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EVIDENCE FOR A STEADY-STATE, HOLOGRAPHIC, TACHYONIC AND SUPER-SYMMETRIC COSMOLOGY

Article submitted for the publication of

N/A

by

<Dr Francis M. Sanchez, Dr Kotov, Dr C.Bizouard, Pr. M.Grosmann, Dr. R.Veysseyres, Dr. D.Weigel, N.Flawisky, D.Gayral. L.Gueroult>

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<April 2019>

To the memory of
Sir Michael Atiyah.

Acknowledgments

This research would not have been possible without ...

"Francis M. Sanchez, Valery A. Kotov, Michel Grosmann, Dominique Weigel, Renee Veysseyre, Christian Bizouard, Nicolas Flawisky, Denis Gayral, Laurent Gueroult."

Abstract

The ancestral concept of Cosmos is rediscovered through the idea of a Tachyonic Grandcosmos Multibasis Computer, inversing the Anthropic Principle and reestablishing the Laplace Determinism. The observed fine tuning between Physical dimensionless parameters is interpreted as relations between optimal calculation basis, announcing a dramatic progress in computer software. The three type of mathematical constants are considered: Large, Intermediate and close to unity. The famous Large Number problem is resolved by Eddington's statistical theory and the gravitational Hydrogen Molecule model, leading to the visible Universe horizon radius $R = 13.812Gly$. The extension of the double cosmic correlation defines a Topological Axis using Euler-Napier constant e as primary basis, confirming String Theory, Cartan-Bott periodicity and the 30 holic dimensions corresponding to the simplest physical diophantine equation $T^2 = L^3 = M^5 = N^{30}$. The point $n = 30$ corresponds to the common time, about $10^{58}s$, given by two mandatory dimensional analysis, interpreted as the Supercycle period. The visible Universe wavelength 'Topon' $2G \cdot \hbar / Rc^3 = 4 \cdot 10^{-96}m$ corresponds to $n = 2e^e$ and enters the 1D mono- radial holographic extension of the Bekenstein-Hawking Universe entropy, implying the critical condition, and breaking the Planck wall by a factor 10^{61} . The monochrome holographic extension leads to a Grandcosmos, larger than the visible Universe by the same factor 10^{61} . This implies a tachyonic speed in the same ratio by respect to c, justifying the Planck renormalisation of the Vacuum Energy, independently checked by the Casimir effect. The couple Universe-Grandcosmos is confirmed by a dramatic geo-dimensional analysis, where Length, Time and Mass are considered as unit vectors in a 3D Superspace. A matter-antimatter $10^{104}Hz$ Oscillatory Bounce unifies standard Single Bang with steady- state cosmology, but suppress Relativity in cosmology, reestablishing the Newton Absolute Space-Time realized by the Microwave Cosmic Radiation. This new space-time structure are tied to unexplained phenomena such as Kotov cycle, Tifft periodicity, Pioneer anomaly and Arp observations. The Kotov period, omnipresent in astrophysics, is directly related with the single-electron cosmology by a 10^{-9} relation. In addition to e, the Archimedes constant π and the electric constant $a = 137.036$ appear as privileged calculation basis. The fusion Mathematics-Physics is confirmed by 10^{-9} precise relations

with physical parameters implying Eddington's 137 and Atiyah constant. The latter enters the Topological axis in liaison with the canonical Galaxy Group radius, the graviton mass and the Higgs Boson, the later being associated to the string dimension $d = 496$. The dramatic connexion of Atiyah constant with the Sternheimer scale factor confirms the fusion of Computational Physics with Theoretical Biology. In particular, the Supercycle Period connects, through the Monster group cardinal, with the Kotov period, itself tied to the well-defined DNA bi-codon mass. The ratio between the Universe mass and the mass associated with the Kotov period, identified with a photon mass, is close to the square of the Monster order. The ratio between the Supercycle period and the Chronon quantum is close to the third power of the Monster order, also close to e^{137e} and d^{60} . Our predictive analysis tend to lift the veil about the future infra-red spatial telescopes which are due to find mature galaxies in the very far range, instead of a Dark Space, disproving once and for all the standard evolutionary cosmology, ill-founded on an imperfect Cosmological Principle.

Table of Contents

List of Figures

List of Tables

1 Introduction

Deterministic Computation and Hierarchy Principle:

It was observed that the physical constants are tightly contrived, but only three dimensionless parameters: a, p, and a_G, are sufficient to explain the main structures of the world [1]. Two of them are precisely measured: the electric constant $a = 137.035999139(31)$, measured with 0.23 ppb precision and the proton-electron mass ration $p = 1836.15267245(75)$, known with 0.41 ppb precision. By contrast, the gravitational coupling constant a_G was neither well defined nor measured, due to the relatively large imprecision on G measurement (10^{-4}). One can read [1]: 'For example, the size of a planet is the geometric mean of the size of the Universe and the size of an atom; the mass of man is the geometric mean of the mass of a planet and the mass of a proton. Such relationships, as well as the basic dependences on a and a G from which they derive, might be regarded as coincidences if one does not appreciate that they can be deduced from known physical theory, with the exception of the Universe, which cannot be explained directly from kwown physics.... This line of arguments, which is discussed later, appeals to the 'anthropic principle'. The existence of relations that are not explained by known physical theories, is called 'fine tuning' phenomena. But as soon as it involves the observable Universe radius, it signals the existence of a more fundamental theory that must take into account the ancestral Cosmos concept, which, as Eddington prophetised [2], must be permanent [3]. But, as about 30 dimensionless parameters appear as 'free parameters' in the Particle standard model, a large majority of theorists believe rather they are due to chance, leading to a separation between Physics and Mathematics, not to speak of Biology. Through a so-called Anthropic Principle, a majority believe in the Multiverse conundrum, a multiplicity of sterile Universe [1]. The present article shows that Physics is a part of mathematics, refuting the Multiverse Hypothesis by precise fine-tuning between main physical and biological parameters, involving main mathematical constants: $\pi, e and \gamma$. Also, these relations confirm the Super-string Theory

and rehabilitates the tachyonic Bosonic String Theory. A magic of physics is the energy conservation. Theorists associate it with time uniformity, but a more logical explication is that cosmos is a computer, so Intelligent Life receive a justification: to help the Cosmos computation. This Inverted Anthropic Principle answers the first of all questions : why do we ask questions ? We proposed that the parameters are optimal basis in a deterministic Computing Cosmos, and they appear indeed in DNA characteristics, and three-point temperatures of Mammals and main molecules [3] (this ref contains well-known ref. not recalled here) This reestablishes the Laplace determinism, rejecting the Copenhague stastitical interpretation of quantum mechanics, involving non-local hidden variables, which identify with the Cosmos. The fact that three parameters, out of about 30, are so clearly emerging means that Physics, and more generally Science, is hierarchic: one can progress in science without knowing the details of the underlying fundamental theory. So, when Dalton found whole numbers in chemical reactions, he was prefiguring the atoms and Chemistry. The same for Balmer, spectral lines and wave mechanics. The same for Mandeleiev, atomic masses and nuclear physics. Also, when Mandel found whole numbers in Biology, he was prefiguring genetics. In the same manner, this article prefigures the fundamental theory which must be based on arithmetics, indeed a characteristic of deterministic computation. This article is separated in 3 sections, corresponding to 3 classes of mathematical constants. The first section explains why, in the Computation Hypothesis, large numbers are necessary, so justifying at last the Cosmos vastness. In particular, the most famous prime number of History $2^{127}-1$, and the Eddington's Large number $N_{Ed} = 136 \cdot 2^{256}$ are empathized. The second section will study the role of intermediate mathematical constants such as the Eddington's constant 137. The third Section involves mathematical constants, such as $\pi and \gamma$. By contrast, the optimal computation basis e is used all along, in particular as the primary basis of the Topological Axis (the secondary basis being 2, the simplest of all)..

