BACK TO COSMOS

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To the memory of Sir Michael Atiyah

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. 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 $R \approx 13.812$ Giga ligth-years. 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 space-time-matter diophantine equation $T^2 = L^3 = M^5 = N^{30}$. This dimension 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' $2G\hbar/Rc^3 \approx 4 \times 10^{-96}$ m corresponds to $n \approx 2e^e$ 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}, justifying the Hawking trans-planckian frequencies. The monochrome holographic extension leads to a Grandcosmos, larger than the visible Universe by the same factor 10^{61}. A toponic quantization justifies the Cosmos vastness in a scanned Universe, justifying the entropy factor ¼. This implies a tachyonic speed in the same ratio by respect to c, justifying the Planck re-normalisation 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 ratios are considered as unit vectors in a 3D Super-space. A matter-antimatter 10^{104} Hz Oscillatory Bounce unifies standard Single Bang with steady-state cosmology, but suppress Relativity in cosmology at large, reestablishing the Newton Absolute Space realized by the Microwave Cosmic Radiation, while Kotov cycle defines a quasi-absolute clock. This new scanning space-time structure is confirmed by single-electron cosmology, connected with Kotov period, and relying Sternheimer Scale Factor and Atiyah constant, which appear as privileged computation basis, as well as e, π *and a ≈ 137.036, in liaison with the sporadic groups. The Atiyah constant enters dramatic ppb precision relations with particle data. This unifies philosophy, mathematics, physics, chemistry, biology and informatics.* It is predicted that the future telescopes will find mature galaxies in the very far range, instead of a Dark Space, ruining the standard evolutionary cosmology, ill-founded on an *imperfect Cosmological Principle.*
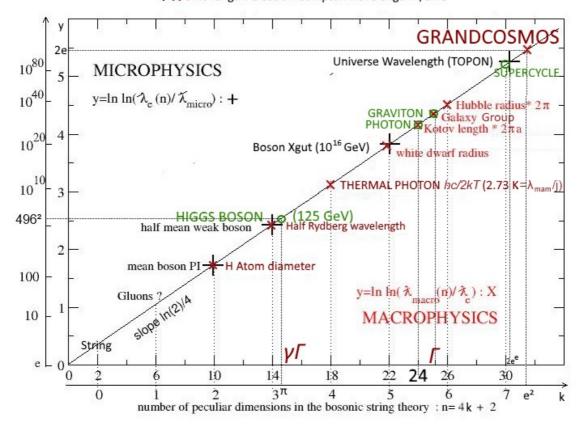
Figure 1. TOPOLOGICAL AXIS [3]. Double logarithm (y = ln(lnY)) of main dimensionless quantities Y corresponds to the String dimension series n = 4k + 2, from k = 0 to 7, showing the Cartan-Bott periodicity $\Delta n = 8$ [25], which is at the origin of the name 'Topological Axis'.

With unit $\lambda_e \equiv \hbar/m_e c$, in the macro-physics side, the Universe circumference is tied to the bosonic string dimension 26, while reduction lead to n = 18 (thermal photon, tied to the mammal wavelength trought the Sternheimer scale factor $j = 8\pi^2/\ln2$), n = 10 (superstring value, Hydrogen atom) and n = 2 (String). For the number of transverse dimensions 24, it is the Kotov length, through a factor $2\pi a$, with $a \approx 137.036$. For n = Γ, the Atiyah constant, it is the galaxy group radius, a characteristic cosmic dimension (10^6 light-years). For k $\approx e^2$, y $\approx 2e$, it is the Grandcosmos radius.

With the same unit $\lambda_e \equiv \hbar/m_e c$, in the micro-physics side, the Space-Time-Matter Holic dimension n = 30 is tied to c times the Cosmic supercycle period, while reduction lead to the known gauge bosons: Gut (10^{16} Gev) for n = 22, weak for n = 14, and strong for n = 6 (massive gluons, about 10 MeV). For the superstring n = 10, it the Pion. For k = π, n $\approx \gamma\Gamma$, corresponding to the square of the string dimension 496 and the tenth root of the Monster cardinal, it is the Higgs Boson (125 GeV). The value n = $2e^e$ corresponds to the wavelength of the critical observable Universe (Topon) which identifies with the monoradial unit length of the Universe Bekeinstein-Hawking entropy.

With unit the Kotov period, the Holic dimension n = 30 corresponds to the Monster cardinal order, apart a $\sqrt{2}$ factor.

With the unit mass m_e, n = 24 would give the photon mass ratio m_e/m_{ph}, and n = Γ the graviton mass ratio m_e/m_{gr}.

The central dimensionis n = 16, suggesting that the whole sheme is tied to the Eddington's matrix 16 × 16.

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 $a \approx 137.035999139(31)$, measured with 0.23 ppb precision and the proton-electron mass ration $p \approx 1836.15267245(75)$, 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]*. Extending this to the spatial homogeneity at large, this leads to the Perfect Cosmological Principle, the very foundation of the steady-state cosmology. So Eddington considered rightly the Cosmic Large Number correlations, as recalled in this article.

This forgetting of Eddington's pioneer work was enforced by the fact that about 30 dimensionless parameters appear as 'free parameters' in the Particle standard model. So, a large majority of theorists believe 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, up to ppb precision, involving main mathematical constants in particle physics: π, e and γ, the Euler-Mascheroni constant. Also, these relations confirm the Super-string Theory and rehabilitates the tachyonic Bosonic String Theory.

A decisive point 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 and reference therein].

This reestablishes the Laplace determinism, involving non-local hidden variables, which identify with the Cosmos, so rejecting the Copenhague statistical interpretation of quantum mechanics.

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, which could proceed byoptimal algotithms, so en lighting the above Hierarchy Principle.*

<div align="center">**Plan**</div>

This article is separated in 3 sections, corresponding to 3 classes of mathematical constants, the large, the intermediate and the small, close to unity.

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 $N_{Ed} = 136 \times 2^{256}$ 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 π and γ. By contrast, the optimal computation basis e is used all along, in particular as the primary basis of the Topological Axis Function $f\{n\} = \exp(2^{n/4})$, the secondary basis being 2, the simplest basis of all.

