TOWARDS SCIENCE UNIFICATION THROUGH NUMBER THEORY

Abstract

The Number Theory comes back as the heart of unified Science, in a Computing Cosmos using the bases 2;3;5;7 whose two symmetric combinaisons explain the main lepton mass ratios. The corresponding Holic Principle induces a symmetry between the Newton and Planck constants which confirms the Permanent Sweeping Holography Bang Cosmology, with invariant baryon density 3/10, the dark baryons being dephased matter-antimatter oscillation. This implies the DNA bi-codon mean isotopic mass, confirming to 0.1 ppm the electron-based Topological Axis, whose terminal boson is the base 2 c-observable Universe in the base 3 Cosmos. The physical parameters involve the Euler ideonal numbers and the special Fermat primes of Wieferich (bases 2) and Mirimanoff (base 3). The prime numbers and crystallographic symmetries are related to the 4-fold structure of the DNA bi-codon. The forgotten Eddington’s proton-tau symmetry is rehabilitated, renewing the supersymmetry quest. This excludes the concepts of Multiverse, Continuum, Infinity, Locality and Zero-mass Particle, leading to stringent predictions in Cosmology, Particle Physics and Biology.

Keywords Number theory · Optimal Computation Principle · Holic Principle · Cosmology · Supersymmetry · String Theory · Bit-String Physics · Cellular Automaton · DNA nucleotides · Crystallography · Sporadic Groups.

1 Introduction

Since the Poincaré-Hilbert opposition, mathematicians separated in intuitionnists and formalists. Poincaré convinced at last the reticent community that there is no means to escape the quantization of the field-matter interaction, claiming a return to Pythagorism [1]. In particular, he explained that the cosmology cannot be founded on differential equations, because of the involved "free parameters" in an unique Univers [2]. However, the mainstream has followed Hilbert and his differential equations, leading nowadays to a blockage of the 6 "free parameters” standard cosmology, with its “mysterious” so-called "dark energy" with the relative present density about 0.7 [3], and the negation of the Universe unicity [4], the Multiverse concept. We showed [5] that the latter is misleading and that the missing energy density is invariant and exactly 7/10, as recalled below.

The situation is even worse in the particle physics, with about 20 adimensional "free parameters". The Table 1 presents the main ones, and the Table 2 recalls the main physical constants [3]. For specifying some values, an Optimal Correlation Principle has been applied, interpreting the "free parameters" as computation bases in a Computing Cosmos [6]. This article shows, more fundamentally, the symmetry between the four basic primes: 2; 3; 5; 7, considered as the cosmic computation bases. Indeed, the symmetric combinations $2 \times 3 \times 5 \times 7 = 210$ and $(2 + 3 + 5 + 7)(2 \times 3 \times 5 \times 7) = 3570$ give the brute mass ratios, relative to electron, of the Muon and Tau.

The standard Supersymmetry receives no confirmation from the CERN super-collisionner. This article shows that a number of symmetries have been overlooked, in particular a meson eta-lepton tau symmetry, which could enter a future
Corrected Supersymmetry, and also the Eddington’s proton-tau symmetry, which could enter a future "Intrasymmetry", connecting particles of the same spin. It has been forgotten that Eddington predicted the tau fermion, 35 years before its surprising discovery, with a correct estimation of its mass. Indeed, starting from a non-standard electron-proton symmetry, Eddington deduced a “mesotron-heavy mesotron” one, the old name for the couple muon-tau. This article rehabilitates these symmetries, in liaison with an Optimal Computation Principle (OCP), which implies the last ideonal Euler number, connected with the Riemann hypothesis. This OCP favors the form $x^2$ and the numbers $\exp(\exp(...$ characterizing at last the “free” parameters, in connection with the Holic Principle, recalled in Section 3.

The table 1 shows the pertinence of the most famous large prime number in Mathematics history, the Lucas Number, which enters the last term of the Combinatorial Hierarchy \[^{[7]}^{[8]}\] Indeed, it defines a gravitational proton-mass ratio $p_G$, connected with $u_0$, where $u_0$ is the Bisection of Rule 23 cellular automaton Wolfram series \[^{[9]}\]. The dimension $d = 30$ is the last dimension of the Topological Axis, corresponding to the terminal term $k = 7$ of the Bott octonion sequence of the special string dimensions (Table 3). This article shows that $p_G$ enters also a 0.1 ppm correlation with the Higgs-electron mass ratio $H^{(0)} = 495^2$ \[^{[5]}\], leading to a connection between gravitation and the gauge couplings of the standards groups U(1),SU(2) and SU(3). This is on the way to resolve the "hierarchy" problem, the huge gap between gravitation and electroweak couplings.

The Eddington’s Fundamental Theory \[^{[10]}\] has been disregarded. Indeed, at his epoch, it was strange to interconnect cosmology and microphysics, and even stranger to introduce a so simple Large Number $N_{Ed} = 136 \times 2^{56}$ as the number of hydrogen atoms in the Universe. Nowadays, nobody realizes that it is precisely the number of neutron masses in 30% of the Universe critical mass, using the following simple formula involving the Planck mass and the four basic masses of electron, proton, Hydrogen and neutron, revealing a 4-fold symmetry:

$$M/m_p = m^0_H / m_p \approx (10/3)N_{Ed}$$

This gives a critical radius $R = 2GM/c^2 \approx 13.80$ Giga light-years, at $5 \times 10^{-4}$ from the Hubble radius given by the following Eddington-Sanchez’s symmetrical double relation, which involves the electric-gravitation force ratio in the hydrogen atom \[^{[5]}\]:

$$R/2\lambda_H = (M/m_e^{(red)})^{1/2} = \hbar c/Gm_e m_p$$

where $m_e^{(red)} = m_e m_p / m_H$ is the formal reduced electron mass in the hydrogen atom. Such a pertinence of the Lucas Number and the Eddington Number means that the Pythagorean Natural Philosophy comes back, called now "Number Theory": this is the main goal of the present article to confirm this. According to Russel "The most surprising in the modern science is its come back to Pythagorism" \[^{[11]}\]. It is a big surprise indeed, since the formalist mainstream rather followed Dirac when he interpreted the Cosmic Large Number correlation as age-varying, with a gravitation constant $G$ varying with time. It was forgotten that Poincare clearly specified that Physics is not possible with varying constants \[^{[2]}\]. Also, an excess of reductionism has blocked the formalists, unable to imagine that cosmology may be simpler than microphysics, and do not really need particles with mass inferior to the electron one.

The String Theory uses already the Number Theory. However, nobody understand why 496, the string group SO(32) dimension, is the third perfect number. This article shows the liasion with 495, the square root of the scalar boson/electron mass ratio. With its continuous space, the string theory compactification process results in an enormous multiplicity of solutions, of order $(10)^{300}$ \[^{[12]}\]. By replacing the continuum by a "quantum", this article eliminates this multiplicity, using the above cellular automaton series, to comes back to the predicted 1D Sweeping Holography process: in an absolute space a moving object sees a variation of its internal period, explaining the local Relativity and the Parity violation \[^{[13]}\].

Any cosmology founded on integral equations must take into account the well-known Newtonian gravitational potential energy $E_{pot} = -(3/5)GM^2/R$ of an homogeneous ball of mass $M$ and radius $R$. For the critical radius $R = 2GM/c^2$, this is the energy $E_{pot} = -(3/10)Mc^2$, which is exactly the opposite of the non-relativist kinetic energy $E_{kin}$ of the receding galaxies in the steady-state model, \[^{[5]}\] which is so characterised by the following classical integral equation, explaining directly the relative density 0.3 of the combinaison matter + dark matter, so justifying the complement 0.7:

$$E_{kin} = -E_{pot} = -(3/10)Mc^2$$

The deepest mystery of the standard cosmology is the clearest evidence for its opponent simplest model, the non-relativist permanent Newtonian model, proving that the standard cosmology is unduly complicated. Recall that Bondi \[^{[14]}\] showed that the Newtonian Cosmology is sufficient to obtain the principal results of General Relativity. In particular the above critical formula, corresponding to an overall euclidean geometry, $R = 2GM/c^2$ states simply that the Newtonian liberation speed at the Hubble surface, $(2GM/R)^{1/2}$ is identified to $c$. So one may consider that receding far galaxies reach the speed $c$ and exceed it when they disappear at the Hubble horizon.

This means that the Restricted Relativity was unduly applied to cosmology. Indeed, it is a local theory, based on the concept of an inertial referential, which cannot be defined by the theory. By contrast, the above Newton Absolute
Space is observationally evident through the Cosmic Microwave Background (CMB). In liaison with the on-going production of Helium in the stars, such a thermal bath was predicted by the steady-state model, with the correct temperature (contrary to the erroneous prediction of the Big Bang tenants: 10K for George Gamow, 30 K for James Peebles) \[15\]. Even worse, the precise thermal Planck spectrum was contradictory with the initial standard Big Bang model, which was obliged to introduce the monstrous inflation step, bringing as many problems as it resolves \[16\]. Moreover, one of the three conditions of Sakharov \[17\] for the elimination of antimatter during the Big Bang is precisely the rupture of thermal equilibrium. Thus, the Cosmic Microwave Background is the refutation of the Big Bang, but it is unduly presented as its confirmation. Note that the tenants of the steady-state model failed to find a thermostatic agent able to transform star light into microwave radiation. It is much simpler to admit that the CMB is simply the emanation of the external Cosmos \[5\].

Also, the steady-state model has predicted an exponential galaxy recession. In the standard model, it was a shocking surprise to observe an acceleration of the galactic recession (unduly interpreted as a Space dilatation). The prediction of the accelerated galaxy recession from the concurrent model has been simply forgotten. Such a conundrum proves the existence of tachyonic physics, which is a necessity since the speed \(c\) is far too small to connect a so vast Universe. Indeed, the simplest application of the primary method in Physics, the \(c\)-free dimensional analysis, gives half the Hubble radius \[19\] \[20\]. The founders of the modern cosmology have missed the most elementary calculation. Even Eddington did not emphasize that his above formula induces a value independent of \(c\), see Eq. (5). This is due to the catastrophic use of the so-called ”natural units” where \(c = 1\), assimilating Time to Space. In his basic text founding Restricted Relativity, Poincaré \[21\] insisted that the 4D space-time concept must not be systematised.

It is claimed that the present epoch is marked by the domination of matter on radiation. This is true for the energy, but the reverse holds for the particle population ratio. Despite the fact that the latter is considered as a standard key parameter, called ”Critical Entropy”, nobody, apart us \[22\], signaled the following tight correlation, where the factor 2 is the polarisation factor:

\[
\frac{Mc^2}{(E_{CMB} + E_{CNB})} \approx (2n_{ph}/n_H)^{1/2}; \quad n_{ph} = (4\pi/3)(R/l_{phCMB})^3; \quad n_H = M/m_H
\]  

Note the formal similitude with Eq(2): this shows a fundamental but non-standard Cosmic Matter-Field Symmetry. This is specified in the Table 2, which presents these two adimensional nearby (0.3 \%) quantities \(K_E\) and \(K_n\) which, in the standard cosmology, are believed to follow different temporal evolutions. The ratio \(K_E\) shows a double expression specifying the electric charge to ppm precision. This is a strong argument in favor of a synthesis of the steady-state model and the standard Big Bang one, since both the Cosmic Microwave Background (CMB) and the Cosmic Neutrino background (CNB) are invoked. Such a model was proposed: the Permanent Sweeping Holographic Oscillatory Bang (PSHOB), where the matter is considered as a very rapid matter-antimatter oscillation, and dark matter a \(\pi\)-dephased oscillation \[23\] \[24\].