2 Internal Fine Tuning and Canonical Large Numbers

2.1 The Famous Double Cosmic Fine-Tuning and the Topological Axis

The most famous fine tuning implies cosmic quantities, but this is awkwardly called the 'Double Large Number Problem'. If it is a 'problem' for standard evolutionary cosmology, it is a precious clue in steady-state cosmology based on the Perfect Cosmological Principle (spatial and temporal homogeneity) [3]. This Cosmic Fine-Tuning leads directly to a Gravitational Hydrogen model of the universe [3] defining the Universe horizon radius $R = 2a_G \lambda\!\!\!^{-}_e$, the factor 2 coming from the two atoms in Hydrogen molecule, where $\lambda\!\!\!^{-}_e = \hbar/cm_e$ is the Electron Compton reduced wavelength, and the gravitational coupling constant $a_G = \hbar c/G \cdot m_H \cdot m_p$, so the speed c is eliminated. This conforms with Coherent Cosmology which needs signal celerity far exceeding c. This gives R = 13,812 Gly, corresponding to a Hubble constant 70.790 (km/s)/Megaparsec, compatible with the most recent measurement [4]: 72(3) (km/s)/Megaparsec, which confirms the value measured directly by the 1a type novae, while the standard optimization of 6 parameters results in a lower value of 9%. Let us associate the visible universe of mass M with a matter-wave, of wavelength $\lambda\!\!\!^{-}_M = \hbar/Mc = 410^{-96}m$. This 'Topon' is close to the touchstone n = 30 of the Topological Axis, see Fig. 1, corresponding to $n \approx 2e^e$, to 0.01% , The Topological Axis illustrates the function $fn+4 = f^2n$ and results from the imbrication of relations of the form $\lambda\!\!\!^{-}_e/l_{micro} \sim (l_{macro}/\lambda\!\!\!^{-}_e)^2$, followed by $l_{macro}/\lambda\!\!\!^{-}_e \sim (\lambda\!\!\!^{-}_e/l\prime_{micro})^2$:

$$\lambda\!\!\!^{-}_e/\lambda\!\!\!^{-}_M \sim (R/\lambda\!\!\!^{-}_e)^2 \sim (\lambda\!\!\!^{-}_e/\lambda\!\!\!^{-}_X)^4 \sim (\lambda_{CMB}/\lambda\!\!\!^{-}_e)^8 \sim (\lambda\!\!\!^{-}_e/\lambda\!\!\!^{-}_W)^{16} \sim (2r_H/\lambda\!\!\!^{-}_e)^{32} \sim (\lambda\!\!\!^{-}_e/l_{Gl})^{64} \sim (\lambda\!\!\!^{-}_{str}/\lambda\!\!\!^{-}_e)^{128} \sim 2^2$$

where a string wavelength $\lambda\!\!\!^{-}_{str}$, appears, with mass about 2 MeV. So, the correlation is eightfold, including, apart the two ones above, three relations which have been independently reported [3]. The overall large number 2^{256} has an evident computational character,

confirmed below by the dramatic appearance of the Eddington Large Number, and allows to approach each physical length. In particular, the relation $R/\lambda\!\!\!^{-}_e \sim (l_{CMB}/\lambda\!\!\!^{-}_e)^4$ ties two cosmic lengths, the Hubble radius and the CMB wavelength by a relation incompatible with the standard evolutionary cosmology. Of this order of magnitude, we infer rather precise relations. First, considering the cosmological neutrino background (CNB), whose wavelength is defined by $(l_{CNB}/l_{CMB})^3 = 11/4$, we have

$$R/\lambda\!\!\!^{-}_e \sim (l^2_{CNB}/l_{CMB}\lambda\!\!\!^{-}_e)^4$$

to 1.7%. Second, with the Hydrogen radius $r_{H(0)} = a\lambda\!\!\!^{-}_e$, we infer

$$R/r_{H(0)} \sim (4 \prec l_{CMB}/r_{H(0)})^4$$

precise to 0.6%. One notes that the appearance of the neutrino field is conform with the synthesis of the two main cosmologies, where the single Bang is replaced by a matter-antimatter Oscillatory Bounce [5]. In particular, it was noted [1] that a_G is of order W^8 , where W is the mass ratio W boson- Electron. With the above R value, one observes the following more symmetrical relation involving the other (neutral) weak boson Z, in the 0.01% indetermination of W and Z: $R/\sqrt{(\lambda\!\!\!^{-}_p \lambda\!\!\!^{-}_H)} \approx (WZ)^4$ where $\lambda\!\!\!^{-}_p$ and $\lambda\!\!\!^{-}_H$ are the Proton and Hydrogen reduced wavelengths. The precision of this formula will be pulled to the ppb range in Chapter 3, by intervention of canonical mathematical constants. The gravitational Hydrogen molecule model [3] implies the following double correlation, which is the simplest case of Eddington's statistical theory [2]. The position of a 'reference particle' is supposed to be determined with an uncertainty $R/2$. For N particles of mass m components of the visible Universe, the deviance is statistically divided by $\sqrt{N}$, where $N = M/m$. If m is assumed to be the effective mass of the electron in the Hydrogen atom, $m\prime_e = m_e p/H$, and if, moreover, we equate the deviance $R/(2\sqrt{(M/m\prime_e)})$ to the Hydrogen wavelength $\lambda\!\!\!^{-}_H = \hbar/c \cdot m_H$, we obtain the double relation:

$$R/2\lambda\!\!\!^{-}_H = \sqrt{(M/m\prime_e)} = \frac{\hbar \cdot c}{G \cdot m_e \cdot m_p}$$

This is the definitive interpretation of the Double Large Number Fine-tuning. So, while the two pillars of Physics, Relativity and Quantum Theory are unable to conciliate Gravitation and Particle Physics, the third pillar, Statistical Physics, directly makes this connection in cosmology [2]. Recall that, contrary to what is often stated, Quantum Physics does not limit to Micro-physics. Indeed the exclusion principle applies in both solid state physics and in stellar physics. In particular, for a star containing N s atoms, in which the pressure

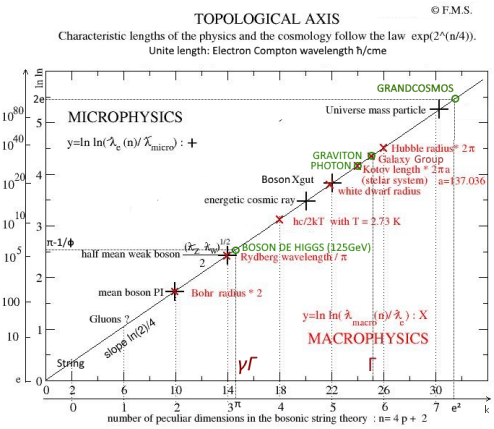

Figure 2.1: A figure example.

has reached the quantum degenerancy value (case of white dwarfs), exclusion principle applies for electrons, and the radius star is about $R/N_s^{1/3}$. So the formula giving the Hubble radius R, a very difficult measurement which puzzled a whole century, was already contained in astrophysics textbooks. The universe radius amazingly appears as the limit of a mono-atomic star radius, of which the electrons are in degeneracy state. Eddingon was aware of this Cosmologic Exclusion Principle, but could not conclude since, at his epoch, the Hubble measurement for R was false by an order of magnitude. The reason for this discrepancy is that LemaÃ®tre and Hubble considered galaxies of the Local Group, which do not participate the so-called Space expansion. In fact, it suffices to introduce a repulsive force proportional to galaxy groups separation distance, for explaining the canonical exponential recession. There is no need of the so-called 'dark energy', the repulsive force is simply the cosmological constant identified to $1/R^2$. The distance for which this force exceeds attractive gravitation between galaxies is about 10^6 light years [8][3], which corresponds, in the Topological Axis, to the Atiyah Constant Γ , presented in the Section III, see Fig 1. In the steady-state cosmology, such a repulsive force between galaxy groups is necessary, in order to avoid a big chill due to the thermodynamics second principle. But, inside a galaxy group, another evacuation mechanism must occur: it would be the role of massive black holes.

For instance, this paper [8] is awesome.

See Figure 2.5 as an example on how to add figures to your thesis. It is recommended that all figures to be kept in a separate directory. Note the './figures/figure' in the example below.

