e)} = \hbar c/Gm_em_\mathrm{p}$:

$$R/2\lambda\!\!\!^{-}_\mathrm{H} = P^2/H \approx (pn)^5(a^4/6^3p_G)^3 \qquad (14.8)$$

which confirms the *G*-value given by (12.27), reproduced here:

$$(a/137)^2 H/p \approx (\sqrt{(pn)}/p_G)^{1/3} \qquad (12.27/14.9)$$

The elimination of pn and $p_G = P/2^{127/2}$ between the two last equations leads to :

$$((a/137)^2 H/p)^{60} \approx 6^{18}2^{127\times7}/P^{10}a^{24}H^2 \approx 16/15 \qquad (14.10)$$

the appearance of the limma 16/15 confirms the above harmonic ^proinciple, with the remarkable

$$a/137 \approx (16/15)^{1/15\times16} \qquad (14.11)$$

now, taking account of (8.14), reproduced here:

$$P^{10} \approx a_w^{\,7}(\sqrt{a})^{134} \qquad (8.14/14.12)$$

Eq. (14.10) leads to

$$((a/137)^2 H/p)^{60} \approx (2^{127}/a_w a^{13})^7 6^{18}/H^2 \qquad (14.13)$$

Now $6^{18}/H^2 \approx (WZ)^{1/2}(p/a)^2$ while $WZ \approx 2^{127}/a_w a^{13}$, leading to the discovery of:

$$(n/H)(a_w/WZ)^7 \approx (WZ)^{1/2}(p_G(H\text{-}p)/\mathrm{a})^2 \qquad (14.14)$$

Now $a_w/WZ \approx \sqrt{a}$, whose ratio has a dramatic 7th power:

$$(WZ\sqrt{a}/a_w)^7 \approx e^{1/a} \qquad (14.15)$$

these relations could help for the search of the Grand Theory.

15. Cosmobiological relations

For explaining a number of correlations between physical parameters, many invoked an Anthropic Principle, a non-scientific argument opening the way to the catastrophic Multiverse idea. In fact, tenants of the Anthropic Principle has not seen that some biologic constants are closed to physical ones [12]. For instance, consider the DNA anhydrous nucleotides masses,

in Dalton units (1 Da ≈ 1.008 m_H). The corresponding Molecular weight (MW) is the sum of the atomic masses of the constituent atoms for 1 mole of oligonucleotide. The anhydrous molecular weight represents the pure oligo free of any of the counter ions or water molecules that are normally weakly bound to an oligo after synthesis. This calculation gives the molecular weight measured by mass spectroscopy, the sum of the nuclebase (mean value 130.87) and the desoxyribose phosphate $PO_6C_4H_3$: http://www.bio-protocol.org/e46: Here are the official complete chemical names and the molecular weigths (g/mole):

A- anhydrid desoxyadenosine monophosphate (anhydrid dAMP) $A \approx 313.21$

G- anhydrid desoxyguanosine monophosphate (anhydrid dGMP) $G \approx 329.21$

C- anhydrid desoxycytidine monophosphate (anhydrid dCMP) $C \approx 289.18$

T- anhydrid desoxythymidine monophosphate (anhydrid dTMP) $T \approx 304.20$

These masses enters the following 3×10^{-5} precise relation

$$A + T = G + C - 1 \qquad (15.1)$$

As each codon of the DNA chain is composed of 3 couples from the dual choice AT or GC, this means the bicodon mass is about an invariant, differing by ±1H, 2H, 3H, with mean value:

$$6(A + T + G + C)/4 \approx p_{hol} \qquad (15.2)$$

precise to 8×10^{-5} where p_{hol} is the mass ratio defined by the holographic relation, deduced above from cosmic consideration (Eq. 8.6):

$$\pi p_{hol}^2 = (4\pi/3)(r_B/\lambda\!\!\!^{-}_e)^3 \qquad (8.6/15.3)$$

Now the holographic term p_{hol} is connected with the Fermi mass F: by $p_{hol} \approx \sqrt{(6F)}$, so:

$$(A + T + G + C)/4 \approx p_{hol}/6 \approx F/p_{hol} \qquad (15.4)$$

Since p_{hol} is close to the Hydrogen mass H, this means that the mean nucleotide mass is close

to the Fermi one, showing a connexion between Biology and Particle Physics. The study of the deviation 367 ppm, leads to the discovery of the 458 ppb relation:

$$(p_{hol}p_G)^3 \approx 6F(p^2n/H)^2 \qquad (15.5)$$

which presents about an holographic character. Now the geometric mean of p_{hol} and p_G is close to the Koide mass ratio (see Eq. 10.12), to 29 ppm:

$$\sqrt{(p_{hol}p_G)} \approx p_K \qquad (15.6)$$

Introducing this in the correlation study leads to a 13 ppb relation:

$$(p_{hol}p_G/p_K)^6 \approx 6Fp_Kp^3H^2/n^2 \qquad (15.7)$$

Moreover, a 0 ppb formula is obtained with the Eddington value for the mass ratio proton/electron, $p_{Ed} \approx 1847.599459$, the ratio of solutions in the equation $10x^2-136x+10$,

$$PpHp_{Ed} \approx p_K^2a^{12} \qquad (15.8)$$

so confirming both the Koide formula and the proposed G-value. This is a spectacular application of the Approach Principle. These relations seem to confirm that the very definition of a mass is related to a number of information channels (Holophysics Principle), and that a DNA chain would be a scanned 1D hologram. So, in harmony with the Coherence Principle, a living organism would be driven by a single frequency organizing wave. Without this hypothesis, biology is not comprehensible. The following famous sentence by I.M. Gelfand seems inadequate: *There is only one thing which is more unreasonable than the unreasonable effectiveness of mathematics in physics, and this is the unreasonable ineffectiveness of mathematics in biology.* *Borovik, Alexandre (November 2006). Mathematics Under the Microscope*. It seems also that the author of DNA computing Adleman L., Computing with DNA (Scientific American) 1998 has not compared the nucleotide masses.

From the second part of Eq (7.5), and the proximity of p_{hol} with p one deduces that the cosmic period relies with the DNA codon mass:

$$\hbar^2/Gm_{codon}^3 \approx 2ct_{cc} \qquad (15.9)$$

Now, consider the mammal temperature $\mathbf{T}_{mam} \approx 310$ K, and the triple point temperature of

Hydrogen $\mathbf{T}_{H2} \approx 13.83$ K, Oxygen $\mathbf{T}_{O2} \approx 54.33$ K, and water $\mathbf{T}_{H2O} \approx 273.15$ K. They are connected by the 1% precise relations:

$$\mathbf{T}_{H2} \times \mathbf{T}_{O2} \approx \mathbf{T}_{H2O} \times \mathbf{T}_{CMB} \tag{15.10}$$

In the relation

$$a/(1+\ln a) \approx e^{\pi} \tag{15.11}$$

the Steinheimer scaling factor [26] appears: $j \equiv 8\pi^2/\ln 2 \approx a - e^{\pi} \approx e^{\pi} \ln(a)$, which enters the canonical form

$$(R/r_B)^{1/2} \approx e^{j/e} \tag{15.12}$$

and one observes:

$$\mathbf{T}_{mam}/\mathbf{T}_{CMB} \approx j \tag{15.13}$$

Moreover, the symmetry between the Universe and Nambu radius is expressed by considering the wavelength associated to the mammal and triple point water temperatures $\lambda\!\!\!^{-}_{mam} \equiv hc/k\mathbf{T}_{mam}$, $\lambda\!\!\!^{-}_{H2O} \equiv hc/k\mathbf{T}_{H2O}$:

$$(R'l_{Pl})^{1/2} \approx \lambda\!\!\!^{-}_{H2O} \tag{15.14}$$

$$(Rl_{Pl})^{1/2} \approx \lambda\!\!\!^{-}_{mam} \tag{15.15}$$

precise respectively to 0.1% and 1%. Recall that temperature is noted by Schrödinger [27] as an essential parameter for Life (tied to the mutation rate). Indeed the mammal temperature is the same for the polar bear and the african antilop, which means apparently a large waste of energy [28]. But it seems here that the Water molecule and the mammal organism are even more important, from a cosmical computer point of view, than the *CMB*. This is not a come back to the anthropomorphic Anthropic Principle, but rather its inversion, the Cosmos using human calculators to help in its computational research this is the natural answer to the basic question: 'why do we ask questions ?'.

16. Conclusions

This study is principaly based on a simple idea: conservations of geometric forms of different dimensions, by analogy with the holographic technique. This leads to very precise relations between the canonic physical ratioes. As these numbers are not reckognized by any mathematical fields, the standard thinking is to attribute them to chance, for instance at the occasion of a primordial Big Bang, and, in order to explain the relations between them, by invoking a multitude of Universes, called the Multiverse. But we have gone further, showing that these relations are connected with the determination of approximations for π, and a liaison with the special series of dimensions in string theory, with enphasis to the bosonic special value $n = 26$ and the superstring one $n = 10$. This means the anscestral idea of a unique Univers should be restaured, with the existence of a Grand Theory, which must be connected with the Eddington Fundamental Theory, since the latter predicted correctly the number 136×2^{256} of atoms in the material part of the Universe. Note that holographic conservations could not occur in an Universe with variable radius, so the refutation of the Primordial Big Bang cosmology is a neccesity. But note that intriguing common points have been found between the two cosmologies, leading to the hypothesis of a 'Permanent Big Bang' [2].