The general tendency of the formalist mainstream has been to neglect such correlations, invoking either the hazard or a multiplicity of Universes. This much controversial Multiverse has been associated to an incongruous application of the so-called ”anthropic principle” \[4\]. Using the argument of an Universe with a finite age of several giga years, it was argued \[25\] that this age is comparable with that of a star, which by the novae process, forms the heavy elements necessary to Life, so the main Eddington’s correlation would be a neccesity. This neglects completely the second Eddington’s correlation, which leads, by a simple statistical argument to define the Hubble radius, from the simple, but non-standard, hypothesis of an electron-proton symmetry.

It is confusing that this fallacious ”anthropic” argument was universally accepted by the physics communauty. The reason for this success is that, more or less concisously, people wants to reintegrate physics and biology. In this respect, it is even more stupefious that nobody seems to realize that the masses of the two DNA nucleotides couples are the same, within an hydrogen atom \[23\]. So the mass of the bi-codon (3 nucleotides couples) is defined to 3 hydrogen, and very close to 1837, which is the hydrogen-electron mass ratio. This article shows, by considering the pure isotopic masses, that the precision reaches 0.1 ppm. Moreover, this bi-codon mass connects also with the central dimension 16 of the Topological Axis, to again 0.1 ppm precision.

This Topological Axis (Graph 3) is the extension of the double Eddington Large Number Correlations, leading to a Bott octonion sequence of dimensions, which rehabilitates the bosonic String Theory \[5\]. The latter was unduly discarded because it involves a tachyon. Quite the contrary, the tachyon interprets the above non-Doppler quasar power oscillation.

A great hope in theoretical physics is the Holographic Principle, which is precisely of integral type (not differential). However, the standard model cannot use it on the Hubble sphere because its radius is considered as variable. It suffices to admit its invariance, and apply this Holographic Principle with the Topon, the wavelength of the whole Universe,
to demonstrate the critical cosmic character. So, there is no need to the standard inflation, which appears as an ad-hoc "epicycle". This could not have been seen before, because this Topon rejects the Planck wall by a factor $10^{60}$. But it is very surprising that cosmologists, who consider the Universes as a whole, have not introduced the Universe wavelength (Topon), which justifies at last the $10^{120}$ quantum vacuum/Universe energy ratio [5].

The Section 2 recalls how the application of the $c$ exclusion and the Holographic Principle lead to the PSHOB cosmology and introduces the connection between gravitation, CMB, and the gauge couplings $g_1$, $g_2$ and $g_3$ of the groups U(1), SU(2) and SU(3). The Hubble radius invariance is definitely proved by the Table 4 showing 55 simple formula, with 8 in the 0.1 ppm domain, while the Table 5 confirms the Cosmos radius by 54 formula, with 10 in the 3 ppm domain.

The Section 3 applies the Holic Principle, the degenerate diophantian form of the Holographic Principle. It shows how the mass concept introduces a symmetry between gravitation and quantum physics in the Keplerian Diophantine Equation. This connects the Bohr’s orbits with the PSHOB model, showing up the mean DNA bi-codon mass which connects to 0.1 ppm with the Topological Axis. The local $c$-observable base 2 Universe appears as a gauge boson in the base 3 Tachyonic Cosmos with massive photon and graviton. These masses are obtained from the two-step interaction, involving a high speed $C$ precursor, by analogy with the two-step real holography technique, using the above non-local quasar period. Note that the concept of a "fuzzy-ball" photon is non necessary [26]. What is general is the symmetry Field-Matter: the propagation is wavy (Shrodinger equation), but the reception is a quantum process (wave packet reduction). All that is incomprehensible without the above cosmic precursor concept. The Section 4 is devoted to the properties of the DNA, showing outstanding 0.1 ppm connections with the Topological Axis and the main "free parameters".

The Section 5 studies the multi-dimensional cristallography, with emphasis to its relation with the "rule 23" cellular automaton Wolfram bisection series. By characterising the main integer parameters 137 and 1836, this leads to a liaison with the string compactification problem. The number 1836 is connected with the maximal Euler suitable number, tied to the generalized Riemann hypothesis. The base 2 Wieferich last prime permits to define the fine-structure constant with the string compactification problem. The nomber 1836 is connected with the maximal Euler suitable number, tied to the generalized Riemann hypothesis. The base 2 Wieferich last prime permits to define the fine-structure constant with the string compactification problem. The number 1836 is connected with the maximal Euler suitable number, tied to the generalized Riemann hypothesis. The base 2 Wieferich last prime permits to define the fine-structure constant with the string compactification problem. The number 1836 is connected with the maximal Euler suitable number, tied to the generalized Riemann hypothesis.

The present-day value for $R$ introduces a dramatic crisis. Despite an optimisation of six parameters, the standard $ΛCDM$ cosmologic model(Cold Dark Matter with cosmological constant) leads to the so-called present-day Hubble constant $H_0 = c/R \approx 67.74 \pm 0.46$ km/s by Megaparsec [3], while, since several years, direct measurements, using different methods, confirm a significant discrepancy. In particular, the latest measurement is $69.8 \pm 0.8$ [27].

This discrepancy is widely discussed, but nobody signals this last value was predicted long ago, by the mere application of $c$-free MLT dimensional analysis [19] [20]. This value was later justified by the model of the Gravitational Hydrogen Molecule [23], which is also the limit of a star radius when its atomic number is reduced to unity [28] and verifies the above double relation Eq.(2). With the Giga light-year unit (Gly), and the electron reduced wavelength $\lambda_e = h/m_e c$, this Hubble radius is:

$$R = 2a_G \lambda_e = 2h^2/Gm_em_pn_H \approx 13.811977 \text{ Gly}$$

(5)

corresponding to $H_0 \approx 70.790 \text{ km}s^{-1} \text{Mpc}^{-1}$, compatible with the above last measurement. Moreover, this value connects within $10^{-3}$ with the reduced topological function $g(k) = \exp(2^{k+1/2})/k$, for $k = 6$, see Graphics [3]. This value $k = 6$ corresponds to the privileged dimension 26 of the string bosonic theory:

$$R \approx g(6) \lambda_e = 13.82 \text{ Gly}$$

(6)

This Topological Axis generalizes the Large Number Correlations, whose the single official justification is the Anthropic Principle, also used to justify the so-called "biologic fine-tuning" through the Multiverse model [4]. But such a rough argument cannot explain the above precision, so the Topological Axis recovers the ancestral idea of an unique Universe. The above Optimal Correlation Principle (OCP) favors the "economic" of $x^3$ form. In particular, with $e_2 = e^\varepsilon$ and $e_3 = e^{\varepsilon \eta}$, one observes:

$$e_3 \approx aHe_2 \approx p_w p_{w_2} \approx \eta \tau$$

(7)
The Table 5 presents 54 simple formula confirming this Cosmos radius $R_c$. The Tachyonic Holographic Cosmos 2.2 The Classical Universe Radius and the Cosmic Gravity-CMB-Microphysics connection

The standard theory associates conservation law with symmetry. However, a conservation law can be seen as the result of a computation. Considering that the Universe is a computing black-hole of radius $R_c$, this introduces the length $(R_c^2)^{1/2} = 10^{-15} m$ [23]. The identification with the invariant electron classical radius defines the Classical Universe Radius $R_e$. It is the radius eliminating $c$ between the classical electron radius and the Planck length formula. This radius presents a very precise dramatic holographic property involving the CMB Wien wavelength:

$$ R_e = 2R_c^2/l_P^2 = 2h^2/Gm^3_{eN} $$

$$ 4\pi(R_e/A_{W,CM}^2)^2 \approx e^\theta $$

where $M_N = R_c e^2/2G$ is the associated critical mass, implying the Nambu mass $m_N = am_e$, central in particle physics [31]. The OCP introduces the “Weinberg-Sanchez” natural geometric extension of the Weinberg triangle [32]. $1/g_0 = 1 + g_1^2 + g_2^2 = 1 + (Z/H^{(0)})^2$. With the BE-Higgs scalar boson mass ratio, by respect to electron: $H^{(0)} = 495^{+2}_{-1} (125.208 GeV)$ [5], the radius ratio $R_e/R$ obeys the following $10^{-7}$ precise relations, involving $G$ through $g_0 = P/2^127/2$ (from the Combinatorial Hierarchy [7]) and the Wien factor $w_i$. From the OCP, the following coupling $g_3$ and the electric charge $q$ are proposed:

$$ 1/g_0 = 1 + g_1^2 + g_2^2 \approx 2R/R_e \approx 2(H/p_0)(\beta \sqrt{a_e/w_i})^{1/2} $$

$$ \tan \theta = g_1/g_2 = g_0/g_3 $$

$$ g_1 \cos \theta = g_2 \sin \theta = (4\pi/\alpha) \approx y\Pi_e/2d_e \sqrt{F} $$

$$ 3^{11-1} \approx 6(2\pi)^5 \approx \pi a^2 $$

Note that the electric charge is tied to the Mirimanoff prime 11 [33], showing the connection supersymmetry-supergavity $10 = 11 - 1$. The small difference between $g_0$ and $g_2$ induces formula in the Hubble and Cosmos Tables. In this manner, the gauge couplings are connected with the Wien factor $w_i$, whose pertinence is not recognized in the present standard model. Moreover, there is a direct confirmation, precise to 0.1 ppm, of the CMB temperature invariance:

$$ K_n = (32\xi(3)/3\pi)^{1/2} R/l_p(\Lambda_{CMB} A_H)^{1/2} \approx K_E(1 - 1/12^{1/2})^{-1/2} $$

This means there is symmetry between radiation and matter; totally unexpected in the present standard theory. This relation has the same form than that of Eddington: $\sqrt{M/m_e} = R/2\Lambda_H$, equivalent to Eq. (5).

2.3 The Tachyonic Holographic Cosmos

The radius $R_c$, about 30% larger than $R$, was identified to the holographic reduced Cosmos radius [19], defined by the Bekenstein-Hawking entropy of the $R_c$-radius sphere [34]: $\pi(R_c/l_p)^2 = 2\pi R_c/l_p$, so:

$$ R_c = R_c^2/l_P \approx 128 l_p(R_0/R_H)^2 \approx 9.075773 \times 10^{86} \text{m} $$

The Table 5 presents 54 simple formula confirming this Cosmos radius $R_c$. In particular, there is dramatic geometrical property, the “Geo-adimensional Cosmos- Universe couple” (Fig.1):

$$ (\ln(R_c/\lambda_c))^2 \approx (\ln(M_H/m_e)^2 + 2(\ln(R/\lambda_c))^2 $$

where the 2 factor comes from the local character of the speed $c$ [5].
Table 1: Adimensional primary constants