<div align="center">**I. Internal Fine Tuning and Canonical Large Numbers**</div>

In this section, we look for a systematic organization of dimensionless physical quantities and canonical Large Numbers stemming from cosmology and micro-physics and mathematics. In particular the Eddington's Large Number and the cardinal order of the Monster group appear to be central.

I.I 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 is $a_G = \hbar c/Gm_H m_p$, so *the speed c is eliminated*. This conforms with Coherent Cosmology which needs signal celerity far exceeding *c*. This gives $R \approx 13{,}812$ billion light-years, 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 type 1a novae, while the standard optimization of 6 parameters results in a lower value of 9 %.

Consider the Universe wavelength $\lambda_M = \hbar/Mc \approx 4 \ 10^{-96}$ m, where $M = Rc^2/2G$ is the Universe critical mass. 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 $f\{n + 4\} = f^2\{n\}$ and results from the imbrication of relations of form $\lambda_e/l_{micro} \sim (l_{macro}/\lambda_e)^2$, followed by $l_{macro}/\lambda_e \sim (\lambda_e/l'_{micro})^2$:

$$\lambda_e/\lambda_M \sim (R/\lambda_e)^2 \sim (\lambda_e/\lambda_X)^4 \sim (\lambda_{CMB}/\lambda_e)^8 \sim (\lambda_e/\lambda_W)^{16} \sim (2r_H/\lambda_e)^{32} \sim (\lambda_e/l_{Gl})^{64} \sim (\lambda_{str}/\lambda_e)^{128} \sim 2^{256}$$

this includes the Cosmic Microwave Background wavelength λ_{CMB} and a string wavelength λ_{str} with mass about 2 MeV. So, the correlation is octuple, including, apart the two famous 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. In particular, the relation $R/\lambda_e \sim (\ell_{CMB}/\lambda_e)^4$ 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. With the Hydrogen radius $r_H^{(0)} = a\lambda_e$, we infer $R/r_H^{(0)} \sim (4 \prec \ell_{CMB}/r_H^{(0)})^4$ precise to 0.6 %. Considering the standard cosmological neutrino

background (CNB), whose wavelength is defined by $(\ell_{CNB}/\ell_{CMB})^3 = 11/4$, we have $R/\lambda_e \sim (\ell_{CNB}^2/\ell_{CMB}\,\lambda_e)^4$ to 1.7 %. 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 rapid 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 λ_p and λ_H are the Proton and Hydrogen reduced wavelengths. The precision of this formula will be pulled to the ppb range in Section III, 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], which start by stating that the position of a 'reference particle' is supposed to be determined with an uncertainty $R/2$. For N particles of mass m constituting 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, $m'_e = m_e\,p/H$, and if, moreover, one equate the deviance $R/(2\sqrt{(M/m'_e)})$ to the Hydrogen wavelength $\lambda_H = \hbar/cm_H$, we obtain the double relation:

$$R/2\lambda_H = \sqrt{(M/m'_e)} = \hbar c/Gm_e m_p$$

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 has reached the quantum degeneracy value (case of white dwarfs), the 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 used this Cosmologic Exclusion Principle, but could not conclude since, at his epoch, the Hubble measurement for R, as well as the Lemaître estimation, was false by an order of magnitude.

The reason for this discrepancy is that Lemaître and Hubble considered galaxies of the Local Group, which do not participate the so-called 'Space expansion'. In fact, in the steady-state model, 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 tied to the Einstein cosmological constant, identified to $1/R^2$. The distance for which this force exceeds attractive gravitation between galaxies is about 10^6 light years [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.

I.II. Cosmic Holography, Toponic Quantification and Cosmos vastness

In the steady-state cosmological model of Bondi, Gold and Hoyle, 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, which was, until now, only devoted to 3D application, as in usual holograms [6]:

$$S_{BH} = A/4 = \pi(R/l_P)^2 = 2\pi R/\lambda_M$$

where A is the horizon sphere area and $l_P = (G\hbar/c^3)^{1/2}$ is the Planck's length. *This shows the equivalence between critical condition and 2D-1D holography*. Note that, while the standard evolutionary cosmology use differential equations, which are not adapted to a single Universe, as Poincaré stated, 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 $-(3/5)GM^2/R = -(3/10)Mc^2$, 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. Relativity is a local theory that does not apply in Cosmology at large: 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, now monochrome instead of the above monoradial relation:*

$$S_{BH} = \pi(R/l_P)^2 = 2\pi R^{(0)}_{GC}/l_P$$

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 $C \sim 10^{61} c,$ introducing an energy larger than that of the visible Universe by a factor 10^{122}, which can be identified with the l_P-renormalized 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 $R' = 2\hbar^2/Gm_N^3 \approx 18.105$ billion light-years, where $m_N = am_e$ is the Nambu mass, of central importance in particle physics. Indeed, the half radius $R'/2$ 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' appears as the spherical hologram representation of the outer Grandcosmos:*

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

This value $R_{GC} = R'^2/2l_P \approx 9.08 \times 10^{86}$ m will be dramaticaly confirmed in the section I.IV. It was also noted [3] that the Grandcosmos volume, with the Hydrogen radius as unit, is very close to a^a/π, see section II.IV revealing some mathematical properties of this computational term a^a. Indeed its occurence confirm that *a must be considered as an optimal computation basis, suggesting a future sofware revolution.*

Assuming a *Toponic Quantification Hypothesi*s, the mass of a particle is an exact sub-multiple of the mass-equivalent M of the visible Universe: $m = M/N_m$, so its canonical wavelength is $N_m\lambda_M$, allowing the following holographic extension of the above mono-radial holographic conservation:

$$S_{BH} = \pi(R/l_P)^2 = 2\pi R/\lambda_M = 2\pi N_m R/\lambda_m$$

This series of large circles generates, by scanning, the approximation of a sphere: this is the logical transition from the Disk to the Sphere, justifying the famous factor ¼ in the 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 $N_{Ed} = 136 \times 2^{256}$ to the equivalent number of neutrons in the effective mass $3M/10$ this leads to $R \approx 13{,}805$ billion light-years, 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, using the wavelengths of the Electron, Proton, and Atomic and Molecular Hydrogen, as well as that of the background radiation:

$$2\pi R/\lambda_e = 4\pi \, \lambda_p \lambda_H/l_P^2 \approx (4\pi/3)(\lambda_{CMB}/\lambda_{H2})^3$$