2.2 Cosmic Holography, Toponic Quantification and Cosmos vastness

In the steady-state cosmologic model of Bondi, Gold and Hoyle[6], the Perfect Cosmological Principle implies the invariance of the Universe mean mass density ρ and the exponential recession of galaxy groups, with time constant R/c being compensated by the appearance of m n massive neutrons at rate c^3/Gm_n. The invariant visible Universe radius R is then defined by the Schwarszchild relation so that each point is the center of an equivalent R-radius black hole, of critical mass $M = Rc^2/2G$ and wavelength $\lambda\!\!\!^{-}M = \hbar/Mc = 2l_P^2/R$, the above 'Topon'. The Bekenstein- Hawking entropy of this black-hole Universe shows an 1D extension of the standard Holographic Principle , only devoted to 3D application [7][6]: $S_{BH} = \pi(R/l_P)^2 = 2\pi R/\lambda\!\!\!^{-}_M$ where $l_P = (Ghbar/c^3)^{1/2}$ is the Planck's length. Note that, while the standard evolutionary cosmology use differential equations, the steady-state Cosmology must favor such integral relations. This one uses the Archimedes Testimony tying the Disk Area to its Perimeter. In the standard evolutionary view, the observed homogeneity of causally disconnected regions of space is known as the so-called 'horizon problem', and is at the origin of the awkward inflation hypothesis, which is not necessary in the steady-state model. Indeed, the critical condition is furnished by the above very definition of R. The cosmic wavelength $\lambda\!\!\!^{-}_M \sim 10^{-95}m$ breaks the 'Planck wall' by a factor $l_P/\lambda\!\!\!^{-}_M \sim 10^{61}$: this is why this holographic relation went unnoticed. Indeed, it was admitted that l_P was the quantum of Space: in fact Planck's length is only an intermediate holographic length. The gravitational potential energy of a critical homogeneous sphere is $-(3/5)GM2/R = -(3/10)Mc^2$, while the nonrelativistic kinetic energy of galaxies is $(3/10)Mc^2$. Their sum is therefore zero: the density of the so-called 'dark energy' being compatible with 7/10, this dark energy is a trivial false problem. As recalled above, Relativity is a local theory that does not apply in Cosmology: galaxies actually reach speed c, and crossing the horizon, reach a Grandcosmos of radius R_{GC} , given, as a first approximation, by the symmetrical holographic relation, this time monochrome instead of the monoradial relation above: $S_{BH} = \pi(R/l_P)^2 = 2\pi R_{(0)}GC/l_P$ with $R_{(0)}GC/R = l_P/\lambda\!\!\!^{-}_M \sim 10^{61}$. The conservation of the time constant $t = R/c, = R_{(0)}GC/C$ introduces a canonical velocity $C \sim 10^{61}c$, making appear an energy larger than that of the visible Universe by a factor 10^{122} , which can be identified with the l_P -normalised quantum energy of vacuum, checked by the Casimir effect [7]. The central problem of quanto-cosmic physics is thus solved. Moreover, the objections against the Hawking approach using trans-plankian frequencies are wiped out [8]. In a better approximation, justified below, R is replaced in the above relation by $R\prime = 2\hbar^2/Gm_N^3 \approx 18.105Gly$, where $m_N = am^e$ is the Nambu mass, of central importance in particle physics. Indeed, the half radius $R\prime/2$ has a simpler definition

than $R/2$: it corresponds to the elimination of c between the classical electron radius and the Planck length. In this way, the sphere of radius $R\prime$ appears as the spherical hologram representation of the outer Grandcosmos:

$$S\prime_{BH} = \pi(R\prime/l_P)^2 = 2\pi R_{GC}/l_P$$

This value will be dramaticaly confirmed in the section I.IV. Assuming the Toponic Quantification Hypothesis, the mass of a particle is an exact sub-multiple of the mass-equivalent M of the visible Universe: $m = M/N_m$, and its canonical wavelength is $Nm\lambda\!\!\!^{-}M$, allowing the following holographic extension of the above mono-radial holographic conservation:

$$S_{BH} = \pi(R/l_P)^2 = \frac{2\pi \cdot R}{\lambda\!\!\!^{-}_M} = \frac{2\pi \cdot N_m \; cdotR}{\lambda\!\!\!^{-}_m}$$

This series of large circles generates, by scanning, the approximation of a sphere: one thus passes from the Disk to the Sphere. Note that this justifies the factor $\frac{1}{4}$ in above BH entropy. But, for the approximation to be sufficient, the numbers N_m must be very large. In this way, the Cosmos- Computer can use the computational properties of the mathematical constants of the continuous analysis, such as π (See Section III). The immensity of the Cosmos thus receives a much simpler computo-holographic explanation than that of standard cosmology, where initial conditions, during Planck's time, would be adjusted with extreme precision, even with inflation. By identifying the large number of Eddington $N_{Ed} = 136 \cdot 2^{256}$ as the equivalent number of neutrons in the effective mass $\frac{3M}{10}$ this leads to $R \approx 13,805 Gly$ at 0.05%of the above value. In the Hydrogen gravitational molecule model, R is defined by the following 1D-2D-3D Special Holographic Relation, where the wavelengths of the Electron, Proton, and Atomic and Molecular Hydrogen apear, as well as that of the background radiation $2\pi R/\lambda\!\!\!^{-}_e = 4\pi\lambda\!\!\!^{-}_p\lambda\!\!\!^{-}_H/l_P 2 \simeq (4\pi/3)(\lambda\!\!\!^{-}_{CMB}/\lambda\!\!\!^{-}_{H2})^3$ The above relation gives $T_{CMB} \simeq 2.73K$. With the measured temperature of the cosmic background, there is a gap compatible with $(H/pG)2p/6\pi 5$, where $p_G^2 = P^2/2^{127}$, with $P = \lambda\!\!\!^{-}_e/l_P$, . This eliminates l_P , so gives a relation independent of G:

$$2^{127} = 2\pi^2\lambda^3_{CMB}/\lambda\!\!\!^{-}_e\lambda\!\!\!^{-}_H 2$$

=> $_{CMB} = 2.725820805$ Kelvin which is the surface of the 4-sphere of radius $\lambda_{CMB}/\lambda\!\!\!^{-}_m$, where $\lambda\!\!\!^{-}_m = (\lambda\!\!\!^{-}_e\lambda\!\!\!^{-}_H 2)^{1/3}$, proving the relevance of the Lenz-Wyler approximation for the Proton/Electron mass ratio $p = 6\pi^5$, (see Section III). Recall that $2^{127} - 1$ is the most famous prime number in the history of Mathematics, being the last term of the Combinatorial Hierarchy of Special Numbers of Mersenne 3, 7, 127, the sum of which is 137. The

critical mass is related to the elementary masses by:

$$m_P^4 = M m_e m_p m_H$$

this directly involves the mass of Planck m_P , which at this day, has no known application, except that it is close to the mass of the human ovocyte. In this way, the local inertia is related to the distant masses, in accordance with the Mach principle, which the Relativity Theory does not explain. Another shortcoming of this theory is that it does not define any inertial frame. However, the Doppler dissymmetry of the cosmic background indicates the speed of our local group of galaxies: 630 km/s. The cosmic background is therefore tied to the Newton absolute frame, the Grandcosmos. The mathematical continuity being excluded by the above Calculative Principle, the associated time

$$\lambda\!\!\!^{-}_M/c = 1.33 \times 10^{-104} s$$

is the new candidate for the 'Chronon', the 'quantum of time', so the oscillatory bounce has a frequency about $10^{104} Hz$ [9][5].

2.3 Evidence for Tachyonic Flickering Space-Time-Matter

The tachyonic hypothesis is consistent with the non-local character of quantum mechanics. The following considerations and observations confirm this hypothesis.

2.4 Single Electron Cosmology

The single-electron cosmology [3] uses the electron indeterminacy, which is the real basis of the Exclusion Principle, giving an horizon value R 1 only dependent of the Hydrogen radius $a\prime = aH/p$. It is the value for which the mean cosmic value is also the atomic one:

$$\frac{\sum(1/n)}{\sum(1/n^2)} = a\prime$$

with the sum running from 2 to $R_1/\lambda\!\!\!^{-}_e$. This implies: $R_1 = \lambda\!\!\!^{-}_e exp((\pi^2/6-1)a\prime + 1 - \gamma) \approx 15.77465 Gly$ very close (0.4 ppm) to the following expression, where $p_G = P/2^{127}/2$, and $\beta = (H-p)^{-1}$ is the Rydbergh correction factor and $p_0 = 6\pi^5$ the Canonic Lenz-Wiler Approximation of p: $R_1 = (p_0/p_G)\sqrt{(\beta R R\prime)}$.

Now, with the Kotov length $l_K = ct_K$, see below, one notes that $\sqrt{(\frac{R}{a_w l_K})}$ is close to $\sqrt{a}$, while the replacement of R by R_1 is about 4π , the canonical form for $\sqrt{a}$, the deviation being compatible with p/p_0 , where $p_0 = 6\pi^5$ is the Lenz-Wyler approximation for p (Section III.I):

$$\sqrt{(R_1/a_w l_K)} \approx frac4\pi^p p_0 \Leftrightarrow t_K \approx 9600.591445s$$

a relation independent from G.

This t_K value will be confirmed, in the ppb range, by the value deduced from $t_K/t_e = \sqrt{(a_G a_w)}$, see below, using values of $a_w and a_G$ connecting, again in the ppb range, with Γ, the Atiyah Constant (section 3.5). From the Holographic two-step interaction [3], it was deduced that the Kotov period is associated with the photon mass. With the above value, it is

$$m_{ph} = \hbar/c^2 t_K \approx 1.222 \times 10^{-55} kg$$

, the graviton mass being

$$m_{gr} = m_{ph}/a_w \approx 3.722 \times 10^{-67} kg$$

. The corresponding ratios with electron mass(Fig.1) corresponds respectively to n = 24 and $n = \Gamma$, the Atiyah constant, see Section III.VIII.