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euler-Napier constant</td>
<td>e</td>
<td>2.718281828459042</td>
<td>optimal base</td>
</tr>
<tr>
<td>Archimedes constant</td>
<td>π</td>
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<td>Euler-Mascheroni constant</td>
<td>γ</td>
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<tr>
<td>Golden ratio</td>
<td>Φ</td>
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<tr>
<td>Wien factor</td>
<td>ω</td>
<td>9.65461245</td>
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</tr>
<tr>
<td>Relative Radiation ratio</td>
<td>u_{CMB+CNB}/u_{CMB} = 1 + 3(7/8)(4/11)^{1/3} ≈ p_{N}/H p_{W}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale-factor 8π/ln2</td>
<td>nL</td>
<td>2177 – 1</td>
<td></td>
</tr>
<tr>
<td>Lucas Large Prime Number</td>
<td>n Ed</td>
<td>136 × 2^{56}</td>
<td></td>
</tr>
<tr>
<td>Eddington Large Number</td>
<td>s65</td>
<td>1848</td>
<td></td>
</tr>
<tr>
<td>Extended Maximal Number of Intersection</td>
<td>p0</td>
<td>1836</td>
<td></td>
</tr>
<tr>
<td>of Diagonals from a 16-gone</td>
<td>p1</td>
<td>1836.15267343</td>
<td></td>
</tr>
<tr>
<td>Proton/Electron mass ratio</td>
<td>p_{e}/m_{e}</td>
<td>≈ 2^{7}(a/4π)^{3}p_{B}^{2}/n_{t}</td>
<td></td>
</tr>
<tr>
<td>Wyler Proton/Electron mass ratio</td>
<td>6π^{5}</td>
<td></td>
<td></td>
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<tr>
<td>Hydrogen/Electron mass ratio</td>
<td>u</td>
<td>136.1 + 1</td>
<td></td>
</tr>
<tr>
<td>Planck mass</td>
<td>P</td>
<td>2.389015907 × 10^{22}</td>
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<tr>
<td>Lucas Gravitational Proton/Electron mass</td>
<td>P/L/√N</td>
<td>1831.531181</td>
<td>≈ β_{wdd}/137</td>
</tr>
<tr>
<td>Bisected of Rule 23 Wolfram series</td>
<td>u_{d,2d} = 1 + 2(d + d + 1) + 2(d + 3) + 8(d + 3)^{2} for d = 12</td>
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<td></td>
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<tr>
<td>Combined R23W for d = 8: Eddington's</td>
<td>u_{d}</td>
<td>137</td>
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<tr>
<td>formula [10]</td>
<td>v_{12}</td>
<td>1831</td>
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<tr>
<td>Combined R23W v_{1} = u_{22}(2 + 1)</td>
<td>v_{13}</td>
<td>12D to 1D</td>
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<tr>
<td>for d = 3: Hol Sweeping 1D Absolute Space</td>
<td>v_{13}</td>
<td>1831</td>
<td></td>
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<td>Electric coupling constant (a^{-1})</td>
<td>a</td>
<td>137</td>
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<tr>
<td>Optimised series with the Wieferich prime</td>
<td>a_{0}</td>
<td>137</td>
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<tr>
<td>137 + 1/28 + 1/p_{w2}</td>
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<tr>
<td>Electron Excess Magnetic moment</td>
<td>a_{2}</td>
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<td>Atiyah constant</td>
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<tr>
<td>Optimised massive scalar boson/Electron</td>
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<td>0.57721566490153</td>
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<tr>
<td>mass ratio</td>
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<td>0.57721566490153</td>
<td></td>
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<tr>
<td>Optimised charged weak boson/Electron mass</td>
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<td>0.57721566490153</td>
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<tr>
<td>Optimised neutral weak boson/Electron mass</td>
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<td>0.57721566490153</td>
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<td>0.88169557</td>
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<tr>
<td>Optimised U(1) Gauge coupling</td>
<td>Zsinθ/H</td>
<td>(γ/y)/(n_{i}/1837) ≈ p_{w}/H</td>
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<tr>
<td>Zsinθ/H(110) ≈ (γ/y)/(n_{i}/1837) ≈ p_{w}/H</td>
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<tr>
<td>Adimensional Electric charge q ≈ (d_{2}^{2}/β_{d,2}^{2})^{1/3}</td>
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<tr>
<td>Optimised SU(2) Gauge coupling W/H(100)</td>
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<tr>
<td>Gravitational Coupling p/p_{G}/2a^{2}</td>
<td>g_{2}</td>
<td>0.6241390</td>
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<tr>
<td>Optimised SU(3) Gauge coupling g_{0}/g_{1} = (p_{G}^{2}/n_{i}H) H_{x} (95a/Z)^{2}</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Optimised charged Pion/Electron mass ratio</td>
<td>0.88169557</td>
<td>0.88169557</td>
<td></td>
</tr>
<tr>
<td>Optimised neutral Pion/Electron mass ratio</td>
<td>g_{0}</td>
<td>0.6241390</td>
<td></td>
</tr>
<tr>
<td>Optimised eta Meson/Electron mass ratio</td>
<td>g_{3}</td>
<td>1.2210476</td>
<td></td>
</tr>
<tr>
<td>4(π_{0}π_{1})^{1/2}(137/a)^{8}</td>
<td>g_{3}</td>
<td>1.2210476</td>
<td></td>
</tr>
<tr>
<td>Optimized &quot;Squared Effective (m_{Z})</td>
<td>sin(θ_{2})^{2}</td>
<td>0.2315965</td>
<td></td>
</tr>
<tr>
<td>Weak-mixing angle&quot; e/32 sin(θ_{cosθ})^{2}</td>
<td>sin(θ_{2})^{2}</td>
<td>0.2315965</td>
<td></td>
</tr>
<tr>
<td>DNA Adenine-Thymine couple main isotopic</td>
<td>o_{1}</td>
<td>61.2312280</td>
<td></td>
</tr>
<tr>
<td>mass/m_{H}</td>
<td>o_{2}</td>
<td>61.2399800</td>
<td></td>
</tr>
<tr>
<td>DNA Guanine-Cytosine couple main isotopic</td>
<td>μ</td>
<td>206.7688269</td>
<td></td>
</tr>
<tr>
<td>mass/m_{H}</td>
<td>206.7688269</td>
<td>206.7688269</td>
<td></td>
</tr>
<tr>
<td>Optimised Muon/Electron mass ratio</td>
<td>206.7688269</td>
<td>206.7688269</td>
<td></td>
</tr>
<tr>
<td>Optimised Koide Tau ratio, with p_{K} = (1 + μ + τ)/2 = (1 + √μ + √τ)^{2}/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koide constant p_{K} ≈ β_{d}ln(2 + 3 + 5 + 7)/ln(2 × 3 × 5 × 7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fermi mass ratio: √μ ≈ (4π/3)(lnP)^{3} ≈ (g_{0}π_{i}/2a_{0})^{2} ≈ (p_{i}/n_{i})(137aq_{i})^{2}/4πτ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eta-Tau mass ratio product</td>
<td>η</td>
<td>3.78 × 10^{10}</td>
<td></td>
</tr>
<tr>
<td>Product of the Wieferich primes 1093 × 3511</td>
<td>η</td>
<td>3.837 × 10^{10}</td>
<td></td>
</tr>
<tr>
<td>Third Primary Economic Number e_{3}</td>
<td>e_{3}</td>
<td>1.691936467 × 10^{38}</td>
<td></td>
</tr>
<tr>
<td>Optimised Gravitational (inverse) coupling</td>
<td>e_{3}</td>
<td>1.691936467 × 10^{38}</td>
<td></td>
</tr>
<tr>
<td>R/2κ = p_{w}/H</td>
<td>p_{w1}</td>
<td>0.15 ppb</td>
<td></td>
</tr>
<tr>
<td>Optimised Electrowek (inverse) coupling</td>
<td>a_{0}</td>
<td>3.283374406 × 10^{11}</td>
<td></td>
</tr>
<tr>
<td>(2θ × 137)^{3} ≈ (6λ_{CNB}/κ_{0})^{5/3}</td>
<td>a_{0}</td>
<td>3.283374406 × 10^{11}</td>
<td></td>
</tr>
<tr>
<td>Optimised Strong (inverse) coupling</td>
<td>a_{1}</td>
<td>8.43452906</td>
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</tr>
</tbody>
</table>
Table 2: Physical constants [3]

<table>
<thead>
<tr>
<th>name</th>
<th>Symbol</th>
<th>unit</th>
<th>Value</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced Planck constant $h/2\pi$</td>
<td>$\hbar$</td>
<td>J s</td>
<td>$1.05457181 \times 10^{-34}$</td>
<td>“exact”</td>
</tr>
<tr>
<td>Official Gravitation constant</td>
<td>$G_{ef}$</td>
<td>kg$^{-1}$m$^3$s$^{-1}$</td>
<td>$6.67430 \times 10^{-11}$</td>
<td>contested</td>
</tr>
<tr>
<td>Optimized Gravitation constant</td>
<td>$G$</td>
<td>kg$^{-1}$m$^3$s$^{-1}$</td>
<td>$6.6754375 \times 10^{-11}$</td>
<td>[5]</td>
</tr>
<tr>
<td>Relativity local speed</td>
<td>$c$</td>
<td>m s$^{-1}$</td>
<td>$299792458$</td>
<td>exact</td>
</tr>
<tr>
<td>Boltzmann conversion constant</td>
<td>$k_B$</td>
<td>JK$^{-1}$</td>
<td>$1.380649 \times 10^{-23}$</td>
<td>exact</td>
</tr>
<tr>
<td>Rydbergh reduced wavelength $\lambda_c(2aH/p_c)^2$</td>
<td>$\lambda_{Ryd}$</td>
<td>m</td>
<td>$1.45190673 \times 10^{-8}$</td>
<td>$\lambda_{Ryd}/l_p \approx \sqrt{OM}$ (Monster Group order)</td>
</tr>
<tr>
<td>Fermi constant</td>
<td>$G_F$</td>
<td>m$^3$</td>
<td>$61.435851 \times 10^{-62}$</td>
<td>500 ppb</td>
</tr>
<tr>
<td>Electron mass $m_e = m_p + p_H = M_H$</td>
<td>$m_e$</td>
<td>kg</td>
<td>$9.109383705 \times 10^{-31}$</td>
<td>0.3 ppb</td>
</tr>
<tr>
<td>Electron reduced wavelength $h/m_e c$</td>
<td>$\lambda_e$</td>
<td>m</td>
<td>$3.861592675 \times 10^{-13}$</td>
<td>0.3 ppb</td>
</tr>
<tr>
<td>Electron classical radius $h/\alpha m_e c$</td>
<td>$r_e$</td>
<td>m</td>
<td>$2.817940322 \times 10^{-15}$</td>
<td>0.45 ppb</td>
</tr>
<tr>
<td>Hydrogen Bohr radius $a(1 + 1/p_i)\lambda_e$</td>
<td>$r_H$</td>
<td>m</td>
<td>$5.294654092 \times 10^{-15}$</td>
<td>0.45 ppb</td>
</tr>
<tr>
<td>Planck length $(hG/</td>
<td>c</td>
<td>^3)^{1/2}$</td>
<td>$l_P$</td>
<td>m</td>
</tr>
<tr>
<td>Critical density $3/8\pi c^2$</td>
<td>$\rho_{crg}$</td>
<td>kg m$^{-3}$</td>
<td>$9.4117996 \times 10^{-27}$</td>
<td>with $T = R/c, \rho_{crg}$ independent of c</td>
</tr>
<tr>
<td>Optimised CMB temperature $T_{CMB}$</td>
<td>$K$</td>
<td></td>
<td>$2.7258204$</td>
<td></td>
</tr>
<tr>
<td>CMB wavelength $h/cK_{CMB}$</td>
<td>$\lambda_{CMB}$</td>
<td>m</td>
<td>$5.278325924 \times 10^{-3}$</td>
<td></td>
</tr>
<tr>
<td>CMB red. wav. $\lambda_{CMB}/2\pi$ : $\pi_{CMB} \approx 3 + 2(a - 137^2/</td>
<td>a</td>
<td>)$</td>
<td>$\lambda_{CMB}$</td>
<td>m</td>
</tr>
<tr>
<td>CMB Wien length $\lambda_{CMB}/h_0$</td>
<td>$\lambda_{CMB}$</td>
<td>m</td>
<td>$0.6034085 \times 10^{-3}$</td>
<td></td>
</tr>
<tr>
<td>CMB photon length $\lambda_{CMB}(16\pi^2/3)^{1/3}$</td>
<td>$l_{ph,CMB}$</td>
<td>m</td>
<td>$1.345131 \times 10^{-3}$</td>
<td></td>
</tr>
<tr>
<td>CMB energy density $(\pi^2/15)hc/\lambda_{CMB}^4$</td>
<td>$u_{CMB}$</td>
<td>J m$^{-3}$</td>
<td>$4.1767647 \times 10^{-14}$</td>
<td></td>
</tr>
<tr>
<td>Radiation density energy $u_{CMB} + u_{CMB} = y_{4CMB}$</td>
<td>$K_E$</td>
<td>-</td>
<td>$12045.685$</td>
<td></td>
</tr>
<tr>
<td>Critical Energy versus radiation ratio $\rho_{crg}c^2/uc_{CMB} + C_{CMB}$</td>
<td>$K_n$</td>
<td>-</td>
<td>$12087.731$</td>
<td></td>
</tr>
<tr>
<td>Square root of critical entropy $(2M_{ph}m_{ph})^{1/2}$</td>
<td>$K_{C}$</td>
<td>-</td>
<td>$1.9455976$</td>
<td></td>
</tr>
<tr>
<td>Optimised CMB temperature $T_{CMB}/l_0$</td>
<td>$K$</td>
<td></td>
<td>$1.176957 \times 10^{-3}$</td>
<td></td>
</tr>
<tr>
<td>Neutrino (CNB) reduced wavelength $\lambda_{CMB}$</td>
<td>$m_{C}$</td>
<td></td>
<td>$1.176957 \times 10^{-3}$</td>
<td></td>
</tr>
<tr>
<td>Non-Local (Kotov) length $c_{nB}$</td>
<td>$l_{nB}$</td>
<td>m</td>
<td>$2.878184911 \times 10^{11}$</td>
<td></td>
</tr>
<tr>
<td>Hubble length (Universe radius)</td>
<td>$R$</td>
<td>m</td>
<td>$1.306713894 \times 10^{26}$</td>
<td></td>
</tr>
<tr>
<td>Cosmos holorphic radius $R_e$</td>
<td>-</td>
<td>m</td>
<td>$1.712894163 \times 10^{26}$</td>
<td></td>
</tr>
<tr>
<td>Cosmos radius $R_C$</td>
<td>-</td>
<td>m</td>
<td>$9.075773376 \times 10^{86}$</td>
<td></td>
</tr>
<tr>
<td>Universe mass $m_{p}^4/m_{p}m_{p}M_X$</td>
<td>$M$</td>
<td>kg</td>
<td>$8.7965248 \times 10^{52}$</td>
<td></td>
</tr>
<tr>
<td>Baryonic Neutron Number $(3/10)m_{p}^4/m_{p}m_{p}m_{n}$</td>
<td>$n_n$</td>
<td>-</td>
<td>$136.068464 \times 2^{236}$</td>
<td></td>
</tr>
<tr>
<td>Eddington Large Number</td>
<td>$n_{Ed}$</td>
<td>-</td>
<td>$136 \times 2^{236}$</td>
<td></td>
</tr>
<tr>
<td>Cosmos holographic reduced mass $m_{p}^4/m_{p}^3 M_N$</td>
<td>$M_N$</td>
<td>kg</td>
<td>$1.15308454 \times 10^{53}$</td>
<td></td>
</tr>
</tbody>
</table>