   The above relation gives $T_{CMB} \approx 2.73$ K. With the measured temperature of the cosmic background, there is a gap compatible with $(H/p_G)^2 p/6\pi^5$, where $p_G^2 = P^2/2^{127}$, with $P = \lambda_e/l_P$. This eliminates l_I, so gives a relation independent of G:

$$2^{127} = 2\pi^2 \lambda_{CMB}^3/\lambda_e \lambda_H^2 \quad \Rightarrow \quad \theta_{CMB} = 2.725820805 \quad \text{Kelvin}$$

which is the surface of the 4-sphere of radius λ_{CMB}/λ_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 $p \approx p_0 = 6\pi^5$, (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 Mersenne Numbers: 3, 7, 127, with sum 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 Planck mass m_F, 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 $\lambda_M/c \approx 1.33 \times 10^{-104}$ s is the new candidate for the 'Chronon', the 'time quantum', so the oscillatory bounce has a frequency about 10^{104} Hz [5].

I.III. 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.

I.III.I. Single Electron Cosmology

   The single-electron cosmology [3] uses *the electron indeterminacy, which is the real basis of the Exclusion Principle,* defining an horizon value R_1 only dependent of the Hydrogen radius $a' = aH/p$. It is the value for which the mean cosmic value is also the atomic one:

$$\Sigma(1/n)/\Sigma(1/n^2) = a'$$

with the sum running from 2 to R_1/λ_e. This specifies the known rough approximation $a \sim \ln a_G$ [1]:

$$R_1 = \lambda_e \exp((\pi^2/6 - 1)a' + 1 - \gamma) \approx 15.77465 \text{ billion light-years}$$

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:

$$R_1 \approx (p_0/p_G) \sqrt{(\beta RR')}$$

Now, with the Kotov length $l_K = ct_K$, see below, one notes that $\sqrt{(R/a_w l_K)}$ 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 (Section III.I):

$$\sqrt{(R_1/a_w l_K)} \approx 4\pi p/p_0 \qquad <=> \qquad t_K \approx 9600.591445 \text{ s}$$

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 III.V).

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 = *Γ*, the Atiyah constant, see Section III.VIII, while the ratio $M/m_{ph} \approx (3/e)\, O_M^2$, to 0.1 %, with O_M the cardinal order of the Monster group, see below.

I.III. II. The Kotov Cosmic Coherent Oscillation Period

The Kotov non-Doppler cosmic oscillation [9] 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 $t_K \approx 9600.06(2)$ s, taking the electron characteristic time $t_e = \lambda_e/c$ 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:

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

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 × m³ [10]. 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 [11], 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 :

$$(2^{127}/a_G)^{1/2} \approx d_e(H/p)^3 \qquad <=> \quad G \approx 6.6754552 \times 10^{-11} \text{ kg}^{-1}\text{m}^3\text{s}^{-2}$$

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

I.III. III. The omnipresence of the Kotov cycle in astrophysics

With $t = R/c,$ the relation $(t\,t_K{}^2)^{1/3} \approx 10.8$ 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 [13].

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 «mysterious» 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 « la période propre de vibration du Soleil, c'est-à-dire la période de son infra-son (1/9 de jour), a joué un rôle essentiel dans la distribution des planètes supérieures ». Presumably, the Sevin's « vibration period » 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 9th harmonic of the mean terrestrial day: the corresponding 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 $F(v)$, 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 5.3σ 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 $F(v)$ is plotted for 11 orbits, including those of asteroid belt, Pluto and Eris (orbital «diameters» 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 4.7σ C.L. (Kotov, 2013)

Close binaries are characterized by the t_0 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, $F_1(v) \equiv F(\pi v/2)$, computed for 5746 close binaries, including cataclysmic variables and related objects. The major peak, with C.L. of about 7σ, 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 $F_1(v)$ spectrum, the program finds – for each test frequency v – deviations of ratios $(2v_i/\pi v)^k \geq 1$ from the nearest integers, and determines then the least-square minimum of such deviations. Here v is the test frequency, v_i – 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 «ideal» 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_0 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 with periods, near-commensurate with timescales t_1 and/or 2 t_1/π, where t_1 = 9603(85) s agrees fairly well with the period $t_K \approx 9600$ s of the so-called «cosmic oscillation», 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 $3 \cdot 10^{-4}$).
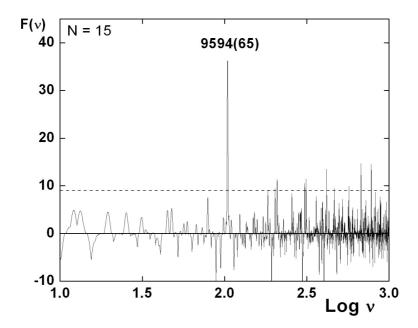

Figure 2. Resonance-spectrum $F(v)$ computed for 15 motions of the largest, fast-spinning bodies of the solar system. On horizontal axis is logarithm of frequency v (in μHz), the dashed horizontal line shows a 3σ C.L., and the primary peak corresponds to the best-commensurable period 9594(65) s.
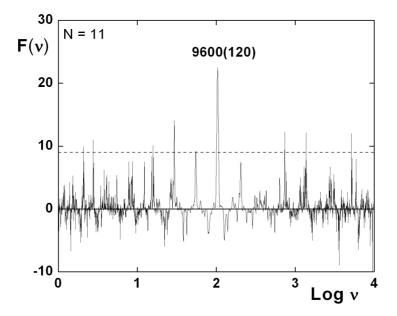
Figure 3. Same as Fig. 2, for $N = 11$ sizes («diameters») of the solar system (with $c = 1$ and the π factor for inner orbits). The highest peak corresponds to the spatial scale 9600(120) light sec.
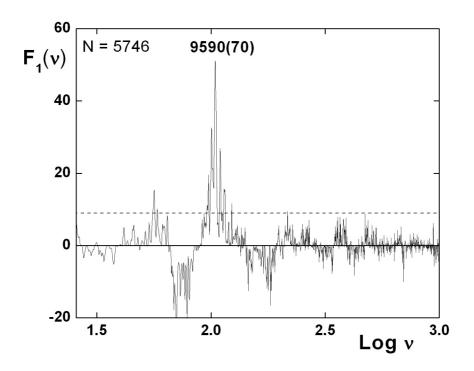