2.5 The Kotov Cosmic Coherent Oscillation Period

The Kotov non-Doppler cosmic oscillation [3] is not considered seriously, since it seems to violate the most basic prerequisite of physics, the generality of Doppler phenomena. Interpreting this as a tachyonic phenomena, we identified the Kotov period $t_K \simeq 9600.06(2)s$, taking the electron characteristic time $t_e = \hbar_e/c$ as unit, to the simplest relation eliminating c between a_G and $a_w = \hbar 3/G_F m_e^2 c$, the well measured 10^{-7} dimensionless electroweak coupling constant a_w :

$$t_K/t_e = \sqrt{(a_G a_w)}$$

The weak coupling constant [1] $a_w = (E_F/m_e c^2)^2$ is defined from the Fermi energy $E_F \approx 292.806161(6)GeV \approx 573007.33(25)m_e c^2$, itself tied to the weak force constant

$$G_F \equiv (\hbar c)^3/E_F^2 \approx 1.4358509(7) \times 10^{-62} Joule \cdot m^3$$

[4]. This introduces the product of two area speeds, confirming the flickering hypothesis:

$$(\lambda\!\!\!^{-}_e 2/t_K)(hbar/\sqrt{(m_p m_H)}) = \sqrt{(GG_F)}$$

so the best measured cosmic quantity, the Kotov period, implies a symmetrization between gravitation and weak nuclear force. This specifies the G value to 10^-6 precision (ppm). It is compatible with the well-elaborate 10^{-5} BIPM measurement [5], at several sigmas from the Codata value [10], but the later is the mean between discordant measurements. Computer analysis shows that this value of G is compatible with the well-defined following value, with $m_P \equiv (\hbar c/G)^{1/2}$ and $d_e \approx 1.001159652$ the relative electron magnetic moment :

$$(2^{127}/a_G)^{1/2} \approx d_e(H/p)^3 \Leftrightarrow G \approx 6.6754552 \times 10^{-11} kg^{-1} \cdot m^3 \cdot s^{-2}$$

This value will be confirmed, in the ppb range, in Section III.

2.6 The omnipresence of the Kotov cycle in astrophysics

With $t = R/c$, the relation $(tt_{K2})^{1/3} \approx 10.8$ years, compatible with the famous 11 years sun period was noted. It was proposed that this unexplained phenomena, responsible for moderate periodic climate variation, was also of flickering cosmic origin [12]. This hypothesis has been recently confirmed by the straight temporal profile of the phenomena, showing it is tied to a quantum process [2]. This Kotov perodicity implies a moderate climate variation. Now, a much larger one, involving glaciations, is tied to the Milankovitch period (100000 years), which presents also a straight temporal edge. Moreover, these two periods seem to be tied to the dimensions n = 24 and $\Gamma \approx 25$, characteristics respectively of a stellar system and a galaxy, see Fig.1. As the second period was attributed to an earth orbital oscillation due to Jupiter effects, this suggests that the solar system is tied to cosmic influence. Indeed, the Kotov period shows itself rather particular in the solar system. In particular, the Uranus orbital radius is very close to the Kotov length $l_K = ct_K$. Remarkable enough, a Â«mysteriousÂ» period $\approx 1/9$ days of the Sun's pulsations has been predicted long before its actual discovery in 1974. Namely, 73 years ago, French amateur astronomer Sevin (1946) claimed that Â« la pÃ©riode propre de vibration du Soleil, c'est-Ã -dire la pÃ©riode de son infra- son (1/9 de jour), a jouÃ© un rÃŽle essentiel dans la distribution des planÃštes supÃ©rieuresÂ». Presumably, the Sevin's Â«vibration periodÂ» of the Sun was merely an issue of his reflections about resonances and distances inside the solar system. Nevertheless, solar pulsations with exactly that period were discovered, after decades, - and independently of the Sevin's paper, - by a few groups of

astrophysicists. Soon the presence of the same period, or timescale, was found in other objects of Cosmos too (see Kotov, 2018, and references therein) . Opponents emphasize often that t_K is very close to the 9th harmonic of the mean terrestrial day: thecorresponding ratio - of the length of a day to the t_K period - is equal to 8.99943(1), - and claim thus the t_K oscillation of the Sun should be regarded as an artifact (see, e.g., Grec and Fossat, 1979; Fossat et al., 2017). As a matter of fact, however, the t_K period occurs to be the best commensurate timescale for the spin rates of all the most massive and fast-rotating bodies of the solar system, in general. This is evident from Fig. 2, which shows the resonance spectrum $F(\nu)$, calculated for 15 motions of 12 largest, fast spinning, objects of the system (with the mean diameters ≥ 500 km and periods < 2 days: six planets, three asteroids and three satellites, leaving apart trans-neptunian objects; see Kotov, 2018). The peak of the best commensurability corresponds to a period of 9594(65) s, which coincides well, within the error limits, with t_K at about 5.3θ C.L., i.e. with a chance probability 10^{-7} . It seems very puzzling also that the spatial scale $t_K \approx 19.24 A.U.$ occurs to be the best commensurate with orbital sizes of the main planetary orbits of the solar system, - see Fig. 3, where the resonance spectrum $F(\nu)$ is plotted for 11 orbits, including those of asteroid belt, Pluto and Eris (orbital Â«diametersÂ» were approximated by the major axes, and for the inner orbits they were multiplied by π). The primary peak - of the best commensurability - corresponds to the spatial scale 9600(120) light sec., or 19.24(3) A.U., at 4.7θ C.L. (Kotov, 2013) Close binaries are characterized by the t_Θ resonance too, with the π number as a factor of ideal incommensurability of motions, or frequencies (Kotov, 2018). Fig. 4 shows the resonance spectrum, or metrics of motion, $F_1(\nu) \equiv F(\pi \cdot \nu/2)$, computed for 5746 close binaries, including cataclysmic variables and related objects. The major peak, with C.L. of about 7θ, corresponds to the timescale 9590(70) s, coinciding within the error limits with t_K (the stellar data were taken from all available binary stars catalogues and original papers). To compute the $F_1(\nu)$ spectrum, the program finds - for each test frequency ν - deviations of ratios $(2\nu_i/\pi\nu)k \geq 1$ from the nearest integers, and determines then the least-square minimum of such deviations. Here ν is the test frequency, ν_i minus the frequency of a given object, i = 1, 2, ...N - the ordinal number, with N, the total number of observed periods in a sample of objects, and the power k = 1 or -1. The factor of two in Eq. (2) takes into account that second half of the orbit repeats the first one, and the transcendental number π appears as a factor of orbital stability, or Â«idealÂ» incommensurability, of motions, or frequencies (the π number, in fact, characterizes geometry of space; for details see Kotov, 2018). Recently it was shown, that the t_Θ timescale characterizes, statistically, the motion of superfast exoplanets too, see Figure 5. It was shown in fact, that a number of superfast, with periods < 2 days, exoplanets revolve around parent stars

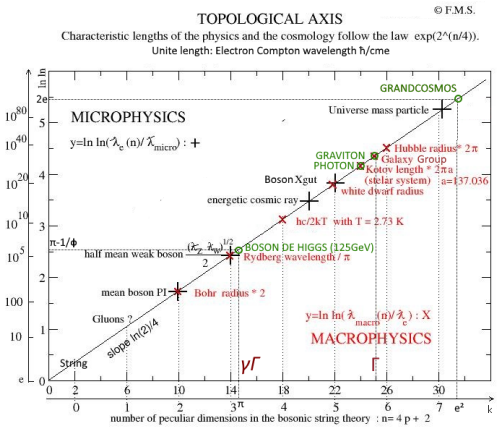

Figure 2.2: Resonance-spectrum F(Îœ) computed for 15 motions of the largest, fast-spinning bodies of the solar system. On horizontal axis is logarithm of frequency ν in μHz, the dashed horizontal line shows a 3θ C.L., and the primary peak yields to the best - commensurable period 9594(65) s.

with periods, near-commensurate with timescales t_1 and/or $2t_1/\pi$, where $t_1 = 9603(85)s$ agrees fairly well with the period $t_K \approx 9600$ s of the so-called Â«cosmic oscillationÂ», found firstly in the Sun, then - in other variable objects of the Universe (the probability that the two timescales would coincide by chance is near $3 \cdot 10^{-4}$).