2.4 The Non-Local Period: the Photon and Graviton masses

The Topological Axis rehabilitates the bosonic part of the string theory which has the apparent imperfection it includes tachyons. In fact, it is rather an advantage in order to explain the quasar non-Doppler oscillation, introducing a non-local period $t_{nl} \approx 9600, 06(2)$ s [18]. Indeed, the ratio of this period and the electron period $t_e = h/m_e c^2$ is precisely given by the elimination of $c$ between the electro-weak constant $a_w$ and the inverse gravitational coupling $a_g = R/c_\lambda$: $t_{nl}/t_e \approx (\alpha_{eg}a_w)^{1/2}$. This gives a $G$ value precise to $10^{-6}$, compatible with the BIPM $10^{-9}$ precise measurement [37]. This implies that the official value of $G$, the incongruous mean between incompatible measurements, is dramatically too small by $8\, \sigma$. By analogy with the practical holography, which is a two-step process, it was introduced a two-step interaction procedure, with a precursor speed $C = cR_e/R$ much greater than $c$, leading to the following masses for the photon and graviton [5]:

\[
\begin{cases}
  m_{ph} = h/c^2 t_{nl} \\
  m_{gr} = m_{ph}/a_w
\end{cases}
\]

In the Topological axis, these masses correspond to the special string dimensions 24 (transverse dimensions) and 26 (main dimension), and will be determinant in the following section. Note the relation, precise to 1 ppm, between the Bohr’s radius $r_H$ and the relativistic factor $1/\beta = H - p$: $f(\beta) = (24)^{1/2} \approx d_4(r_H/\beta\lambda_e)\lambda_e$, showing that the electric parameter $a = (p/H)r_H/\lambda_e$ is central in the Topological Axis.
Towards Science Unification Through Number Theory

### Table 3: The Topological Axis follows the law $\exp(2^{d/4})$ for the main physical characteristics lengths, with unit length the electron Compton reduced wavelength: $h/m_e c = \lambda_e$. This is the extrapolation towards smaller numbers of the Eddington’s Large Number correlations, a reunion of height 2D-1D holographic relations, whose micro-macrophysics imbrication explains the double log, hence the name ‘Topological Axis’. The double natural logarithms $y = \ln(\ln(Y))$ of the main dimensionless physical quantities ($Y$) corresponds to the special string dimension series, which identifies with the spectroscopic series with spin $1/2$, where $k$ is the orbital quantum number, $d = 4k + 2$, from $k = 0$ to $k = 7$, characteristics of a Bott octonion sequence, as anticipated by Atiyah, whose constant $\Gamma = \gamma a/\pi$ is central. The mean value $d = 16$ connects directly with the DNA bi-codon, decisive in the Holic Cosmology, where $R_e$ is the holographic reduced Cosmos radius and $R$ the Hubble radius, whose ratio is connected with the Weinberg-Sanchez gauge couplings (Eq(4), $\phi$, a special value of the golden number, $m_N = am_e$ the Nambu mass, the Kotov length $c_{\text{Kot}}$, and $j = 8\pi^2/\ln2$ the scale factor \[^{[19]}\]. In this rehabilitation of the Bosonic String Theory, the Universe appears as the final boson in the Cosmos.
Towards Science Unification Through Number Theory

Table 4: 56 formula for the Hubble radius \( R \)

<table>
<thead>
<tr>
<th>Formula</th>
<th>Value (Gly)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 2H^2/\text{G}_m m_m m_H )</td>
<td>13.81197676</td>
<td>Gravitational Hydrogen Molecule radius ([5])</td>
</tr>
<tr>
<td>( (H/p) R_H )</td>
<td>13.81197676</td>
<td>From mono-atomic star limit radius ( R_H ) ([28])</td>
</tr>
<tr>
<td>( \alpha_0 (t_0/t) )</td>
<td>13.81197676</td>
<td>Identification predicting ( t_0 \approx 9600.594157/5 ) (Eq.(5))</td>
</tr>
<tr>
<td>( (\lambda_p \lambda_H)^{1/2} (WZ)^4 )</td>
<td>13.81197676</td>
<td>Symmetrising the published relation ( a_0 \approx W^8 ) ([4])</td>
</tr>
<tr>
<td>( \lambda_e 2^{128}/d_n^2 m_H/m_p )</td>
<td>13.811977</td>
<td>Empirical, from the Combinatorial Hierarchy Lucas Large Number ([7])</td>
</tr>
<tr>
<td>( (n_{ph}/1836)^{1/2} \lambda_e (2^{18}/\pi \sqrt{a})^{10} )</td>
<td>13.811977</td>
<td>From ( (2p)^{11} \approx s_{68}/2 \pi, p = 6\pi^2 ) and ( s_{68} \approx (2\pi)^2 \sqrt{a} )</td>
</tr>
<tr>
<td>( (1/g_0) H_R (R_c/2128)^{1/2} )</td>
<td>13.811978</td>
<td>From ( 1/g_0 = 1 + q_1^2 + g_2^2 \approx 2a^{3}/pp_R, ) with ( p_R = P/12^{127}/2 )</td>
</tr>
<tr>
<td>( (\lambda_p \lambda_H)^{1/2} (a_0/2)^{1/2} )</td>
<td>13.811978</td>
<td>From ( (WZ)^4 \approx a^2 a_0^2/20 )</td>
</tr>
<tr>
<td>( \alpha_e (p_{pH})^2 \exp \sqrt{a} )</td>
<td>13.81198</td>
<td>Liaison between ( e_3 = \exp(\exp(\exp)) ) and ( p_{pH} = 4a_0^3/3 ) from the holographic relation ( 2nR/\lambda_e \approx (4\pi/3)(\lambda_{CMB}/\lambda_H)^{3} ) ([5])</td>
</tr>
<tr>
<td>( (H/pw) (2\pi a_0^5/\lambda_e) )</td>
<td>13.81196</td>
<td>with ( pw = 6\pi^2, 5D ) holography in the gravitational hydrogen molecule ([19]) confirms the strong coupling ( \alpha_s )</td>
</tr>
<tr>
<td>DNA bi-codon mass as calculation basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytosine topologic pertinence ( C_y^{(0)} \approx f(10) = f(26)^{1/16} ) with ( N_{ph} ) the Cosmos photon number, confirms that the Universe is a cosmic boson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With the holo number ( 210^{330} ), confirming the couple Universe- Cosmos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows the pertinence of the computational term ( \mu_e )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the geo-adimensional Cosmos-Universal (Fig.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holic Principle, with the reduced wavelength of the DNA bi-codon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From ( (1/g_0) \approx 2R/ \lambda_e \approx (R/ \lambda_e)^{1/210} ) (Eq. (14))</td>
<td></td>
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</tr>
<tr>
<td>Empirical, with the central value ( f(16) = e^{16} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirming the Wien CMB wavelength. from ( 4\pi(\lambda_e/\lambda_{CMB})^{2} \approx e^a )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 137, a, a_e ) as computation basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cosmic role of electric charge ( g_1 \cos \theta = g_2 \sin \theta )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the cosmic thermal bath and the couple GC with mass ( o_2 m_H )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the Eddington Number ( 136 \times 2^{256} ) and the gravitational parameter ( 10/3 ) ([19])</td>
<td></td>
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</tr>
<tr>
<td>Symmetry ( R/ \lambda_e ) associated to symmetry ( f(2)-g_1 ) (string-SU(1) gauge coupling)</td>
<td></td>
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<tr>
<td>Pertinence of the symmetry ( 1836-1848 ) (Eq.(25))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the relation ( a_{o_2} \approx 3^{37}/(d_7^{10}+d_7^{127})^{1/2} ) ([19])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the Topological Axis: ( f(18) \approx H^1 \approx (a/\pi)^3(6^{1/2} a_{o_2})^{1/2} )</td>
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<td></td>
</tr>
<tr>
<td>Confirms the strong coupling ( a_1 ) and the electric charge ( q )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows a symmetry ( a ) ( WZ ) ( F )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the non-local Kotov length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the Combinatorial Hierarchy Lucas Large Number ([12])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertinence of the holo term ( 210^{330} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertinence of the holo term ( 210^{330} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With the product of the 20 happy sporadic groups ( \Pi_{holar} \approx e^{674.5210287} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c-free dimensional analysis ([24])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the pertinence of ( a_{o_2} ) and ( g_2 ) ( p ) and ( H ) as computation basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central role of mammal temperature: ( T_{man} \approx jT_{CMB} ), with ( j = 8\pi^2/In2 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corresponds to ( (1/sin\theta) \approx 3/\sqrt{2} \approx p_1^{1/10} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \pi ) calculation basis: ( 2^{1/155} \approx a^{1/165} \approx (2\pi)^{1/3\times137} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertinence of the basic economic number ( e_3 = e^{e^e} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 6/\pi ) calculation basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atiyah’s constant ( \Gamma ) calculation basis with the reduced topological function ( g(k) = \exp(2^{k+1}/k) / k ), for ( k = 6, d = 26 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the non-local Kotov length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D-3D Holography with the non-local length ( l_{ad} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the Cosmos non-locality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D-3D holography in the hydrogen molecule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirms the CMB invariance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complementarity of photons and neutrinos backgrounds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: 55 formula for the Cosmos radius \( R_C \)