Figure 4. Resonance-spectrum $F_1(\nu)$, computed for N = 5746 binaries with periods < 5 days. Horizontal axis gives logarithm of the trial frequency ν (in μHz), the dashed line indicates a 3σ C.L., and the major peak corresponds to a timescale of 9590(70) s.
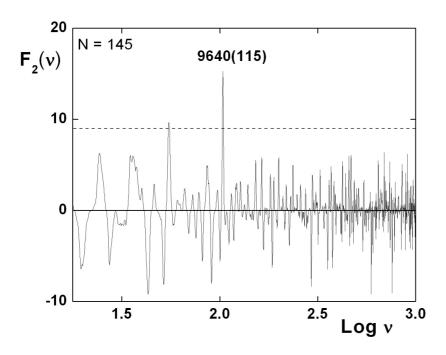

Figure 5. Same as Fig. 4, for the $F_2(\nu)$ spectrum, computed for N = 145 exoplanets with P < 1.5

days. The strongest peak of the composite commensurability corresponds to a period of 9640(115) s at nearly 3.9σ significance (after Kotov, 2018).

I.III. IV. 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 $c/v_1 \approx \sqrt{a_w}/a = F/a$, corresponding to the quantum resonance $v_n = nv_1 = n\hbar/r_e m_F$, where $r_e = \lambdabar_e/a$ is the electron classical radius and $m_F = m_e\sqrt{a_w}$ is the Fermi mass, close to the mean DNA nucleotide mass [3].

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}. 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.

I.IV. The Singular 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 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 T* categories. Indeed, with $t = R/c$, summing the square of $\ln(M'/m_e)$, where $M' = R'c^2/2G$ is the critical mass in the above holographic sphere representing the Grandcosmos, and the square of $\ln(R/\lambdabar_e) = \ln(t/t_e)$, one gets, to 40 ppm:

$$\ln^2(M'/m_e) + \ln^2(R/\lambdabar_e) + \ln^2(t/t_e) \approx \ln^2(R_{GC}/\lambdabar_e)$$

which traduces in function of $P = m_P/m_e$ by $\ln^2(P^4/a^3) + 2\ln^2(P^2/pH) \approx 2\ln^2(2P^5/a^6)$. Moreover, to 10^{-7}, corresponding to $7 \cdot 10^{-6}$ precision on the above G value:

$$\ln^2(P^4/a^3) + 2\ln^2(P^2/pH) \approx \exp(4e - 1/a)$$

This is a dramatic geometrical confirmation for the visible Universe – Grandcosmos holographic couple, confirming the B.I.P.M. measurement of G [11].

Figure 5. Geo-dimensional Universe-Grandcosmos couple. In a 3-Dsuper-space, the natural logarithms of length, time and mass ratio are considered as vectors. The ratio of Grandcosmos radius by the Compton electron wavelength appears as the norm of the vector using for length and time projections the same ratio, that of the Hubble radius by the electron Compton wavelength, and for mass ratio that of M′ by the electron mass; M′ being the critical mass in the grandcosmos reduced spherical hologram, this is a dramatic geometrical confirmation of the Holographic Principle

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 Poincaré, 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, the first author obtained the length:

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

but it took 9 years to get this published [12], and it appeared later [3] that m must be considered more precisely as the cubic root of the product $m_e m_p m_H$. Moreover, the above critical condition relies the time $t = R/c$ and the mean mass density by the *c-free* formula $\rho_c = 3/8\pi Gt^2 \approx 9.41198 \times 10^{-27}$ kg m^{-3}, so the mainstream idea of a temporal variability of the mean density ρ_c cannot sustain, meaning that ρ_c *must be considered as a fundamental constant*. This 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. Others will argue that the flying galaxies cannot reach the celerity c at horizon, but it must be recognized that Relativity is a local theory, so do not apply in Cosmology at large. Indeed, even General Relativity in unable to define what is a Galilean frame, while the Foucault pendulum 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 %:

$$l\{\hbar,\rho_c,G_F\} = \hbar/\rho_c^{1/2}G_F^{1/2} \approx 9.07154\ 10^9 \text{ m} \approx \lambda_e^2/l_P$$

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

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

$$T'\{\hbar,G,m\} = \hbar^3/G^2 m^5 \approx 5.5224 \times 10^{57} \text{ s}$$

This corresponds in the Topological Axis to the holic dimension (see below) n = 30, to 4%. Comparing T with the above 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 [17]. By comparing with the above 0.1 % relation $M/m_{ph} \approx (3/e)O_M^2$, this introduces O_M^3, and the ratio T/t_0, implying the Chronon $t_0 = \hbar/Mc^2 \approx 1.1333 \times 10^{-104}$ s in:

$$T/t_0 \approx (3/e\sqrt{2})O_M^3$$

The simplest interpretation is this is the number of quantum events in a cyclic cosmos of period T, in a perfectly deterministic and periodic Cosmos. See below the dramatic properties of O_M^3.

Note that the c-free formula [3] involving $\hbar$, G and the DNA bi-codon mass $\approx m_H^2/m_e$ gives twice the Kotov length ct_K, suggesting the DNA chain to be an hologram connected with the Kotov quasi-absolute time.

Now, introducing the above Pioneer abnormal deceleration g_{PN}, one gets the time: $t\{G, m_e, g_{PN}\} = (Gm_e/g_{PN}^3)^{1/4} = (t_{PN}^3 t'_e)^{1/4}$, where $t_{PN} = c/g_{PN}$ and $t'_e = Gm_e/c^3$. This time is compatible with:

$$t\{G, m_e, g_{PN}\} \approx t_K /(F/a)^2$$

where the above Tifft factor F/a appears. The implication of the time $t'_e = Gm_e/c^3 \approx 2.2568 \times 10^{-66}$ s *confirms the above Planck wall breakdown.*

II. Fine-tuning with intermediate Mathematical Constants

The intermediate mathematical basis whose importance are here clearly recognized are the Eddington's constant 137, the Green-Schwarz string dimension 496, the Atiyah's constant, the Sternheimer biological scale factor, the Bizouard strong constant and the cardinal order of the first Matthieu sporadic group.