2.7 The Tifft, Arp and Pioneer effects

Another unexplained effect is the 75(5) km/s periodicity in the galactic redshift [14]. Now this speed v_1 is compatible with $\frac{c}{v_1} \approx \sqrt{a_w/a} = \frac{F}{a}$, corresponding to the quantum resonance

$$v_n = nv_1 = n\hbar/r_e m_F$$

, where $r_e = \frac{\lambda\!\!\!^{-}_e}{a}$ is the electron classical radius and $m_F = m_e\sqrt{a_w}$ is the Fermi mass, close to the mean DNA nucleotide mass [8]. The Halton Arp observations of chains of galaxies with different redshifts [15] was also rejected. But it could be the sign of the galactic regeneration maintaining constant the visible Universe mass: this is confirmed by the following confirmation of the invariance of the mean mass density ρ_c . Much controversial is the Pioneer deceleration [16]

$$g_{Pi} \approx 8.7 \times 10^{-10} ms^{-2}$$

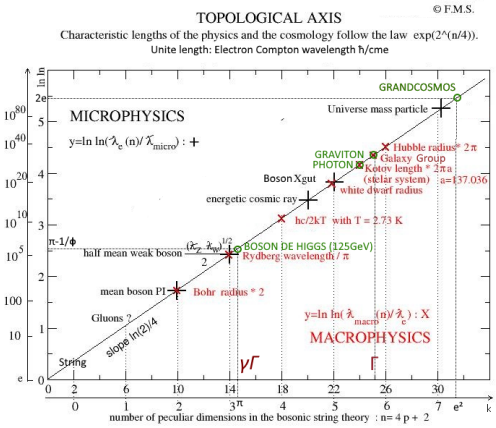

Figure 2.3: Same as Fig. 2, for N = 11 sizes Â«diametersÂ» of the solar system (with c = 1 and the π factor for inner orbits). The highest peak corresponds to the spatial scale 9600(120) light sec.

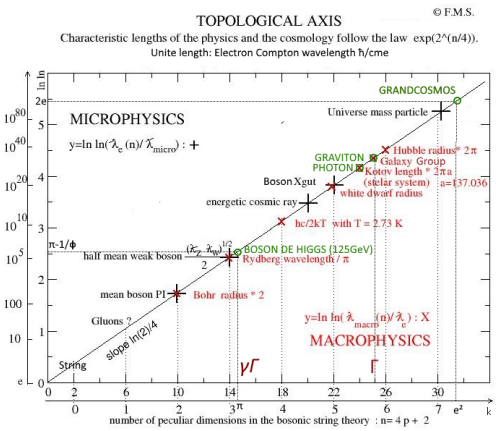

Figure 2.4: Resonance-spectrum $F_1(\nu)$, computed for N = 5746 binaries with periods < 5 days. Horizontal axis gives logarithm of the trial frequency Îœ (in ÎŒHz), the dashed line indicates a 3θ C.L., and the major peak corresponds to a timescale of 9590(70) s.

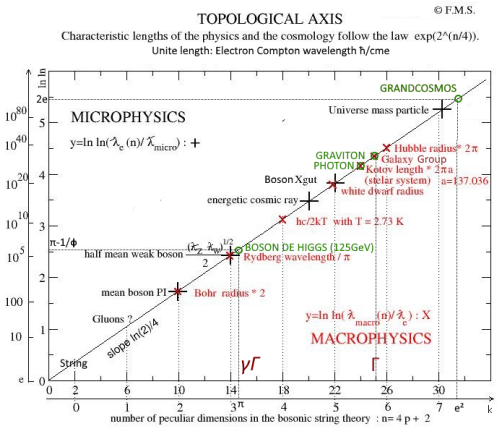

Figure 2.5: Same as Fig. 4, for the $F_2(\nu)$ spectrum, computed for N = 145 exoplanets with P < 1.5 days. The strongest peak of the composite commensurability corresponds to a period of 9640(115) s at nearly 3.9θ significance (after Kotov, 2018).

. This corresponds to the Pioneer time

$$t_{Pi} = c/g_{Pi} \approx 3.4 \times 10^{17} s$$

, close to

$$t = R/c \approx 4.3587 \times 10^{17} s$$

. The following section will show a connexion between the Kotov, Tifft and Pioneer effects.

2.8 The intriguing Logic of Prospective Dimensional Analysis

Physical relations use principally physical quantities as monomials of type $Q = M^x L^y T^t$, where the three categories, M, L and T are Mass, Length and Time measurements, and where the exponents are rational numbers. However, the addition of measures of different categories has no signification. This seems at first sight illogical, since, fundamentally, a product is a sum of additions. So there must be a hidden common nature for the 3 categories, mass, length and time. This sustains the above single electron cosmic model [3]. Moreover, this mimics the Fundamental Principle of Arithmetics, founded on prime numbers, but limited to the three M, L and T categories. Indeed, with $t = R/c$, summing the square of $ln(M\imath/m_e)$, where $M\imath = R\imath c2/2G$ is the critical mass in the above holographic sphere representing the Grandcosmos, and the square of $ln(R/\lambda\!\!\!^{-}_e) = ln(t/t_e)$, one gets, to

40 ppm:

$$ln2(M\imath/m_e)+ln2(R/\lambda\!\!\!^{-}_e)+ln2(t/t_e)\approx ln2(R_{GC}/\lambda\!\!\!^{-}_e)$$

more precisely, to 10^{-8} , corresponding to $10-7$ precision on the above G value:

$$ln(\sqrt{(ln2(M\imath/m_e)}+ln2(R/\lambda\!\!\!^{-}_e)+ln2(t/t_e)))\approx 2e-1/2a$$

This is a dramatic geometrical confirmation for the visible Universe - Grandcosmos holographic couple. Another crucial point in Physics is the existence of invariant fundamental constants. Thus, association of three of them must give characteristic values of M, L, T. So, approaching a domain in Physics necessitates to calculate characteristic values (M, L, T), from the three universal constants which are the most pertinent in the considered domain. This Prospective Dimensional Analysis is largely used in Fluid Mechanics, were the equations are intractable, but is largely ignored in other domains, because there is no real mathematical foundation, apart the above essential remarks. But in virtue of the above Hierarchy Principle, the lack of theoretical justification is not a reason to neglect Prospective Dimensional Analysis. Now, the elimination of c in the above R formula means that the simplest basic dimensional analysis starting from $\hbar$, G and m, the Electron-Proton-Neutron mean mass gives a good approximation for R/2. Indeed, in the Hypothesis of a Coherent Cosmos, it is logical to discard c which is far two small a speed. This has not been observed during one century, since c is always believed to be the single mandatory foundation of Space-Time. The warning of Poincare, the true discoverer of Relativity: 'use 4D space but do not confound Space and Time' has long been forgotten, and physicist have unwisely put c = 1 in their equations. In his three first minutes of cosmology, one of the author obtained the length:

$$l(\hbar,G,m)=\hbar 2/Gm^3\approx R/2$$

but it took 9 years to get the current article published [12], and it appeared later [3] that m must be considered more precisely as the cubic root of the product $m_e\cdot m_p\cdot m_H$. Moreover, the above critical condition links the time $t=\frac{R}{c}$ and the mean mass density by the c-free formula

$$\rho_c=3/8\pi Gt^2\approx 9.41198\times 10^{-27}kg\cdot m^{-3}$$

, So the mainstream idea of a temporal variability of the mean density ρ_c cannot be to sustain, meaning that ρ_c must be considered as a fundamental constant. One writes:

$$t\hbar,\rho_c,G=1/\rho_c^{1/2}G^{1/2}=(R/c)(8\pi/3)^{1/2}$$

This idea of ρ_c being a fundamental constant permits to define R without any ambiguity: the radius containing a critical mass. This means each point is the center of an equivalent black hole, justifying the above application of the Bekenstein-Hawking entropy. Opponents would say that the center of a black hole presents a singularity: that is indeed the case in the above flickering Space- Mass-Time hypothesis. Other will argue that the flying galaxies cannot reach the celerity c at horizon, but it must be reckognized that Relativity is a local theory, so do not apply in Cosmology. Indeed, even General Relativity in unable to define what is a Galilean frame, while the Foucault pendulus shows it directly, realizing the Cosmic Microwave Background frame, identified with the Grandcosmos frame, as seen above. Introducing the Fermi constant G_F , the associated c-free length is very particular, to 1.7%:

$$l\hbar, \rho_c, G_F = \hbar/\rho_c^{1/2} G_F^{1/2} \approx 9.0715410^9 m \approx \lambda\!\!\!^{-2}_e / l_P$$

Now, the following mandatory c-free times are close each over to 0.7%:

$$T\hbar, \rho_c, G_F = \hbar^4/\rho_c^{3/2} G_F^{5/2} \approx 5.4829 \cdot 10^{57} s$$

$$T\prime\hbar, G, m = \hbar^3/G^2 m^5 \approx 5.5224 \times 10^{57} s$$

This would be the periodic time of a Large Cosmologic cycle, which matches with Topological Axis at n = 30; the holic dimension (see below), to 4%. Comparing T with the Kotov Non-Doppler Cosmic Oscillation period $t_K \approx 9600.60(2)$ s, one observes, to 0.04%:

$$T/t_K \approx O_M/\sqrt{2}$$

where O_M is the cardinal order of the Monster Group, the largest of the 26 sporadic groups, which is suspected by some researchers to play a central role in Physics: indeed string theory allows a bridge between apparently no-connected mathematical theories [1][17]. The simplest interpretation of T is the cosmic period of all events, in a perfectly deterministic and periodic Cosmos. Now, introducing the above Pioneer abnormal deceleration g_{PN} , one gets the time:

$$tG, m_e, g_{PN} = (Gm_e/g_{PN}^3)^{1/4} = (t_{PN}^3 t\prime_e)^{1/4}$$

, where $t_{PN} = c/g_{PN}$ and $t\prime_e = Gm_e/c^3$. This time is compatible with:

$$tG, m_e, g_{PN} = t_K/(F/a)^2$$

where the above Tifft factor F/a appears. The implication of the time $t\prime_e = Gm_e/c^3 = 2.2568 \times 10^{-66} s$ confirms the above Planck wall breakdown.