<table>
<thead>
<tr>
<th>Formula</th>
<th>Value ((10^{86} \text{m}))</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_C^2/2p )</td>
<td>9.07577</td>
<td>1D-2D Holographic Principle with ( R_C ) [5]</td>
</tr>
<tr>
<td>( \lambda_e \exp(\exp(\exp(\exp(-g_2)))) )</td>
<td>9.07577</td>
<td>The final log of ( R_C/\lambda_e ) is a SU(2) coupling: ( g_2 \approx W/(495^2 + (\tau/\mu)^2) ) from the connections ( g_0 \approx g_2 ) and ( a - 9 \approx 2^7 )</td>
</tr>
<tr>
<td>( \exp(\exp(\exp(\exp(-g_2)))) )</td>
<td>9.07579</td>
<td>confirms the role of the central topologic term ( f(16) = e^{16} )</td>
</tr>
<tr>
<td>( e^{210} f(16) e^{9\mu n_1} )</td>
<td>9.07577</td>
<td>confirms the Holic Principle and the CMB temperature invariance</td>
</tr>
<tr>
<td>( e^{210} )</td>
<td>9.07577</td>
<td>confirms 1/g0 = 1 + g_0^2 + g_0^2 = 1 + (Z/H^2)^2 from the cosmic atomic mass ( M_c/m_H \approx B \sqrt{\sigma} )</td>
</tr>
<tr>
<td>( \lambda_p (6dnp^2 \sin^2 \theta/\pi)^{1/13} )</td>
<td>9.07574</td>
<td>confirms the SU(3) coupling ( g_3 )</td>
</tr>
<tr>
<td>( p/(\exp(60(16/160))) )</td>
<td>9.07777</td>
<td>from ( \frac{g^2}{\pi} \approx 3^4 - 1 )</td>
</tr>
<tr>
<td>empirical, with ( p_w = 6n^5 )</td>
<td>9.07777</td>
<td>empirical, implying a relation between ( a ) and ( a_t )</td>
</tr>
<tr>
<td>confirms the cosmic base 3</td>
<td>9.07786</td>
<td></td>
</tr>
<tr>
<td>( R_a ) ((1/137)^2/\pi^4))</td>
<td>9.07587</td>
<td>base 12</td>
</tr>
<tr>
<td>confirms the electric charge ( q ); ( 61/60 = (n_e/p_i)^{12} )</td>
<td>9.07548</td>
<td>implies the musical property (16 ppb): ( (3/2)^{1/5} \approx 24(a/137)^{12}(p_i/p_\phi)^{1/2} )</td>
</tr>
<tr>
<td>( \lambda_P (2) \sqrt{5}^{(80)/64} )</td>
<td>9.07580</td>
<td>confirms the CMB temperature invariance, with ( p_{\phi 0} = 1836 )</td>
</tr>
<tr>
<td>( \exp((\theta/2)/2)) )</td>
<td>9.07584</td>
<td>confirms the CMB temperature invariance, through the Wien wavelength</td>
</tr>
<tr>
<td>( \lambda_e (\sin^{2\theta}(\pi/r_{\phi}))^{-1}(4a_t)^{6/4} )</td>
<td>9.07573</td>
<td>confirms the CMB temperature invariance, through its photon length ( I_{\phi CMB} )</td>
</tr>
<tr>
<td>( l_p (\exp(1378)/\lambda_e) )</td>
<td>9.07580</td>
<td>Holic Principle, with the reduced wavelength of the DNA bi-codon bases ( a_o ) and ( a_t ), the nuclear couplings</td>
</tr>
<tr>
<td>base ( a ) the electric coupling, with ( j ) the scale factor [5]</td>
<td>9.07568</td>
<td>base 12</td>
</tr>
<tr>
<td>( \lambda_e ) ((6/60)/(1 + 1/\sqrt{2}) )</td>
<td>9.0755</td>
<td>base 7</td>
</tr>
<tr>
<td>( \lambda_e e^{1/2e} )</td>
<td>9.0769</td>
<td>base 6</td>
</tr>
<tr>
<td>( \lambda_e ) ((2/210)/(1830) )</td>
<td>9.0756</td>
<td>base 3</td>
</tr>
<tr>
<td>( \lambda_e (1 + 1/\sqrt{2})^{2/4} )</td>
<td>9.085</td>
<td>base 2</td>
</tr>
<tr>
<td>( \lambda_e ) ((2/210)/(1830) )</td>
<td>9.082</td>
<td>base 5</td>
</tr>
<tr>
<td>( \lambda_e (1 + 1/\sqrt{2})^{2/4} )</td>
<td>9.075</td>
<td>base 7/6 ( \approx a^{1/2} )</td>
</tr>
<tr>
<td>( \lambda_e (1 + 1/\sqrt{2})^{2/4} )</td>
<td>9.075</td>
<td>base 1/q</td>
</tr>
<tr>
<td>confirms the terminal Euler number ( s_{65} = 1848 )</td>
<td>9.07577</td>
<td>confirms the charge ( q )</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0776</td>
<td>with the product of orders of the 26 sporadic groups ( e^{674.5210287} ) [5]</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0795</td>
<td>Confirms the Holic Number ( 210^{1/2} \approx 1 ) from the reduced topologic function for ( d = 30 ) : ( g(7) = f(30)/30 ) [5]</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0778</td>
<td>Confirms the base ( r ) holic term</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0775</td>
<td>Confirms ( T_{CMB} ) with ( p_{K} = (1 + \mu + \tau/2) ) [35]</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0776</td>
<td>comes from the de photons number, using the mono-electron radius ( R_1 ) [5]</td>
</tr>
<tr>
<td>base 137</td>
<td>9.0788</td>
<td>comes from the non-local length ( l_{nl} )</td>
</tr>
<tr>
<td>with the non-local length ( l_{nl} ) [5]</td>
<td>9.0775</td>
<td>base ( j ), the scale factor</td>
</tr>
<tr>
<td>base ( e ), confirms ( g_2 )</td>
<td>9.0775</td>
<td>natural base ( e ), with ( p_{00} = (60 \times 61)/2 )</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.06</td>
<td>bases ( p_i ) and ( n_i )</td>
</tr>
<tr>
<td>natural base ( e ) in the Topological Axis</td>
<td>9.06</td>
<td>c-observable Universe Cosmos couple ( (R/\lambda_e = t/t_a) ) , fig 1</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0777</td>
<td>base 6/\pi</td>
</tr>
<tr>
<td>( \exp(1/2\pi) )</td>
<td>9.0777</td>
<td>Confirms the invariance of the thermal background [5]</td>
</tr>
<tr>
<td>base 6/\pi</td>
<td>9.0777</td>
<td>From non-local holography [5]</td>
</tr>
<tr>
<td>( \mu ) calculation basis, close to holic base 210</td>
<td>9.0777</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: Geo-adimensional Cosmos-Universe couple, with unit length the Electron Compton reduced wavelength. In a 3D Super-space, logarithms of physical ratios are considered vectors. The Cosmos radius $R_C$ appears as the norm of the vector using for length and time projections the same value $R/\lambda_e = t/t_e$. For the mass projection it is $M_N/m_e$ where $M_N$ is the critical mass in the Cosmos reduced spherical hologram of radius $R_e$. This is a dramatic geometrical confirmation (independent of the base for logarithms) of the Extended (2D-1D) Holographic Principle applied to the Bekenstein-Hawking Universe entropy. So the Universe is characterised by the c-equivalence $R/\lambda_e = t/t_e$, where $t$ is the Hubble time (no relation with any "Universe age").

3 The Holic Principle

The string theory considers space-time as a secondary property [38], so the concepts of mass, length and time are, in final, related to pure numbers. Indeed an arithmetic-physical synthesis has been anticipated by the Holic Principle [13], a simplified form of the Holographic Principle.

Recall that holistic equations are prefered to differential ones, in order to eliminate free parameters. The systematic use of differential equations in the standard physics is the origin of the proliferation of free parameters.

In any Diophantine equation, this Holic Principle allows to discriminate a temporal ratio $T$, acting by its square, from a spatial ratios $L$, acting by its cube (due to the 3D space). Indeed, the simplest Diophantine Equation, which implies a 2-dimensional Time, $T^2 = L^3 = n^6$, with $n$ a natural integer, is the Diophantine form of the third law of Kepler, and implies: $L_n = r_n/r_1 = n^2$ (the Bohr's orbit law) and $T_n = t_n/t_1 = n^3$. Hence, with $v_n = r_n/t_n$:

$$\begin{align*}
    r_n v_n^2 &= r_1 v_1^2 = G m_G \\
    r_n v_n &= m_n v_1 = n h/m_b
\end{align*}$$

These gravito-quantum equations introduce an "hyper-symmetry" between the universal constants $G$ and $h$, by respect to the mass concept: the undefined masses $m_G$ and $m_b$. So, this defines the conceptual trajectories:

$$\begin{align*}
    r_n &= n^2 r_1 \\
    r_1 &= h^2 / G m_G m_b^2
\end{align*}$$

With $m_G = m_e^{(red)} = m_e m_p / (m_e + m_p)$, the classical electron reduced mass and $m_b = m_p / \sqrt{\alpha}$, this is the Bohr's orbits distribution. The above PSHOB Cosmology includes the following 6 more special cases (Table 6), using the main masses, plus a new one: $m_{bc}$, close to $m_H/m_e$, which identifies with the DNA bi-codon mass, studied in the next section.

So, the PSHOB Cosmology is tied to the couple $G, h$, while the classical quantum theory uses in fact the "photonde" couple $h, c$, and the gravitation theory the "gravitonde" couple $G, c$. These three couples define the "Trihedra of Constants"(Fig. 2).

These neologisms 'photonde” and "gravitonde” are introduced to recall that only waves propagate, not the particles: this is a main cause of misinterpretations in quantum physics.
Table 6: PSHOB cosmology (Eq.(12))

<table>
<thead>
<tr>
<th>$m_G$</th>
<th>$m_h$</th>
<th>$r_1 = \hbar^2/Gm_Gm_h^2$</th>
<th>Precision</th>
<th>Arithmetic Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>$m_e$</td>
<td>$m_p$</td>
<td>$\lambda_e$: Electron reduced wavelength</td>
<td>exact</td>
<td>$r_H/\lambda_e \approx 137 = 2^7 + 2^3 + 2^0$</td>
</tr>
<tr>
<td>$m_e^{(red)}$</td>
<td>$m_p/\sqrt{\alpha}$</td>
<td>$r_H$: Bohr’s radius</td>
<td>exact</td>
<td>$R_e/\lambda_e \approx (3^3)^3$</td>
</tr>
<tr>
<td>$m_N$</td>
<td>$m_N$</td>
<td>$R_c/2$: half cosmos reduced holographic radius</td>
<td>exact</td>
<td>$l_c/\lambda_e \approx \pi^{50}$</td>
</tr>
<tr>
<td>$m^{(0)}_{bc}$</td>
<td>$2l_c$: double non-local length</td>
<td>$-6.3 \times 10^{-3}$</td>
<td>$\lambda_W/n \approx \pi^{64}$</td>
<td></td>
</tr>
<tr>
<td>$m_p\alpha^3$</td>
<td>$\sqrt{m_p m_H}$</td>
<td>$\lambda_{Wn}$: Wien CMB wavelength (thermal background)</td>
<td>$-3.2 \times 10^{-4}$</td>
<td>$R/\lambda_e \approx g(6) \approx 2^{17} \approx (2R/R_e)^{210}$</td>
</tr>
<tr>
<td>$m_e^{(0)}$</td>
<td>$\sqrt{m_p m_{gr}}$</td>
<td>$R/2$: half Universe radius</td>
<td>exact</td>
<td>$R/\lambda_e \approx e^{2\nu} \approx 6^{21} \approx (2R/R_e)^{64a}$</td>
</tr>
<tr>
<td>$m_{bc}R_e/R$</td>
<td>$\sqrt{m_{ph}m_{gr}}$</td>
<td>$R_C$: Cosmos radius = $RC/c = (R/2)m_{bc}^2/m_{ph}m_{gr}$</td>
<td>$4.7 \times 10^{-4}$</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: The Trihedra of Constants $h = G = c$. The $c$-local visible Universe is a Cosmos bosonic “immergence”

Extrapolating the above simplest Diophantine equation with the prime numbers 5 and 7 which follow the basic prime couple $2;3$, the Holic Principle proposes the exponent 5 for a mass ratio, and 7 for a field ratio (note that the lifetime of a particle depends effectively to the power 5 of its mass). So, the general resolution is:

$$T^2 = L^3 = M^5 = F^7 = n^{210}$$

Note that the primes $2;3;5;7$ are the terms of the two simplest solutions of the Pell-Fermat equation, which has been connected with the metric equation [13].