II.I. The Singular Prime 137

The pertinence of the 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', 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. It is a pity that this term 'immergence' is a neologism.

The Eddington's proposal for a was the whole number 137, which intrigued some 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 of theory M unifying the 5 string theories, and the 4 of space-time. Indeed:

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

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

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 1/n, they were certainly aware of this particular harmonic series $s_5 = 137/60$.

Indeed it appears in the Ptolemaic approximation for π: $377/120 = 2 + s_5/2$.

Recall that the electrical constant a characterizes the force $\hbar c/al^2$ 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:

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

So $137 = 2^7 - 1 + 3 + 7$, the Hierarchic Combination form. But this appears also as $137 = 135 + 2$, showing the String dimension 2. In particular, one obtains the value $a \approx 137.035999119$ compatible with measurement $a \approx 137.035999139(31)$ in:

$$\ln 137/\ln(a/137) \approx (2+135/d_e)^2$$

meaning the ratio $a/137$ acts as a canonical ratio. Indeed it is very close to $3^{a/F}$ (to 3 ppb), where the above Tifft factor F/a appears again.

II.II. The Arithmetical Logic: Holic Principle

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 phase 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 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 a mass ratio. Recall that the lifetime of an unstable particle depend on the fifth power of its mass. This is called *the Holic Principle, concerning only the apparent world*. The complete Holic Principle, concerning also the quantum vacuum, would involve a term F^7, and a dimension $30 \times 7 = 210$, whose pertinence is assured by (0.03 %):

$$R/\lambda_e \approx (2/\delta)^{210}$$

confirming the central computational role of $\delta = R'/R = pH/a^3$, which is, to 1.6 ppm:

$$\delta \approx e^{2/e^2}$$

confirming the central role of the optimal basis e.

II.III. The Information Conservation

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

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

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 paradox [20]. Independently of our approach, an argument in favor of a total conservation 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]. Note that e^a is also compatible with the half volume of the proton, with the Planck length as unity.

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, *ruining the Copenhagen statistical interpretation. The hidden variables exist really: the Cosmos !* Heisenberg relations would be only Fourier transform manifestations of Wave Mechanics.

II.IV. The cosmical liaison between Atiyah and Sternheimer constants

Sir Michael Atiyah was a precursor in the search for unity of Mathematics and Physics. His last work in this domain introduced the constant $\Gamma = \gamma a/\pi$, as a simplification term [22]. Indeed, Γ and the canonical e^π enter in the following simplification of the above single-electron cosmology formula (0.3 ppm):

$$a = (p/H)((\ln(R_1/\lambda_e) + \gamma - 1)/(\pi^2/6 - 1)) \approx \ln(R/\lambda_e) + \Gamma + e^\pi$$

so confirming the R value to 45 ppm, which is, within 0.2 ppm, the correction $\beta p/p_0$. Moreover, this confirms the central role of the Sternheimer scale factor $j = 8\pi^2/\ln2$ (to 0.013% and 0.046%):

$$j \approx a - e^\pi \approx e^\pi \ln a$$

It was noted [3] that $j \approx \theta_{mam}/\theta_{CMB}$, the ratio between mammal and cosmic temperatures, and that $\sqrt{(Rl_P)}$ is close (1%) to the mammal wavelength $hc/k\theta_{mam}$. So, *the couple Thermal-photon-Life is at the upper center of the Topological Axis: n = (6 + 30)/2 = 18*, while the down center is the Higgs boson. The real center is the dimension n = 16, so associated with the Clifford algebra of Eddington. Moreover $\sqrt{(R'l_P)}$ is close (0.1%) to the water triple point, which is also the product of triple points of Hydrogen and Oxygen, divided by the Cosmic temperature. This shows that Chemistry is also involved.

The last equation means the implication of $B = \exp(e\char`\^\pi)$ in the ultimate theory. Indeed, it appears in the following holographic relation, with the F value of Section III, to 0.3 ppm and 0.03 % :

$$(\lambda_{CMB}/\lambda_e)^3 \approx F^5/6 \approx B^3/a$$

It appears also in the following holographic relation, to 0.16 % :

$$(4\pi/3) B^3 \approx \pi(F^3/a)^2$$

while $F^3/(44\pi)$ is close, to 0.01 %, to the term $A = (3/2) a^7$, which enters, the 'forgotten' electromagnetic power $E_e^2/A\hbar$, in the Hydrogen atom, with $E_e = m_e c^2$.

Note that, to 10 ppm and 2 ppm:

$$(H/n)^2(F^7/B)^3 \approx (4/3) a^2 \approx W/2\pi\beta^4$$

Where W is the W boson-Electron mass ratio (see Section III). Now, to 30 ppm and 20 ppm :

$$(F^3/a)^2 \approx (P/FH^2)^3 \approx (a/137)(4\pi/3)(F^2/\sqrt{p})^3$$

The central term F^3/a shows another relation between j and Γ, to 0.05 % and 0.2 %:

$$F^3/a \approx (3/e)(e/2)^j \approx (3/\pi)\, 4^\Gamma$$

confirming that j and Γ has the status of invariant dimension, i.e. they are, according to the Holic Principle, privileged exponents.

II. V. Ubiquity of a^a

From the basic Computation Hypothesis, a must be an optimal basis. But, according to Eddington, 137 is the number of independent parameters in the matrix 16×16 plus one: $137 = 136 + 1$, so 137 must be considered as a dimension number, so must appear as an exponent.

Indeed a^a is, apart a π factor, the Grandcosmos volume with unit length the Hydrogen radius. Moreover $a^a \approx e^{p/e}$ has been connected with the fifth optimal musical scale and to the operational definition of e [3]. So it is here looked for its manifestations in classical mathematics.