The main physical parameters are obtained easily by applying basic quantum principles, with, in particular, the resolution of the dark matter problem, an unsolvable dilema in standard cosmology. So, while Particle Physics is uncomprehensible without invoking cosmology, the latter is also uncomprehensible if the Universe is, as ordinary stated, merely 'an ensemble of particles in *c*-limited probabilistic interaction'. Note that, while a real physicist carefully distinguish Time from Space, all other research people put $c = 1$ in the formula: they are mathematiucians, applied mathematicians, physical mathematicians, and theoretical physicists.

In fact, the holographic relations seems to reveal more than a simple geometric analogy. Indeed the associated 'Coherence Principle' can be related to the fact that holographic technique use a coherent, i.e. monofrequency radiation. Considering that holography is the charactistic of coherent waves, it may be deduced that all waves associated with particles have a mutual coherence. This is the signification of the Universal Coherence Principle: a single frequency is at work, $t = h/E \approx 10^{103}$ Hz, and can be associated with matter-antimatter oscillation, which permits to define 'dark matter' as oscillation in quadrature.

This leads to the idea of a computing Univers, using the mysterious physical parameters as optimal calculation basis. This answers the question 'why do we ask questions ?' Animals and human beings would be peripheric calculators of Cosmos. But, as infinity of events is

excluded, this must be periodic, so there is only one cyclic History. Thus, the 'undeterministic' interpretation of quantum mechanics would be replaced by an hidden deterministic calculation. The famous 'hidden variables' would be in fact the rest of the Cosmos, and, of course, are subject to the quantic non-locality. But strict non-locality is also excluded, because it would involve an infinite velocity. So we have propose that a supercelerity is at work, about $10^{60}c$.

So, the whole science seems to need a complete reformulation, based on the following principles, which are neither exhaustive nor mutually independent, which come after the very basic one, the Approach Principle : one can learn something without the need to know everything. :

1. General Quantification Principle: the physical laws are arithmetical ones, excluding both infinity and continuum concepts. As Kronecker said 'God invented whole numbers, but humans defined all the other sorts of numbers'. One may add the prediction of an ULTIMATE ARITHMETICS PRINCIPLE : Nature uses an yet unknown optimal *inductive* arithmetics, só jusfying the Approach Principle.
2. Perfect Cosmical Principle: The laws of physics are the same everywhere and everytime (a spatial generalisation of Poincaré's Principle) implying the steady-state cosmology,
3. Cyclic Principle : all the events reproduce themselves with a periodicity multiple of $T = R/c \approx 13.812$ Gyr,
4. Ambivalence Principle: a physical phenomena can be explained by very different models.
5. Coherence Principle: an unique frequency governs each phenomena, including a DNA chain, a biological cell, or a whole organism.
6. Resonance holoscanning Principle: the universe with energy E is vibrating with a periodicity $t = h/E = 2t_P^2/T$. The period of the vibration matter-antimatter of each particle is a whole multiple of t.
7. Tachyonic Principle: there is an invisible tachyonic world, with speed $C = cR_{GC}/R_U \approx 6.94\times10^{60}\ c$, associated with the quantum vacuum.
8. Holophysics Principle: Holographic conservations are the fundamental laws.
9. Grandcosmos Principle: an external thermostat is the source of the CMB, with radius $R_{GC} = R'^2/2l_{Pl}$.
10. Computing Principle: the numerical constants are computation basis in a calculating Cosmos.

11. Harmonic Principle: numerical physical constants appears in musical numbers.

12. Immergence Principle, or Inverted Anthropic Principle. Life helps cosmic computation: biological parameters are tied to cosmic ones.

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Leaving apart the far-reaching philosophical consequences of *this refutation of the Primordial Big Bang hypothesis, with, in particular, the definitive refutation of any global universal evolution or the non-scientific Multiverse concept,* this study leads to dramatic observational predictions, *(a*) by selecting *the true cosmic redshifts*, the recession time must be identified with the period *T* (which is no longer any age), corresponding to the recession constant 70.79 km s^{-1} Mpc^{-1}, *(b)* the far-field galaxies, in average, could present the same features as near field ones, with identical physical characteristics (notice it is already supported by "abnormal" old galaxies, and even groups of galaxies, in the deep field), *(c)* the existence of young galaxies in the near field (in this respect the observations of Arp must be revisited), *(d)* the identical CMB temperature everywhere, *(e)* the Wolf solar cycle $(Ttcc^2)^{1/3}1/3 \approx 11$ yr and the large climatic period, $(T^{-1}tcc)^{1/3}1/3 \approx 400000$ yr, might be present in other celestial objects (e.g., a cycle of 11.4 yr has been already detected in the monstrous blazar OJ 287) [29]. *(f)* a mass for gluons, which is not exclude by theory [30] is predicted, around 10 electron mass . (g) a specified value for G is proposed, in the ppm range. (h) the galaxy recession is exponential

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