Indeed, the Hubble radius “holic key” is singular, to 15 ppm, while the base 2 is confirmed to 0.3 ppm, and the base 3 to 60 ppb in the following relations:

$$\begin{align*}
(R/\lambda_e)^{1/210} &\approx 2R/R_e = p_G/H_0 \\
(P^2/a_0)^{1/210} &\approx 2 \\
(p_G/2a_n)^{R_C/\lambda_e}\approx 3
\end{align*}$$

with $p_G$ the proton-electron mass ratio and $a_n$ the neutron-electron mass ratio. Note that 3 is the optimal integer base, the closest integer to $e$ [39]. This is tied to the economic functional definition of $e$, whose square interconnects the main musical ratios, using the primes $2;3;5$, while the ratio $7/6$, unknown in classical music, connects with $a$. Recall that, according to Euler “music is an inconscous calculation”:

$$\begin{align*}
\{x^{1/3}\} &\text{ maximal for } x = e \\
e^2 &\approx (3/2)^5 \approx (4/3)^7 \approx (5/4)^9 \approx (6/5)^{11} \approx (7/6)^{13} \approx a^{13/32} \approx \mu^{3/16}
\end{align*}$$

So the base 7 is also pertinent. It is foreseen that special music could use also the base 7. A symmetric use of these four bases $2;3;5;7$ explains the above role of the global base 210, so justifies the brute muon mass.
4 The DNA bi-codon

Using the main isotopes: $^{1}H(0) = H$, $^{6}C = C(0)$, $^{7}N = N(0)$, $^{8}O = O(0)$, $^{15}P = P(0)$ [36], the masses of the 4 DNA nucleotides, by respect to the hydrogen mass $H$ (the product of the nucleotide mass ratios: $m_{H}$), the terminal dimension 32 of the Topological Axis is associated to the central value of the Topological Axis $e^{16}$, with $m_{bc}$ (0.6 ppm): 

$$m_{bc} \approx m_{H}/m_{n} \approx 360.432199, \text{ close to } \pi^{2} \approx 360.02.$$ 

The mean nucleotide mass is $(a_{1} + a_{2})/6 \approx 1838.418122$ connects very precisely with the following main parameters and the central term $J(16) = e^{16}$ of the Topological Axis, and also with the Relative Radiation Ratio $y$ (5 ppm), the second Wieferich prime $p_{w2} = 3511$ being, while $e^{8}$ connects directly to canonic numbers (0.6 ppm): 

$$m_{bc} \approx m_{H}/m_{n} \approx 360.432199, \text{ close to } \pi^{2} \approx 360.02.$$ 

The bi-codon minimal mass uses the three couples AT, so is very close to $Hm_{H}$. Since $a_{2} \approx a_{1} + 1$, the other masses are of type $(H + n)m_{H}$, with $n = 1, 2$ or 3: the DNA seems a base 3 computer, like the Cosmos.

The mean nucleotide mass is $(a_{1} + a_{2})/6 \approx 360.432199$, close to $\pi^{2} \approx 360.02$, the sixth part of the Lenz-Wyler proton-electron mass ratio $[40] 6\pi^{2}$, which shows a geometric property: it is the product of the area by the volume of a cube of side $a$. The mean DNA bi-codon mass $m_{bc}/m_{H} = (6/4)(a_{1} + a_{2}) \approx 1838.418122$ connects very precisely with the following main parameters and the central term $J(16) = e^{16}$ of the Topological Axis, and also with the Relative Radiation Ratio $y$ (5 ppm), the second Wieferich prime $p_{w2} = 3511$ being, while $e^{8}$ connects directly to canonic numbers (0.6 ppm):

$$m_{bc} \approx m_{H}/m_{n} \approx 360.432199, \text{ close to } \pi^{2} \approx 360.02.$$ 

So, the DNA mass establishes the lacking connection (0.1 ppm) between the main masses: electron, proton, Hydrogen, neutron with $J(16)$, the central value of the Topological Axis $e^{16} = J(16)$, which shows also the following Keplerian holic relation, implying the leptons ratios:

$$e^{16} = f(12)^{2} = (f(4(1 + \sqrt{2}))^{3} \rightarrow f(4(1 + \sqrt{2}) \approx \mu ; \quad f(12) = e^{8} \approx 6\pi/7$$

where $(1 + \sqrt{2})$ is the Pell-Fermat generator. Since $a^{1/32} \approx 7/6$, this implies the terminal term $J(32)$ of the Topological Axis. The analysis shows, to $4$ ppm:

$$(\tau - 1)^{32}/f(32) \approx a^{2}/137$$

So, the terminal dimension 32 of the Topological Axis is associated to $\tau$, the terminal lepton. The number three of particle families is therefore confirmed.

One notes the direct correlation implying the product of the nucleotide mass ratios: $4d_{c}C_{u}(0)C_{y}(0) \approx 4d_{c}A_{d}(0)T_{h}(0) \approx (H/3)^{2}$, which induces the symmetrical relation implying $s_{65} = 1848$, the last Euler number:

$$H^{(0)} + Z^{2}/H^{(0)} \approx (H/3)^{2}$$

This shows a symmetry between 1836 and 1848, which are the $34th$ and $35th$ areas of integer-sided triangles whose area equals 6 times their perimeter (A332879 in OEIS).
a dramatic connection with the electric constant $a$ and symmetry number $b$. The connection with the electromagnetic group $U(1)$ of complex numbers with modulus 1.

Carl Hermann [41] calculated the number of crystallographic point symmetries $N_d$ between the Multi-Dimensional Crystallography, the Number Theory and the main particle mass ratios. Conservation is tied to both symmetry and computation. As recalled above, supergravity. Dimensions: 26 for the bosonic theory, 24 for the transverse dimensions, 10 for the superstring theory, 11 for the supergravity proton-electron mass ratio, which is also $u$.

If the Riemann conjecture is right, the final Euler ideonal number is unity, which was predicted in a Sweeping Universe, and, for $d = 11$, the supergravity dimension. The sum of $N_d$ for $d = 12$ (half the 24 transverse dimensions) is 1836, the integer closest to the proton-electron mass ratio. For $d = 9$, which is the number of compactified dimensions in string theory, $N_9 + K_9$ identifies both with 495, the square root of the Higgs boson-electron mass ratio and the 9th pentapode number. Moreover, the relation $S_9 + 4 = K_9$ seems fundamental, since 419/447 ∼ $F^2/Pr^2$ to ppb precision. The natural extension of the 13th pentapode number, where 13 is half the 26 main bosonic dimensions, is again 1836. The bissection of the Rule 23 Wolfram series shows the dimensions $u_{11} = 4$ and $u_{12} = 11$, which are those of the usual Space-time and the Supergravity, with $u_1 + u_2 = u_3 = 137$. Reducing the dimensions by a 2 factor shows that $u_{13} = 991 = 495 + 496$, the third "perfect couple", where 496 is the dimension of the string SO(32) group, while 11 = 5 + 6 involves the first "perfect couple". The combined Rule 23 Wolfram Series shows 137 for the dimension unity, which was predicted in a Sweeping Universe, and, for $d = 12$, the number 1831, the closest integer to the Lucas gravity proton-electron mass ratio, which is also $u_{13}$, showing the reduction from the Topological Axis dimension 30 to 12. If the Riemann conjecture is right, the final Euler ideonal number is $s_{65} = 1848 = 1836 + 12$, which shows dramatic connections with the electric constant $a$, the tau-electron mass ratio, the Topological Function and the DNA mass. The Fermi atomic number and that of a nucleotide are close to $s_{53} = 312$, while $53 = u_{17}/2 \approx 2\sigma_a$.

### 5 The Multi-Dimensional Crystallography

The main problem of string theory is the connection between the usual 4D time-space with the favored theoretical dimensions: 26 for the bosonic theory, 24 for the transverse dimensions, 10 for the superstring theory, 11 for the supergravity.

As recalled above, conservation is tied to both symmetry and computation. So, this section is devoted to connections between the Multi-Dimensional Crystallography, the Number Theory and the main particle mass ratios.

Carl Hermann [41] calculated the number of crystallographic point symmetries $N_d$ for dimensions from 1 to 8. This number $N_d$ is the number of monic polynomials (i.e. with first term $x^d$) with roots on the unit circle: there must be a connection with the electromagnetic group $U(1)$ of complex numbers with modulus 1.

The Weigel team [42] (Table 7) extended this calculation for higher dimensions, up to $d = 70$, focusing on the positive symmetry number, noted $K_d$, which defines $N_d$ via:

$$
\begin{align*}
N_{2n+1}/2 &= K_{2n+1} = K_{2n} \\
N_{2n} &= K_{2n} + K_{2n-2}
\end{align*}
$$

These recurrence rules are non sufficient to define the series. This implies to look for specific recurrences, characteristic of the Number Theory and the standard “free parameters”, in particular ($a; p_1; n_i$) with whole values (137;1836;1839).
5.1 The Prime Number series Connections

Considering the Prime Number Series including the unity \( \sigma(n) \) (OEIS A014284), the connections are unambiguous (Table 7), showing a partition of 137, the Eddington-Atiyah constant. This partition is characteristic of the Periodic Table (Section 5.7):

\[
\begin{align*}
\sigma_9 &= 78 = N_9 \\
\sigma_8 &= 59 = K_8 \\
\sigma_{2i} + \sigma_{2j-1} &= 122 = 2N_7 + 1 \quad (i = 1) \\
\sigma_{3i} + \sigma_{3j-1} &= 137 = 2N_9 + 1 \\
\sigma_{4i} + \sigma_{4j-1} &= 329 + 282 = 611 = 1833/3 \\
\sigma_{5i} + \sigma_{5j-1} &= 964 + 875 = 1839 = 3 \times 613 = N_9 + K_9 + N_7 \\& 137 \times 4\pi \ln(1/g_1) \\
\sigma_{6i} + \sigma_{6j-1} &= 3 \sigma_{4i} + \sigma_{4j-1} + 1 = 1836 \\
\end{align*}
\]

The crystallographic partition of 137 induces the double partition of 1836, which is the arithmetic origin of the DNA bi-codon partition in 4 nucleotides. The number of nucleons in the Guanine is 329, see below, while \( N_9 + K_9 = 495 = \sqrt{H}^{(0)} \), and \( N_7 = 137 - K_4 \) a partition tied to the Periodic Table (following section).