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 $N_n \approx u_3{}^{\wedge}(2^{\wedge}q)$, and for q = 9:

$$u_3{}^{\wedge}(2^{\wedge}9) \approx (2(a^2 + 2\sqrt{\mu}))^{64} \approx a^a$$

defining a to 39 ppm, where μ is the mass ratio muon/electron. Also, with the Pell-Fermat generator $u_1 = 1 + \sqrt{2}$:

$$a^a \approx u_1{}^{\wedge}(3 \times (2^8 - 1))$$

defining a to 0.3 ppm. So the number a^a establishes a connexion between u_1 and u_3, two of the simplest arithmetics generators. *This opens a new research in pure mathematics.*

II. VI. Omnipresence of the sporadic groups

The above 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:

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

Moreover, the above term $O_M{}^3$ appears in, to 0.08 %, 2.5 % , 1 %, 2% and 61 ppm:

$$e^{137e} \approx (e/3)e^{ea} \approx O_M{}^3 \approx 496^{60} \approx f \times (\exp(e^\pi))^{16} \approx f^{4d137/pi}$$

implying the Green-Schwarz String dimension 496, which is the third perfect number, after 6 and 28, and tied to the Higgs Boson (see Fig.1). In particular $f = a_w/2\pi(pH)^{3/2} \approx 8.43450$ is the Bizouard strong ratio, which appears also as a computation basis, with, to 61 ppm:

$$\ln f \approx \pi e/4d_e$$

Note that it is the inverse $1/f \approx 0.1184(7)$ which is called 'strong coupling constant' [10]. One observes the following combination of the three dimensionless parameters, the electrical one a, the Fermi ratio $F = \sqrt{a_w}$ and f, to 0.05 % and 0.07%:

$$F/af \approx 496 \approx j^\delta$$

Also, to 8 ppm: $\ln O_M / 2\ln\ln\ln\ln O_M \approx 137$, and the product of the 20 groups of the happy family tied to the Monster shows, to 0.015 %, 1 % and 0.9 %:

$$\Pi_{\text{happy}} \approx \delta \times a^a \approx j^\wedge(j^\wedge(\pi/3)) \approx (j/496)^2 \, \Gamma^{210}$$

This implies the role of Γ as computation basis and confirms the above Complete Holic Principle. Now, to 2%, $a^a \approx \Gamma^{209}$, while the order of the Baby-Monster is, to 1%, $O_B \approx \Gamma^{24}$, so, since $209 = 137 + 3 \times 24$, to 2%:

$$O_B \approx (a/\Gamma)^{a/3}$$

Note that $j/496 \approx 0.229$ is close to the weak mixing angle, but $p/g_0 \approx 0.232$ *i*s closer to the measured value [10], where $g_0 = 7920$ is the smallest Matthieu sporadic group. These ratios appears as calculation basis in the product of cardinal orders of the Monster and the baby-Monster groups, to 1%, 0.2 %, 1 % and 0.1%:

$$O_M O_B \approx H^{2H/a} \approx (g_0/p)^a \approx (496/j)^{137} \approx n_{\text{ph}}/\sqrt{\delta}$$

where $n_{\text{ph}} \approx (3/\pi) \exp(e^6/2)$ (to 0.2 %) is the photon number in the visible universe. So $496/j$ is a computation basis. Now the study of the 22 amino-acids [3] has proven that j itself is a computation basis (to 2%): $j \approx 2(a/j)^{22}$. So 496, p and g_0 are also privileged computations basis. From the above relation, by taking the $a^{\text{ième}}$ root, one obtains, to 0.03 %: $496/j \approx (ae^e/\Gamma)^{1/3}$.

III. Fine-tuning with basic mathematical constants

Since some dimensionless physical parameters are very precisely measured, it is natural to look for relations with mathematical constants other than 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.

III.I. The Euler constant e confirmed as the optimal calculation basis

The Topological Axis shows clearly that the Grandcosmos is defined by the following conjunction (1%):

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

The supplementary term $\exp(e^2)$ being close to $a^{3/2}$. Note that the 'economic number' $E = \exp(e^e) \approx j^6/F$ (0.04 %), and that e^2 has the following musical property:

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

a series converging very much rapidly than the classical Euler's one $(1+1/n)^n \rightarrow e$. The first two terms defines the occidental 12 tones scale

Now the canonical ratio $R_{\text{GC}}/\lambda_M = 2P^9/a^6pH$ confirms the Extended Holographic Principle, to 0.04 %, 0.2 % and 1.4 ppm :

$$R_{\text{GC}}/\lambda_M = (e_{\text{GC}}^2)^{210} \approx (137e/a)^{420} \approx \pi(a-136)(2\pi)^{2j} \approx (4a/5\times137) \, j^\wedge(\ln(R/\lambda_e))$$

exhibiting the fact that (0.3 ppm):

$$(a/137)^{420} \approx (7 + 127)/120$$

where e_{GC} is a rational approximation for e, compatible with the following rational number, in the ppb range, and tied to the heavy Leptons mass ratios by, to 3 ppm:

$$e_{GC} = (3 \times 16 \times 787)/(13 \times 1069) \approx a\mu/3\tau \ (e/2)^{1/420}$$

This is a dramatic confirmation of the cosmical use of rational approximation of e, explaining the cosmos vastness (Section I.II), and this enligtht a double relation of μ and τ with e, to 0.01 \% and 0.06 \%:

$$\ln \tau \approx 3e \approx a\mu/\tau$$

These numbers enters the following dramatic series, to 1 ppm, 56 ppm, and 13 ppm:

$$2/\delta = 2a^3/pH \approx \ln(pH)/2d_e\ln a \approx (\ln\tau/\ln\mu)/d_e^2 \approx d_e^2 \ln s/\ln\tau$$

where $s \approx (F/af)^2$ is compatible with the mass ratio Higgs boson/Electron, corresponding to 125.6 GeV.

III.II. 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 two following approximations for p with the same imprecision 80 ppb,, so leading to the ppb relation:

$$p \approx (137/a)\,(p_0H)^{1/2} \approx EH^3/d_e^2jFD$$

where $D = 196883$ is the Moonshine Monster dimension [23], which appears also, to 10^{-7}, to be $(\pi_pP/d_eF)^{1/2}/H$, with $\pi_p \approx (p/6)^{1/5}$, so confirming again the pertinence of Wyler's approach. Note that its rejection, due to a non-perfect formula for the p and a values, is a new manifestation of the general neglect of the Hierarchy Principle.