For updating nomenclature run the following commands: makeindex Thesis-main.nlo -s nomencl.ist -o Thesis-main.nls makeindex LettersClassification.nlo -s nomencl.ist -o LettersClassification.

3 Fine-tuning with intermediate Mathematical Constants

3.1 The Arithmetical Monster Prime 137

The pertinence of our above simple polynomial relations are not admitted by the standard community, for instance arguing that since the proton is composite, its mass cannot enter simple relations. The same argument is presented for the theoretical dependence of the electric constant a with other constants g and $g\prime$, or with the energy level. These are reductionist arguments, unable to explain the fine-tuning phenomena, and leading to the sterile concept of unexplained emergences. By contrast, the holistic approach implies immergences from a comprehension of the Cosmos. What a pity for 'immergence' to be a neologism. The Eddington's proposal for a was the whole number 137, which intrigued many physicists for a century, but apparently nobody signaled it has a fundamental mathematical property: it appears as a Singular Prime in the series of the maximal primes appearing in the numerator of the harmonic series: 3,11,5,137,7,11, showing a symmetry between the 11 supergravity dimensions and the 4 of space-time. Indeed:

$$137 = 11^2 + 4^2$$

$$\frac{11}{4} = (\frac{\lambda_{CNB}}{\lambda_{CMB}})^3$$

Since Riemann series are tied to the prime number distribution, it is strange that mathematicians have not point out the primes appearing in the Harmonic series, since it is the single pole. It seems that the basic precept 'all occurs in the pole' was forgotten in this case. As ancient Egyptian used only fractions of type $\frac{1}{n}$, they were certainly aware of this particular harmonic series $s_5 = \frac{137}{60}$. Indeed in appears in the Ptolemaic approximation for π:

$$\frac{377}{120} = 2 + s_5/2$$

. Recall that the electrical constant a characterizes the force $\frac{\hbar c}{al^2}$ between two l - distant elementary charges, appearing central in Atomic Physics and in many fine-tuning relations [1]. It is misleading that physicists focused on only one property, the appearance of its fifth power in the Hydrogen hyper-fine spectra, and call its inverse the 'fine-structure constant'. It is strange also that Eddington's Theory was rejected as soon as a appeared to be different from 137. Indeed, the following shows that 137 plays a central role in fine-tuning analysis. One may interpret 137 + 1 as the sum of the numbers of dimensions in the Topological Axis [3], taking into account the double point for the superstring value n = 10, and the remarkable sum:

$$\sum_{k=7}^{k=0}(2+4k) = 2^7$$

So $137 = 2^7 - 1 + 3 + 7$, the Hierarchic Combination form. But this appears also as 137 = 135 + 2, with the dimension 2 of the String patent. In particular, one obtains the value $a \approx 137.035999119$ compatible with measurement $a \approx 137.035999139(31)$ in: $ln137/ln(a/137) \approx (2+135/d_e)^2$ meaning the ratio a/137 acts as a canonical ratio.

3.2 The Arithmetical Logic : Holic Principle and Topological Axis

In the hypothesis of an Arithmetic Cosmos, the ultimate equations must be diophantine. The simplest one is $T^2 = L^3$, where T is a time ratio and L a length one, resolving, since 2 and 3 are co- prime, by $T^2 = L^3 = n^6$, meaning the classical 6D space of classical mechanics. This particularizes the usual 3D space, but attribute 2 dimensions for the Time, in conformity with an independent study [18]. This is the degenerate arithmetic form of the spatio-temporal holographic principle, It is also the 3rd Kepler's law, but its diophantine form gives $L = n^2$, the orbit law in the Hydrogen atom and in our Gravitational Molecule model, where the visible Universe corresponds to the first orbital, suggesting the existence of a Grandcosmos, as the Topological Axis does also, which favors the dimension n = 30, the natural extension of the above : $T^2 = L^3 = M^5 = n^{30}$ where M is the mass ratio. Recall that the lifetime of an unstable particle depends on the 5th power of its mass. This is called the Holic Principle, concerning only the apparent world. The entire Holic Principle, concerning also the quantum vacuum, would involve a term F^7 , and of dimension 210.

3.3 The retention of Information

The Grandcosmos holographic reduction radius $R\prime$ shows itself an overwhelming holographic relation with the CMB Wien wavelength l_{CMB} , to 0.01%:

$$4\pi(R\prime/l_{CMB})^2 \approx e^a$$

Since the holographic technique uses coherent radiation, this seems incompatible with the CMB thermal character. But in a totally deterministic cosmos, there is no paradox. This question is connected with the black hole information paradigm [20]. Independently of our approach, an argument in favor of a total retention of information was tied to a non-evolution cosmology [21], Moreover, we have shown that formalisms of Holography and Unitary Matrix Quantum Physics are very similar [3]. One notice that e^a is also compatible with the half volume of the proton, with the Planck length as unit. So, while General Relativity and Unitary Quantum physics disagree about the nature of Space- Time, specially the non-locality phenomena, they agree for complete determinism, leading to the collapse of the Copenhagen statistical interpretation. The hidden variables exist really: the Cosmos ! Heisenberg relations would be only Fourier transform manifestations of Wave Mechanics.

3.4 Ubiquity of a^a

The famous Lucas-Lehmer primality test uses the series of whole numbers $N_{n+1} = N_n^2 - 2$, starting from $N = 4 = u_3 + 1/u_3$, with $u_3 = \sqrt{3}+2$, belonging to the Diophantine generators $u_n = \sqrt{n} + \sqrt{(n+1)}$., whose entire powers are close to whole numbers. One shows that $N_n \approx u_3^{(2^q)}$, and for q = 9: $u_3^(2^9) \approx (2(a^2+2\sqrt{\mu}))^{64} \approx a^a$ defining a to 39 ppm, where ÎŒ is the mass ratio muon/electron and the main term $2a^2 = m_e c^2/E_{Ryd}$ is tied to the Rydbergh energy's principal value E_{Ryd} whose ratio with the Planck energy is closely related to the Monster group cardinal order, to 1.5 ppm:

$$O_M e^{-1/2a} \approx (E_P/E_{Ryd})^2 = \frac{\hbar G c^5}{E_{Ryd}^2}$$

Indeed, by respect to the Chronon$\lambda\!\!\!^{-}_M/c \approx t_\Theta = 1.1333 \times 10{-}104s$, the number ot quantum events in the above Supercycle period T/t_Θ shows, with $\delta = R\prime/R$, to 0.4%, 2% and 0.6%:

$$\delta \times T/t_\Theta \approx (e^e)^{137} \approx O_M^3 \approx 496^{60}$$

implying a liaison between O_M , 137 and the famous String dimension 496, tied to the Higgs Boson (see Fig.1). One is struck by the following combination of the three dimensionless parameters, the electrical one a, the Fermi ratio $F = \sqrt{a_w}$ and the Bizouard strong ratio $f \approx 8.4345$:

$$F/af \approx 496$$

Also, to 8 ppm: $lnO_M/2lnlnlnlnO_M \approx 137$, and the product of the 20 groups of the happy family tied to the Monster shows, to 0.015%: $\Pi_{happy} \approx \delta \times a^a$. Also, with the Pell-Fermat generator $u_1 = 1 + \sqrt{2}$: $a^a \approx u1^(3 \times (2^8 - 1))$ defining a to 0.3 ppm. So the number a establishes a connexion between u_1 and u_3 , two of the simplest arithmetics generators. Moreover a has been connected [3] to the canonical $e^{1/e}$ and the 5th optimal musical scale with 306 notes. This opens a new research in pure mathematics.

4 Fine-tuning with basic mathematical constants

4.1 Basic mathematical constants

Since some dimensionless physical parameters are very precisely measured, it seems obvious to look for relations with mathematical constants different from the optimal basis e, such as π and $\gamma \approx 0.577215665$, the Euler-Mascheroni constant, which appears already in the above single-electron cosmic radius and the Topological Axis.