5.2 The Positive Crystallographic Function and the Scalar Boson

The method of least square leads to the following polynomial, where the coefficients clearly correlate with the physical parameters, with emphasis to the scalar boson - electron mass ratio \( H^{(0)} = 495^2 \) predicted by the Topological Axis and the Atiyah constant \( \Gamma = \gamma a/\pi \) (Graph 3).

\[
d \approx (lnN_d)^2/A + BlnN_d + 1/C \\
A & \approx 11.4672 \approx 2 \times 137 \sqrt{6}/5 \sqrt{\alpha} \approx 137a495/\sqrt{2a_\alpha} \approx 2\pi^2WZ/a^3 \\
B & \approx 1.1812 \approx 495/K_{10} \approx N_{10}d_e/495 \\
C & \approx 43.9290 \approx 495^2 \sin \theta/\sqrt{2} \times 9\mu \approx 495^2 \cos \theta/\sqrt{2} \times \tau
\]

Here \( \mu \) and \( \tau \) are the leptons relative masses, \( \cos \theta = W/Z \), and \( d_e \approx 1.00116 \) is the electron magnetic excess.

The two fist terms are close for \( d = 32 \), which specifies the Topological Axis symmetry, from \( k = 0 \) to \( k = 7 \), and the characteristics of the string group SO(32), whose dimension is the third perfect number 496:

\[
d_k + d_{7-k} = 32 \\
d(S'O(32)) = \left\lfloor \frac{32}{2} \right\rfloor = 496
\]

From the above double relation for \( B \), the following property of the scalar boson emerges, with a special recurrence relation between the dimensions 10 and 9, showing also a connection with \( S'_{26} = 381540 \), to 48 ppm:

\[
\begin{align*}
H^{(0)} &= 495^2 = K_9N_9 = K_{10}N_{10} + N_9 - 1 \approx \sqrt{WS'_{26}} \\
495 &= \left( \frac{12}{4} \right) = \left( \frac{11}{2} \right) + \left( \frac{11}{2} \right) = 3\left( \frac{11}{2} \right) = 3K_9 = \left( \frac{32}{2} \right) - 1 = 496 - 1
\end{align*}
\]

where \( N_9 = 9K_9 \) is the total number of positive zeros on the unit circle for the central string reduction dimension 9, and \( N_9 \) the number of non-trivial 9D symmetries. This is clearly related to the relation with pentapode numbers: \( q_8 = N_9, q_{11} = K_{12}, q_9 = \sqrt{K_{10}N_{10}} \), showing a kind of symmetry between \( N \) and \( K \). Note that 495 is the odd part of the first Mathieu group order 16 \( x = 495 \), and the couple 495- 496 is the third perfect couple. In such a couple, the first number is the sum of the non-trivial divisors of the second. Since 496 = \( \left( \frac{32}{2} \right) \) is the dimension number of the group SO(32), and 495 = \( \left( \frac{12}{4} \right) \), this leads to the conjecture : the third co-perfect number 495 could be the single one being a non-trivial binomial number.

The most striking fact is the following connection between the Guanine and the couple \( N_9 = 2K_9 \), the factor 2 being identified to the duality proton-neutron, and the following factor 3 to a symmetry proton-neutron-electron, meaning that what counts is the number of particle, independently of their nature: this number is 499 in the Guanine molecule, which means 495 + 4, the latter 4 attributed to the Helium atom:

\[
\begin{align*}
N_9 &= 330 = n^{(nuc)}_{Ga} + 1 \\
(3/2)N_9 &= 495
\end{align*}
\]
Note that \( N_0 \) and \( K_0 = N_0/2 \), as well as \( 210 = \binom{10}{4} \), are Euler suitable numbers, whose pertinence is confirmed below.

The associated nucleotide to the Guanine is the Cytosine, which is clearly tied with the topological function \( f(10) \), giving rise to a formula in the Hubble Table. The other couple (AT), as shown before (Eq. 19), is associated to the Fermi constant.

### 5.3 The "free parameters" and the Euler ideonal numbers

The equivalent relation for dimension 4, implying \( N_4 = 4K_4 \) shows up a relation between the brute proton-electron mass ratio 1836 with the Euler maximal suitable number \( s_{65} = 1848 = 43^2 - 1 \approx (4\pi)^2 \sqrt{137} \):

\[
N_4(N_4 + 1/2) = (K_4 + N_4)^2 - 1 - N_4/2 = s_{65} - 12 = 1836
\]

This shows up a kind of symmetry between the additive and multiplicative operations in the 4D space. The maximal Euler’s suitable number is very close to the Eddington’s prediction [10] for the proton/electron mass ratio, \( \rho_E \approx 1847.599459 \), as the ratio of the roots of the equation \( 10x^2 - 136x + 1 = 0 \). Note that to \( 10^{-4} \) and 23 ppm:

\[
\left\{ \begin{array}{l}
\tau \approx p_E(2 - q^2) \approx (2 - 1/a_s)(4\pi)^2 \sqrt{137} \\
\, s_{65} \approx (a/10)^2 \mu^7 / p^8 
\end{array} \right. \tag{32}
\]

While \( a_s \) is tied to the SU(3) group, this shows a tight liaison with the U(1) group, which is rather logical for the lepton tau. Moreover, this confirms the Eddington’s prediction of the tau fermion, 35 years before its surprising discovery as an “heavy mesotron”, based on a non-standad proton-tau symmetry [10]. This could unlock the, presently sterile, supersymmetry partner research.

Note the dramatic properties of the ideonal numbers preceding \( s_{65} \) (the unambiguous factor 5 being unexplained):

\[
\left\{ \begin{array}{l}
s_{64}/5 = 273 = s_{51} = q_{12}/5 \approx \Pi_4 \\
s_{65}/5 = 264 \approx 4q_{11}/a_s \approx \Pi_0
\end{array} \right. \tag{33}
\]

The total number of particles (protons + neutrons + electrons) involved in the four nucleotides is 1863 = 9 \times 207, where 207 is the second approximation for \( \mu \) in the bit-string model [8]. After separating the 4 \times 4 trivial ones from Helium, this reduces to 1847 = 435 + 446 + 471 + 495, at one unity from \( s_{65} \). The presence of 495 for the Guanine could not be due to hasard. Indeed while its atomic massis is 329, at one unity from \( N_0 = 330 \), its number of particles is about \( 3/2 \times 330 = 495 \), due to the electrical neutrality, so the factor 3/2 in the Table 5 is justified. In the four nucleotides, counting the elementary particles (electrons + quarks) leads to 1863 \times 7/3 = 3 \times 7 \times 207 \approx 5\tau/4, to 45 ppm, leading to further research.

In the Particle standard model, the scalar boson is necessary to explain the non-Zero mass of particles. Indeed, in the above procedure, the connection between the scalar boson and the 9D crystallography is clear, while it is not so for the above decisive 4D relation. But the first one has induced the latter one by analogic induction. Thus the central role of the scalar boson is confirmed, and the mass concept is tied to a number of cristallographic symmetries.

There is another connection between 1836 and 1848: they are both the area of an integer-sided triangle which is 6 times its perimeter, opening new further study. The connection with the pentapope number \( q_{13} \) is immediate:

\[
q_{13} + 16 = \frac{16}{4} + 16 = 1836 \tag{34}
\]

meaning that 1836 is the sum of crossings from 16 points including those points, in parallel with the definition of 137, the maximal number of zones defined by 16 straight lines in a plane, as recalled below.

Moreover with \( \Pi_0 \), the neutral Pion-electron mass ratio, and the associated term \( \Pi_4 \), for the charged Pion, \( \rho_{hol} = (4(r_H/A_e)^3/3)^{1/2} \) and the 137th Fibonacci (prime) number:

\[
\left\{ \begin{array}{l}
\Pi_4, \Pi_0 \approx 1838^2/4 \sqrt{a} \approx (2\pi)^2 m_{cd}/m_e \\
s_{65} + 1/2 \approx (4\pi)^2 \sqrt{a} \approx F_{137}/96a_{ew}^2 \approx (q^2 a/4)^2 H^{10}/p_{hol} \\
(s_{65} + 1)/2 = \frac{(13)}{6} \approx (210^{10}/\mu^6)^{1/3}
\end{array} \right. \tag{35}
\]

The last formula is deduced from the relation with the Monster Group (section 5.7) confirming the connection \( \mu \approx 210 \). The +1/2 term comes from taking account of the dimension 0 in the half sum of symmetry numbers, as confirmed below. The involved precise value for \( \pi \approx 3 + 1/(7 + 9/137) \) is very particular, opening further study.

This number \( s_{65} \) enters the correlations:

\[
s_{65}/2\pi \approx 8\pi \sqrt{a} \approx (R_c/R)^{1/21} \tag{36}
\]
Comparing this with the above holic relation $R / \lambda_e \approx (2R / R_s)^{210}$, this leads to $R / \lambda_e \approx (2^{18} / \pi \sqrt{a})^{10}$ which is also, according to the tabulated holographic relation: $R / \lambda_e \approx (2\pi^2 a^3)^{5}$. Their ratio involves $a / 137$, leading to:

$$\begin{cases} 
137 / \pi^4 \approx (a / 2^7)^5 \approx \sqrt{2} \\
(a_d / 2^7)^{10} \approx 1 + d_c 
\end{cases}$$  

(37)

where $2^7$ is the Combinatorial Hierarchy brute value of $137^7$, and also the effective value for $a$ at Fermi energy.

It is shown [13] that a single Euler suitable number could exist beyond $s_{65}$, and if not, i.e. if $s_{65}$ is really the maximal one, then the generalized Riemann conjecture would be confirmed. So the proton-electron ratio is at the heart of Number Theory.

Thus the string canonical 9D dimension reduction is correlated with the 9D crystallographic symmetries. This confirms the elimination of the continuum in theoretical physics, in conformity with the Computing Principle. This could unlock the present dilemma of string theories which lead to an enormous number ($10^{500}$) of solutions for dimension reduction, an anomaly which is claimed to sustain the unscientific Multiverse model.

With the electric charge $q = W \sin \theta / H^{(0)}$, the computer shows up the following relations, in the ppb domain:

$$\tau F / Wq \approx K_5 K_5 K_9 / 3$$  

(38)

Note that $1 + K_5 K_5 / 3 K_9 = 4181 = F / a$, showing the 19th term of the Fibonacci series, the first composite number of order prime. Moreover, the U(1) coupling $g_1 = Z \sin \theta / H^{(0)}$ is confirmed in the ppb domain by:

$$f(26) = f(2)^{32} \approx (H / p_i)(2 / g_i d_c)^{16}$$  

(39)

This confirms the central role of the string dimension 26.

The above adopted value of the coupling $g_2 = g_2 g_1 / g_0$ shows a dramatic connection (0.5 ppm) with the terminal Euler idealonal number:

$$g_2 \approx 3 + 2a / s_{65}$$  

(40)

This means that the Cosmos uses approximations for $\pi$, which is quite natural when a "quantinum" replaces the standard continuum. Another formal approximation of $\pi$ appears in the Adimensional Electrical Charge (Table 1), which confirms $g_3$:

$$\begin{cases} 
g_1 \cos \theta = g_2 \sin \theta = 4\pi^2 / a \\
2\pi q g_2 \approx g_3 (a / 137)^8 \approx e \sqrt{2} / \pi 
\end{cases} \rightarrow 3^{10} \approx 6(2\pi q)^5 \approx \pi a^2$$  

(41)

This confirms the central role of the base 3 Mirimanoff property of the supergravity and superstring dimensions 11 and 10. The definition of the first Mirimanoff number 11 is that $3^{11} - 1$ is a multiple of $11^2$ [33]. This recalls that [13]:

$$3^{10} \approx \pi a^2 \approx \Phi^{3/6} \approx (l_{phCMB} / \lambda_e)^{1/2}$$  

(42)

involving the Golden ratio in the old Chinese musical scale of 60 notes per octavus. The length $l_{phCMB}$ is the side of a cube containing a single CMB photon. The total number of photons in the Hubble sphere and in the Cosmos shows dramatic particularities (190 and 4 ppm):

$$\begin{cases} 
n_{phCMB} = (4\pi / 3)(R / l_{phCMB})^3 \approx 2(R / (\pi^2 a^4 \lambda_e)^{3/2}) \exp(\phi / 4) \\
(4\pi / 3)(R / (\pi^2 a^4 \lambda_e)^{3} \approx (a / 137) \pi \sqrt{g_0} (R / \lambda_e)^7
\end{cases}$$  

(43)

This direct liaison with the Number Theory confirms that the $c$-Universe acts as a Cosmic boson, acting by the seventh power, in conformity with the Topological Axis and the Holic Principle [13].