Note that the Lenz-Wyler formula is nothing but the product of the area by the volume of a cube with side π. If one consider a cube with side 5, privileging again the identification dimension = exponent, this gives $6 \times 5^5 = 137^2 + 19$. This is no hazard, since this relation was long been deduced from basic considerations on quarks [3]. Indeed with u = 5 and d = 6, the combination uud = 150, whose power 3/2 is close to H, while the combination udd $\approx (n/a)^2$, with n the neutron-electron mass ratio. This leads to $6 \times 5^5 \approx (aH/n)^2$, to 0.012 \%. Note that, while, to 41 ppm:

$$R_{GC}/\lambda_e \approx 6^{128}/(1+1/\sqrt{2})$$

giving to the celerity ratio the approximation C/c $\approx$ $3^{128} \sqrt{(\ln2/2)}$. Moreover, one observes, to 2.6 %;

$$(R_{GC}/\lambda_e)^3 \approx 150^{137}$$

so the quark hypothesis u = 5, d = 6 is comforted by the Grandcosmos. This would imply that the quark d is composite.

III.III. 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 cube of side π. Now, the value f{26} of the Topological Function for the String main dimension 26 shows, to 0.1 %, the same form: $f\{26\} \approx 6(2\pi^2 a^3)^5$, 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:

$$(p/n)\ (R/\lambda_e)^2 \approx (f\{26\}/6)^2 \approx (2\pi^2 a^3)^{10} \approx \pi^{155}$$

The corresponding value of π in the last expression shows the fractional development 3, 7, 16, -u, with $u \approx 2d_e \times 137$. 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

$$\pi_R = (355u - 22)/(113u - 7)$$

corresponds to the above G value to 10^{-9} precision. *This confirms the above Rational Approximation Principle.*

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 musical scale with 155 notes is not known, but 137 appears also in the classical musical scales [3], in particular the above 306 notes fifth optimal scale. The CMB Wien wavelength l_{CMB} verifies, to 0.1 %:

$$l_{CMB}/l_P \approx \pi^{64}$$

Note that powers of π appears in the 2 ppm Reilly formula and, to 8 ppm:

$$a \approx 4\pi^3 + \pi^2 + \pi \approx \pi^{9/2}/2^{1/3}$$

Recall that whole powers of π appears also in the even order Riemann series, showing that π is already a calculation basis in classical mathematics.

In Atiyah's last work the Bernoulli function $x/(1-e^{-x})$ is used. Now, this is the kernel of the thermal Planck law. Indeed, considering the Wien reduced constant $w = hc/kT\ell_{Wien} = 5\ (1-e^{-w}) \approx 4.965114245$, one notes that $a \approx e^w -2\pi$, suggesting a to be a trigonometric line. Indeed $\cos a \approx 1/e$, and, to 65 ppb:

$$a \approx 44\pi - \text{Arccos}(1/e)$$

a formula largely diffused on the web, but without indication of its origin. Now $w^{\wedge}(e^{\wedge}w)$ is close to the canonic R_{GC}/λ_e. The study of deviation leads to (0.14 ppm):

$$w^{\wedge}(e^{\wedge}w)\ p/\sqrt 2 \approx 2^{64 \times 5}\ (6\pi^5)^2$$

This reaches the ppb precision for $\pi = 77368/24627$, corresponding to the fractional development 3, 7, 16, -218.

III.IV. The electroweak constant mathematical fine tuning

The Particle standard model achieved a unification between electromagnetism and weak nuclear force. So we look for a relation involving a, 137, a_w and the mathematical constants. One

immediately gets:

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

Now, by introducing the characteristic length $l_{eF} = (G_F/m_e c^2)^{1/3}$, this electroweak constant appears as a cube $a_w \approx (\lambda_e/l_{eF})^3$, so:

$$\lambda_e/l_{eF} \approx 2\gamma 137 a/\pi$$

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

III.V. 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 $2.5 \ 10^{-7}$ indetermination. Another fine-tuning ties the muon, proton and Hydrogen masses: $E_F/m_e c^2 \approx m_\mu^2 \sqrt{(m_p m_H)}/a m_e^3$. This corresponds to a muon mass relative to electron $\mu = 206.7682869$, inside its 2×10^{-8} measurement range.

Now the Koide relation [24], where μ and τ are the Muon and Tau masses relative to Electron:

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

has a mathematical justification in term of circulating matrix. It predicted correctly the tau/electron mass ratio at an epoch where its measurement was false to 3 sigmas. With the above μ value, it gives $\tau \approx 3477.441701$. with, to 0.1%, $\tau^5 \approx P\pi^4/8F$.

The above Koide constant $p_K \approx 1842.604994$ is close to p, but, more interesting, it connects with the dimension $D = 196883$ of the Monster, to 48, 10, 13, 26 ppm:

$$137/8 \approx p^2/D \approx (p_K/2\pi)^{1/2} \approx 137^{1/\sqrt{3}} \approx p^{1/\sqrt{7}}$$

Moreover, τ correlates with the term $1+1/\sqrt{a}$, central in quantum electrodynamics (to 10^{-7}):

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

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

III.VI. The Intermediate Bosons mathematical fine tuning
The computer indicates, with $n \approx 1838.68366089(17)$ the neutron/electron mass ratio:

$$W \approx \gamma a 137^2/3\pi d_e$$

$$Z \approx a p^2 \pi^4/137 d_e n$$

With these values, the above relation $R/\sqrt{(\lambda_p \lambda_H)} \approx (WZ)^4$ corresponds to the above G value in the ppb range. Moreover, note that,

$$R/\sqrt{(\lambda_p \lambda_H)} \approx (WZ)^4 \approx 2(\pi j^2)^9$$

confirming the role of j (defined here to 12 ppm) as an holographic computation basis.

III.VII. The Direct Gravitational Constant mathematical fine-tuning

Computer analysis shows the following ppb precise extension for the deviation between 2^{127} and a_G, with $a_w^{1/2} = F$:

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

leading to:

$$(aF/\pi d_e)^{1/3} \approx 4\pi n'/\gamma a$$

where $n' = nH/p$ 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 fifth 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 always a non-resolved problem, this confirms that present mathematics is incomplete and that Nature uses rational approximations for π.*

III.VIII. The central role of Atiyah constant

This constant Γ simplifies some of the above relations:

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

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

$$(F\Gamma/\gamma d_e)^{1/3} \approx 4n'/\Gamma$$

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

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

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 are fold on very small distances [25].