4.2 The Wyler's approach

Armand Wyler singularized a value a_W approaching a to 0.6 ppm and confirmed the pertinence of the Lenz approximation which plays a central role above: $p_0 = 6\pi^5$ approaching p to 18.824 ppm. A confirmation of a symmetry between a and 137 is the following relation involving H, the Hydrogen electron mass ratio, precise to 83 ppb:

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

One observe that the rejection of Wyler's work, due to a non-perfect formula for the p and a values, is a new manifestation of the general neglectance of the Hierarchical Principle.

4.3 The Archimedes constant π as a calculation basis

The above Lenz-Wyler formula has a geometrical interpretation: $6\pi^5$ is the product area-volume of a square of radius π. Now, the value f26 of the Topological Function for the String main dimension 26 renders, to 0.1%, the same form $f26 \approx 6(2\pi^2 a^3)^5$, where $2\pi^2 a^3$

is the area of a 4-sphere of radius a. Moreover, with n/p the mass ratio Neutron/Proton, to 0/3%, 0.02% and 1 ppm:

$$(p/n)(R/\lambda\!\!\!^{-}_e)^2 \approx (f26/6)^2 \approx (2\pi^2 a^3)^{10} \approx \pi^{155}$$

The corresponding value of π in the last expression shows the fractional series 3, 7, 16, -u, with $u \approx 2 \times 137$. This confirms the above hypothesis concerning the origin of the Cosmos vastness, namely that π is a intermediate rational calculation basis: in this case, the rational value $\pi_0 = (355u-22)/(113u+7)$ corresponds to the above G value to 10^{-8} accuracy. Since $(R/\lambda\!\!\!^{-}_e)^2$ is also close to 2^{256} , within 1%, this illustrates the following musical relation involving again 137:

$$2^{1/155} \approx \pi^{1/256} \approx (2\pi)^{1/3\times 137}$$

The scale with 155 notes is not known, but 137 appears also in the classical musical scales [3], in particular the 5th 306 notes scale (about π^5), in conjunction with the canonical definition of the optimal scale e, encountered all along above, and confirmed below. One remarks that entire powers of π appears in the 2 ppm Reilly formula: $a \approx 4\pi^3 + \pi^2 + \pi$ Recall that whole powers of π appears also in the even order Riemann series.

4.4 The Euler constant e confirmed as the optimal calculation basis for the Grandcosmos

The Topological Axis shows clearly that the Grandcosmos is defined by the following conjunction:

$$fe^2 = exp(2^{e^{2+\frac{1}{2}}}) \approx exp(e^{2e} + e^2)$$

The supplementary term $exp(e^2)$ is close to $a^{3/2}$. Note that e^2 has the following musical property:

$$(3/2)^5 \approx (4/3)^7 \approx (5/4)^9 \approx (6/5)^{11} \approx ... \approx (1+1/n)^{2n+1} \implies e^2$$

a series converging faster than the Euler's one

$$(1+\frac{1}{n})^n \implies e$$

. The first two terms define the occidental 12 tones scale.

4.5 The electroweak constant mathematical fine tuning

The Particle standard model achieved the unification between electromagnetism and weak nuclear force. One ought to look for the relation involving a, 137, a_w and the mathematical constants. One immediately gets:

$$a_w \approx (2\gamma \cdot 137 \cdot a/\pi)^3$$

Now, by introducing the featured length

$$l_{eF} = (\frac{G_F}{m_e \cdot c^2})^{1/3}$$

, the electroweak constant appears as a cube $a_w \approx (\frac{\hat{\lambda}_e}{l_{eF}}^3$, yielding to:

$$\frac{\hat{\lambda}}{l_{eF}} \approx 2\gamma \cdot 137 \cdot a/\pi$$

see below how this formulae simplifies again by using the Atiyah Constant.

4.6 The Muon and Tau fine tuning

Admitting the above relation, this defines $F = a_w^{1/2} = E_F/m_e c^2 \approx 573007.3652$, inside its 2.510^{-7} indetermination. Another fine-tuning ties the muon, proton and Hydrogen masses: $\frac{E_F}{m_e \cdot c^2} \approx m_\mu^2 \sqrt{(m_p \cdot m_H)}/a m_e^3$. It yields to a muon mass relative to electron ÎŒ = 206.7682869, inside its 2×10^{-8} measurement range. Now the Koide relation [22], where μ and τ are the Muon and Tau masses relative to Electron:

$$(1+\mu+\tau)/2 = (1+\sqrt{\mu}+\sqrt{\tau})^{2/3}$$

has a mathematical justification in term of circulating matrix. The correctly predicted tau/electron mass ratio at an epoch during which its measurement was false to 3 sigmas. With the above μ value, it gives

$$\tau \approx 3477.441701$$

. This Koide relation, quite discarded by the communality, is another sign of the serious incompleteness of present Particle Physics standard model. This value correlates with the

term $1+1/\sqrt{a}$, central in quantum electrodynamics to 10^{-7}:

$$1+1/\sqrt{a} \approx \tau^3 H/pD^2$$

confirming the central role of the Moonshine Monster dimension [23] D = 196883.

4.7 The Intermediate Bosons mathematical fine tuning

The computer indicates, with $n \approx 1838.68366089(17)$ the neutron/electron mass ratio:

$$W \approx \gamma \cdot a \cdot 137^2/3\pi d^e$$

$$Z \approx ap^2 \cdot \pi^4/137 \cdot d_e^n$$

Considering the above values, the relation

$$R/\sqrt{(}\lambda\!\!\!^{-}{}_p \lambda\!\!\!^{-}{}_H) \approx (WZ)^4$$

matches G value in the ppb range.

4.8 The Direct Gravitational Constant mathematical fine-tuning

Computer analysis shows the following ppb precise extension for the deviation between 2^{127} and a_G ,

$$(2^{127}/a_G)^{1/2} \approx d_e(H/p)^3 \approx a_w^{1/2}(a/\pi)^4(\gamma/4n)^3$$

leading to:

$$(aa_w^{1/2}/\pi d_e)^{1/3} \approx 4\pi n\prime/\gamma^a$$

where $n\prime = nH/p$ is the principal value of the neutron mass by respect to the electron effective mass in the Hydrogen atom. Note that this is close (0.12%) to the monstrous 5th term 292.6345909 in the fractional development of π which is itself very close to $n/2\pi$ to 3.4×10^{-6} . Since the fractional development of π is to this date an unsolved problem, it confirms that current mathematics is incomplete and that Nature uses rational approximations for π.

4.9 The Atiyah constant

Michael Atiyah was a precursor in the quest for unicity of Mathematics and Physics. His ultimate findings in his domain introduced the constant

$$\Gamma = \gamma a/\pi$$

, as a simplified term [24]. Indeed this constant Γ clarifies some of the expressions given below:

$$a_w = (137 \times 2\Gamma)^3$$

$$W \approx 137^2\Gamma/3d_e$$

$$(\Gamma\sqrt{a_w/\gamma d_e})^{1/3} \approx 4n\prime/\Gamma$$

and the above relation giving a_G shows a dual form, the first one without any numerical factor:

$$ap_G/\pi\sqrt{(pH)} \approx (n_F/137^2\Gamma^3)^3 \approx (4n/\Gamma)^3/F$$

Now, as recalled before in the Holic Principle, the exponents represents the number of dimensions. So, this corresponds to a dimensional reduction, by eliminating 137, from 9D and 6D to 3D, which could be associated to Superstring theory, where the equations are coherent only if space has 9 dimensions, and if the 6 supplementary dimensions unfold on very small distances [25]. Bearing in mind:

$$m_e c^2 f\gamma\Gamma \approx 125.175GeV$$

compatible with the Higgs Boson energy, interesting to note the perfect match with the dimension index $k \approx \pi : \gamma\Gamma \approx 4\pi + 2$. The length $\lambda\!\!\!^{-}_e f\Gamma \approx 5 \times 10^5$ light-years is characteristic of a galaxy group radius, and the length associated to the Milankovich cycle. One obtains : $\Gamma \approx e^\pi + 2$ meaning that the special value in the Topological Axis $k = e^\pi/4 \approx 4/ln2$ corresponds to about $n = \Gamma$. The following double correlation is specially suggestive (2.2 and 0.3 ppm):

$$a \approx 4\pi^3 + \pi^2 + \pi \approx ln(R/\lambda\!\!\!^{-}_e) + \Gamma + e^\pi$$

the first one is due to Reilly, and the second one confirms the R value. Moreover the uncertainty ranges from 0.013% to 0.046%:

$$a - e^\pi \approx e^\pi lna \approx j = 8\pi^2/ln2 \approx \Theta_{mam}/\Theta_{CMB}$$

where j is the Sternheimer scale factor, central in Theoretical Biology [3], being, in particular the Temperature ratio Mammal/CMB.