One observes:

$$m_e c^2\, f\{\gamma\Gamma\} \approx 125.175 \text{ GeV}$$

compatible with the Higgs Boson energy, Note that it corresponds to the dimension index k $\approx \pi$, since $\gamma\Gamma \approx 4\pi + 2$.

The length $\lambda_e\, f\{\Gamma\} \approx 5\ 10^5$ light-years is characteristic of a galaxy group radius, and the length associated to the Milankovich climatic period. Now, $\Gamma \approx e^\pi + 2$, meaning that the special value in the Topological Axis $k = e^\pi/4 \approx 4/\ln2$ corresponds to n $\approx \Gamma$. One notes also, for the Pions mass ratios, in their 5 ppm uncertainty:

$$a/\pi \approx 496^2/137\Pi_0^{2/3} \approx p\beta^2/\Pi_\pm^{2/3}$$

confirming the role of the dimension 496 and Atiyah's symmetry between π and a.

1. **Discussion**

There is presently an intense debate in physics community. Only a minority believes in a Single Final Theory, while a large majority have abandoned hope and believes seriously in the extreme consequence of the 'Anthropic Principle', the Multiverse conundrum. The present article settles the debate in favor of a single steady-state cosmos.

This article confirms direct connexions [3] between physical and biological parameters. 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]. The fundamental hypothesis of this article is that the Cosmos is a computer. A common point with the brain is the multi-base character, experienced in musical sensation. *So, intelligent life must be universal*. The famous Fermi question 'where are they?', is not a paradox, since any abnormal observation is a-priori rejected by a dogmatic communality.

Another type of separation exists, but *with not any debate*: only a small minority thinks 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 infancy, not realizing that the discovery of sporadic groups is a crucial discovery for physics*. In particular, it is clearly shown that Grandcosmos is a computer which uses optimal physico-mathematical dimensionless 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. 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].

The same rejection seems to apply now to Atiyah's last work. The present article shows that at least a part of it is very pertinent.

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 wave propagation (Field *and* flickering Matter), through Fourier transform properties. Thirdly, in cosmology, the recourse to the Multiverse conundrum.

V. Conclusions: 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 relations. The standard cosmological principle was unduly limited to spatial homogeneity. The Relativity theory, unable to define an inertial frame, is a local one and do not apply in Cosmology at large: the Absolute Space is reestablished, realized by the Microwave Cosmic Background, which identifies with the Grandcosmos Frame, while Kotov period is a quasi-absolute clock, ruled by the tachyonic celerity.

The *simplest topological equation*s, the equality between dimensionless topological 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, and identifies with the sum of 26 string dimensions and 4 of space-time.*

The standard Holographic Principle must be generalized to wavelengths others than the Planck length, in particular the Topon, 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 dilemma factor 10^{122}.

The high precision (until ppb) prove that the traditional scientific thinking is not at all baffled by the physical parameter values*, meaning they are mere mathematical constants*. In this respect, the high precision in the measurement of the Fermi constant, Muon mass, background temperature and Kotov cosmic period must be saluted as *decisive achievements*.

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.... '* This is a definite refutation of 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 micro-physics, 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 dimension n = 30 in the Topological Axis, whose apparent asymmetry 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 Poincaré, the father of 4D Relativity Theory recommended. Indeed their confusion, by writing $c = 1$, impeded the fact that the Hubble-Lemaître radius *R, the most difficult measurement of History,* is a trivial length.

The *simplest model*, the gravitational Hydrogen molecule gives R, explaining the 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 (3σ) 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*. This is probably the most dramatic prediction in all scientific history.

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.

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 logical 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, guided by the flickering Time-Length-Mass concept.

This answers several main problems : 1. Unification Gravitation-Quantum Physics, by rehabilitating the forgotten Eddington's statistical theory, 2. The real signification of Quantum Physics, by assuming Physics is based on Arithmetics, 3. The overall unification by showing that cosmology is the basis of United 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 3/10 is the trivial ratio between gravitational and critical energy. 6. The introduction of the Topon justifies the 10^{122} gap between vacuum energy and the visible universe one.

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 very large infra-red telescopes in preparation will show in the very far field old galaxies instead of expected young ones. Then no artifice, such as inflation, dark energy, multiverse ..., will not save the *already refuted standard evolutionary model*.

In short, the rediscovered cosmos unifies the two main modern cosmologies in a rapid matter-antimatter oscillatory bounce. *The Cosmos appear as simple, unique, permanent, computational, deterministic, trans-planckian, cyclic, topological and inverse-anthropic.*

It is now clear that present mathematics are incomplete, and this Coherent Cosmology announces a reunification of Philosophy, Mathematics, Physics, Chemistry, Informatics and Biology.

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TOPOLOGICAL AXIS

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Characteristic lengths of the physics and the cosmology follow the law $\exp(2^{(n/4)})$.

+ ✗ Unit length: Electron Compton wavelength $\hbar/cme$

GRANDCOSMOS

SUPERCYCLE

Universe Wavelength (TOPON)

Hubble radius* 2π

GRAVITON — Galaxy Group

PHOTON — Kolov length * $2\pi a$

white dwarf radius

Boson Xgut (10^{16} GeV)

THERMAL PHOTON $\hbar c/2kT$ (2.73 K=λ_{mam}/j)

$y=\ln\ln(\tilde{\lambda}_{macro}(n)/\tilde{\lambda}_c)$: X

MACROPHYSICS

Half Rydberg wavelength

ϕ (125 GeV)

HIGGS BOSON

half mean weak boson

H Atom diameter

MICROPHYSICS

$y=\ln\ln(\tilde{\lambda}_c(n)/\tilde{\lambda}_{micro})$: +

mean boson PI

Gluons ?

slope $\ln(2)/4$

String

number of peculiar dimensions in the bosonic string theory : n=4k + 2

$\gamma\Gamma$ Γ

n
k

e^2 7 e^2

30   $j2e^e$

26   6

24

22   5

18   4

14   3π

10   2

6   1

2   0

0

y

$2e$ 5

10^{80} 4

10^{40}

10^{20} 3

10^{10}

496^2 2

100

10   1

e   0