5 Discussion

5.1 Discussion

This article aims to solve the following problems :

- 1/ Unification Gravitation-Quantum Physics, by rehabilitating the forgotten Eddington's statistical theory.

- 2/ The real significance of Quantum Physics, by assuming Physics is based on Arithmetics.

- 3/ The overall unification by showing that cosmology is the basis of all science.

- 4/ The role of dimensionless parameters, by proving that they are optimal basis of computation tied with the Holographic Principle and its arithmetic form, the Holic Principle.

- 5/ The so-called Dark energy proportion 0.7, which is a false problem, since the trivial ratio between gravitational energy and critical one of the observable universe is 3/10. The high precision (ppb) of the relations shown in the present article prove that the traditional scientific thinking is not at all baffled by the physical parameter values, meaning they are mere mathematical constants. In the wonderful success of mathematical group formalism, it was forgotten that the direct search for relations between measurement results has lead Dalton, Balmer, Mendeleiev and Mendel to decisive discoveries, as recalled in the introduction. In this respect, the high precision in the measurement of the Fermi constant, Muon mass, the background temperature and the Kotov cosmic period must be saluted as decisive achievements. Now, we have also shown [3] direct connexions between physical and biological parameters which have escaped researchers. So, while the 'Anthropic Principle' states that

Life implies a favored Cosmos among a Multiverse, the 'Inverse Anthropic Principle' [3] is more logical, stating that an all-deterministic single Cosmos implies Life, in contradiction with the Darwin 'accidental life' approach, a generally admitted so- called 'theory' which is contradicted by so many missing links [26]. Whilst the physicists community debates; the minority believes in a Single Final Theory, whereas a vast majority have given-up their believes towards an 'Anthropic Principle' primacy, the Multiverse conundrum. The present article settles the arguments in favor of a single steady-state cosmos. Another type of separation exists, but with not any debate: only a small minority think Physics and Mathematics are unified, while a large majority separates the two domains (so separating also Biology). The present article shows that the former are right: physical constants are mathematical constants, so the present-day mathematics are still in enfancy, not realizing that the discovery of sporadic groups is a crucial discovery for physics. In particular, we have clearly shown that Grandcosmos is a computer which uses optimal physico-mathematical constants as calculation basis and that they are present in DNA characteristics [3]. The present article show definitely the liaisons with π, e and γ, and rehabilitates String theories, also abandoned by a majority [27]. There is also the Determinism separation, a majority believing seriously that 'God plays dices',in contradiction with our Cosmic Computing Principle. The c-free analysis gives simply and directly the Large time periodicity of an all-deterministic Grandcosmos, as it gives in an elementary calculation the visible Universe horizon radius, in a formula which was present for a century in astrophysics text-books: the limit of a star radius when the number of atoms reduce to unity [3]. This is tied to the application of the exclusion principle that Eddington dared to apply in cosmology. For this reason he was declared 'crakpot' and his theory discarded by a majority. The same rejection seems to apply now to Atiyah's last work. Fortunately, the large theoretical advance of Eddington is now recognized [28][29], but without mentioning a crucial point: he predicted the tau fermion with a right order of mass, 30 years before its surprising discovery, calling it Heavy Mesotron [1]. It seems that the pre-scientific role of chance is a common point between three misleading views in present mainstream thinking. Firstly, in biology, the assimilation of Darwin vague arguments with a scientific theory. Secondly, in quantum physics, the so-called 'incertitude relations', which are only manifestations of the general (Field and flickering Matter) wave propagation, through Fourier transform properties. Thirdly, in cosmology, the recourse to the Multiverse conundrum.

6 Conclusions

7 Conclusions

7.1 Simplicity at work

The application of the old direct scientific method, looking for fine tuning between physical parameters leads to a return to the Perfect Cosmological Principle implying a Steady-state Cosmos, confirmed by holographic quanto-cosmic relations. The Relativity theory is a local one and do not apply in Cosmology: the Absolute Space-time is re-established, realized by the Microwave Cosmic Background, which identifies with the Grandcosmos Absolute Frame. The standard Holographic Principle must be generalized to units others than the Planck length, even invoking the visible Universe wavelength in 1D holography, which breaks another taboo of current thinking: the Planck wall, by an enormous factor, about 10^{61} resolving the vacuum energy dilemna factor by 10^{122} . The multiple connexions with the DNA chain seems to imply it is a 1D hologram. This seems to be confirmed by recent studies [30]. The simplest method of looking for simple monomial expressions involving mathematical constants leads to ppb correlations, confirming Cosmos Unicity. As Atiyah wrote [24]: 'Nobody has ever wondered what the Universe would be if π were not equal to 3.14159.... Similarly no one should be worried what the Universe would be if a were not 137.035999...'. It definitly disproves the Multiverse Hypothesis. The present article confirms also the Topological Axis, which was obtained by the simplest visualizing method to represent in a single figure the characteristic lengths in macro and microphysics, taking the electron wavelength as unity. The pertinence of the Topological Axis confirms the importance of the Electron wavy propagation. This rehabilitates the String theory, including the tachyonic bosonic version, since the canonical dimension 26 appears to characterizes the observable universe radius R. This confirms that c is not a cosmic pertinent speed, as is clearly shown both by logic (it is far too slow) and quantum non-locality. Moreover, by excluding c in the simplest tool of elementary physics, prospective dimensional analysis, this gives immediately a very good approximation of both R/2, the cosmic temperature and the cosmic overall periodicity, which connects with the holic di-

mension n = 30 in the Topological Axis, whose apparent dissymetry suggests directly the existence of a Grandcosmos. While it is claimed that String Theory do not connect with experiment, the Cartan-Bott periodicity appears, showing the gauge bosons, so confirming the Standard Model of Particle Physics, but with massive gluon, which is independently seriously considered [31]. This means also that the International System must go back to only three fundamental unities, Mass, Length and Time. The distinction between Length and Time must be emphasized, as PoincarÃ©, the father of 4D Relativity Theory himself, recommended. Indeed their confusion, by writing c = 1, impeded the fact that R is a trivial length, already present in astrophysical text-books.The simplest model, the gravitational Hydrogen molecule gives R, explaining the above 2 factor and justifying the elimination of c, as in the Bohr model. This corresponds to a Hubble constant 70.790 (km/s)/Megaparsec, consistent with the recent measurement [4]: 72(3) Megaparsec/(km/s), which confirms the direct novea measurement, but disagree 3θ with the standard value. The simplest statistical theory of Eddington gave another justification to R. Also, particularly simple and elegant is the Large Eddington number, giving correctly the number of neutrons in the trivial fraction 3M/10 of the observable universe. The simplest topological equations, the equality between dimensionless varieties, circumference, area, 3D volume... appear to apply in cosmology, which is, for many, the hardiest chapter of physics. This modern, negative, opinion is in fact contrary to the ancient culture, for which the Cosmology is the first of all science, so must be the simplest. In the original sens of the word 'revolution', it is a return to the source of Science, the 'all is whole number', of Pythagoras. Even the degenerate form of topological or holographic relations, the simplest diophantine equations, the Holic Principle, shows direct pertinence. In particular it emphatizes the 30 dimensions, which appear decisive in the Topological Axis. The simplest proof of the computation basis character of the electrical parameter a is provided by the multiple appearance of the terms e^a and a^a . The later is of order $e^{p/e}$, while $e^{1/e}$ is decisive for the operational definition of e. The fact that a^a appears also in the 5th Optimal (305 notes) Musical Scale highlights a liaison with Arithmetics. Now, the deep significance of a number of dimensions is the number of independent variables, which is a fundamental invariant, whatever the theory [32]. So, it is normal to introduce the hypothesis that 26 physical parameters are defined by the 26 sporadic cardinal orders. Since Sporadic Groups are associated with octonion algebra [33], this rejoins a prediction of Atiyah's last work, the essential role of octonion algebra in the final theory [24]. The ancestral problem of the stability of the solar system must be revisited, taking into account seriously a cosmic influence, characterized by the Kotov's period and length. Also the Pioneer, Tifft and Arp effects must be seriously considered, and used to constrain the flickering Time-Length- Mass process. It is so

previsible that the very large infra-red telescopes in preparation will show in the very far field old-type galaxies instead of nascent ones. Then no artifice, as inflation, black energy, multiverse, will not save the already refuted standard evolutionary model. It is now clear that present mathematics are incomplete, and this article announces a Reunification of Philosophy, Mathematics, Physics, Informatics and Theoretical Biology. Acknowledgements. The authors want to salute the memory of Sir Michael Atiyah for this message to one of us; 'While I appreciate your efforts in physics, please do not use my name in any way other than referencing a published paper'. We salute his modesty, but his introduction of the rather unexpected Euler-Mascheroni constant in the fine-tuning research has considerably helped our task of proving the existence of a fundamental theory.

References

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A Appendix 1

appendix 1 content...