### 5.4 The Eddington-Atiyah’s inverse brute electric coupling 137, an Arithmetical Monster

The number 137 is the Eddington’s inverse brute electric coupling, and has been unambiguously connected with the Lucas-Lehmer series [5]. Atiyah recently associated this number with three algebra: the octonion, quaternion and real ones, associated to the number $273 \approx m_{11} / m_e$, which is again one of the Euler’s suitable numbers:

$$137 = 2^7 + 2^3 + 2^0 \quad 2 \times 137 - 1 = 273 = 2^8 + 2^4 + 2^0$$  

(44)

Strangely enough, it seems that nobody have looked for the prime numbers that appear in the harmonic series, which is the single pole of the Riemann series, precisely known to inform about the distribution of prime numbers. The six
first prime numbers appearing are the following, showing a symmetry of 11 around 137, showing the 11 supergravity dimensions and the usual 4 ones:

\[ 3; 11; 5; 137; 7; 11 \quad \Rightarrow \quad 137 = 11^2 + 4^2 \]  (45)

Note that, while 137 = l_{16}, the 16th Lazy Caterer number (maximal number of zones in a plane defined by n straight lines), 11 = l_4 and 4 = l_2. Moreover, with the Rule 23 cellular automaton Wolfram series \( u_n = 1 + n(2n + 1) \), and its combined form \( v_n = u_{2(d+3)} \) (Table 7):

\[
\begin{align*}
    u_1 &= 4 \\
    u_2 &= 11 \\
    u_8 &= 137 = u_1^2 + u_2^2 \\
    v_8 &= 991 = 495 + 496 \\
    u_{11} &= 2(2^7 - 1) = N_{11} - N_{10}
\end{align*}
\]  (46)

This series has been deduced from the fact that \( u_{30} = v_{12} = Q_{13} - 5 = 1831 \approx p_G \) (Table 1). This shows clearly that the compactification operates from the Topologic dimension 30, by groups of 3 and 4 dimensions, where 12 and 13 are the half of the 24 transverse and the 26 = 30 - 4 main dimensions. The 4D appears as 3D + 1D, separating the Space from the Time. The latter 1D is interpreted as the predicted Cosmic Hol Sweeping Absolute Time \[13\].

The corresponding Pythagorean triangle has the sides 88,105,137, i.e. the number of partitions of 18, 19 and 20, with elements greater than 1 (OEIS A002865). Its perimeter is 330 = \( K_9 \) and its area 10 \( s_{65} \):

\[
\begin{align*}
    p_{137} &= K_9 = 330 = 137 + 105 + 88 \\
    A_{137} &= 14P_{137} = 1065 \[32\].
\end{align*}
\]  (47)

This connects the 9D crystallography with the maximal Euler number \( s_{65} = 1848 \). The above Pythagorean triangle has a radius 28 for the internal circle, while \( a \approx 137 + 1/28 \). The next term in the development is 3511, the second Fermat-Wieferich number: \[29\]

\[ a \approx 137 + 1/28 + 1/3511 \]  (48)

This defines \( a \) in its 0.15 ppb indetermination (Table 2).

The only known couple of Wieferich numbers are \( p_{w1} = 1093 = 1 + 4(16^2 + 16 + 1) = 1 + 4(136 + 137) \approx 4\Pi_+ \) and \( p_{w2} = 3511 = 1 + 6(8^3 + 8^2 + 8 + 1) \). This induces the supersymmetric couple (meson \( \eta \) fermion \( \tau \)). They connect with the only known couple of Mirimanoff numbers \[33\], which uses the base 3 instead of the Wieferich base 2: \( p_{m1} = 11 \) and \( p_{m2} = 1006003 = 1003^2 - 6 \), where 1003 = \( K_9 + K_{10} + K_{11} \) shows up in the Crystallographic Table 7. One notes an 0.1 ppm relation between \( p_{m2} \) and the supersymmetric electron-proton-neutron-triplet:

\[
\begin{align*}
    p_{w1}p_{w2} &\approx e^7 \times e^{3e} \approx \eta \tau = e^{2\Phi} \approx e^{2\Phi}H \\
    p_{m2} &= (K_{p_{m1}} + K_{p_{m1}-1} + K_{p_{m1}-2})^2 - 6 \approx 4a \sqrt{p_n} / d_e
\end{align*}
\]  (49)

confirming the pertinence of the basic economic number \( e_3 \).

This “arithmetic monster” 137 appears twice in the Crystallographic Table:

\[ 137 = \sum_{6} K_d = \frac{7}{2}(N_d/2) - 1 = \sum_{4} K_d = (K_7 + 1)/2 = d_7 \]  (50)

This identifies the 4D term \( \sum_4 K_4 = d_7 = 30 \) in the brute U(1)-SU(2) gauge partition 137 = 107 + 30 \[32\]. Extrapolating to the superstring dimensions 10 and 11, this connects with the holic term 210, itself connecting with 26 = \( d_6 \):

\[
\begin{align*}
    (K_7 + 1)/2 &= d_7 = 2 \times 3 \times 5 = 30 \\
    (K_1 + 1)/2 &= d_{26} = 2 \times 3 \times 5 \times 7 = 210
\end{align*}
\]  (51)

This connects the main dimension 30 of the Topological Axis with the dimension 210 of the Holic principle.

As recalled above, 137 is the number of partitions of 20 with integers superior to 1. This seems connected to the Golden ratio \( \Phi \) through:

\[
\begin{align*}
    \sqrt{\Phi}/2 &\approx (1 + 2\cos \theta)/\sin \theta \approx (a/20) - 1 \approx \Phi^4 - 1 \\
    (1 + 2\cos \theta) &\approx (4p_n/n)^{1/2}g_2g_3 \approx (\cos \theta/2e)(137/\sin \theta)^{1/2}
\end{align*}
\]  (52)

where \( 1 + 2\cos \theta \approx \pi \), involving the sum \( Z + W_+ + W_- = Z + 2W \), showing another non-standard particle symmetry.
5.5 The precise U(1)-SU(2) gauge partition

Taking account of the dimension zero, the above sum (Table 7) becomes $S_{12} = 1836.5$, close to the mean proton-Hydrogen mean, and the gauge separation could imply rather $n_7 + 1/2 = 30.5$, which is close to 196 ppm with the real U(1)-SU(2) gauge partition term $a(\sin \theta)^2 \approx 30.505983$, and more precisely:

$$d_7 + 1/2 \approx 137^2 / a \approx (a_2^2)/Z^2 \approx a^{1/2} / a^2$$

(53)

Moreover, this number connects again with the holic term 210:

$$2(d_7 + 1/2)^2 = 9 \times 210 - (d_7 - 1/2)$$

(54)

The above proximity between $\mu$ and 210 materializes in the following 44 ppb determination of $\mu$, with a 23 ppm correlation with $\tau$:

$$\left(\frac{a}{137}\right)(2(137^2/(a \approx (a_2^2)/Z^2)^2) \approx 9 \mu \approx \tau \mu$$

(55)

So the U(1)-SU(2) gauge partition is at the heart of the optimal computation process.

5.6 The String dimension partition 26 = 22 + 4

In the string theory, the 26 dimensions reduce to the usual 4D by separating 22 hidden dimensions. Indeed, one observes:

$$N_{22} = K_{20} + K_{22} = (20 \times 22) \times 137$$

(56)

maybe the most incredible property of the Arithmetical Monster 137. The same relation applies also to the 4D usual space:

$$N_4 = K_2 + K_4 = (2 \times 4) \times 3$$

(57)

The computer shows up another case, which involves the four usual dimensions $d = 1, 2, 3, 4$ in a symmetrical way:

$$N_{13} = 2K_{11} = (2 \times 11 \times 13) \times 7 = N_5N_6N_7/N_1N_2N_3N_4$$

(58)

The sum of the implied dimensions is the same: 23 = 1+2+3+4+13 = 6+8+9.

The other string partition is 26 = 10 + 16. One observes the following precise relations with the 3 couplings, electric, electroweak and gravitational (1 ppb and 10 ppb):

$$K_{10}/(K_{10} - 2) = K_{10}/(S_9 + 2) \approx F^5/Pa^3 \approx e^{1/(210-1)}$$

(59)

This could be tied to the two trivial symmetries, identity and point inversion.

5.7 The Connections with the Periodic Table

The string dimensions special series $d = 2+4k$ identifies both with the Topological Axis one and with the spectroscopic one, so the string dimension 2 identifies with the spin 1/2 degeneracy, where $k$ identifies with the orbital number, running in the octonion series, between 0 and 7.

In the Periodic Table of elements, the total number of elements until the $n^{th}$ raw, where $n$ is the principal quantum number is:

$$n_n = \sum_{j=1}^{n} \sum_{k=0}^{n-j-1} = 2 \sum_{j=1}^{n} n^2$$

(60)

There is a particularity for the 7th row, due to the association symmetry-computation where the central dimension is 16: indeed $2 \times 16 = 32 = 2 + 30 = 6 + 26 = 10 + 22 = 14 + 18$:

$$\sum_{k=0}^{7} d_k = 2^7 \Rightarrow \sum_{k=0}^{7} d_k + \sum_{0}^{1} d_k + 1 = 137$$

(61)

which shows the Atiyah formula [30]. The height numbers are all of the form “prime - 1”, except $d_1 = 14$ and 26, the later being the critical dimension which verifies: $d_26 = d_6 = 106$, so justifying the "reduced" Atiyah sum, with the octonion term ($2^7$) and the quaternion one ($2^3$). This identifies with the reduced U(1)-SU(2) gauge partition, where 136 is the initial Eddington’s electric coupling, the number of elements in the symmetrical matrix 16 × 16:

$$\sum_{k=0}^{7} (d_k + 1) = 2^7 + 2^3 = 136 = 30 + 106 = d_7 + d_{d_6}$$

(62)
There is a particularity for the 4th row which is effectively used in the Periodic Table, corresponding to the famous spectroscopic numbers, called by Friedrich Hund "sharp" (s = 2), "principal" (p = 6), "diffuse" (d = 10) and "fundamental" (f = 14). The 7th row of the Periodic Table terminates in the Oganesson, recently synthesised \[45\], of atomic number 118, which is precisely the Herman number for \(d = 7\). By adding the following group of 18 (orbital quantum number 4), the Periodic Table would attain 136 elements. Apart one unity, since 118 = 2 \times 59, this corresponds to the above crystallographic partition 137 = 118 + 19 + 78 + 59. The Oganesson involved coefficients, with the symmetrical distribution of the spectroscopic groups \(s, p, d, f\) are the following:

\[
\sum_{k=0}^{7} c_k d_k = 118 \quad \rightarrow \quad c_k = (7, 6, 4, 2)
\]

The above variation of one unity, connected to prime numbers, leads to

\[
\sum_{k=0}^{7} c_k (d_k + 1) = 137 = 2^7 + 2^3 + 2^0 = 107 + 30
\]

which recovers the complete Atiyah sum, including the "real algebra" term \(2^0\), and, since the last "fundamental" (an anticipated judicious name) term is \(2 \times 15 = 30\), coming back to the above brute U(1)-SU(2) gauge partition. Note that the four basic primes \(p_1 = 2; p_2 = 3; p_3 = 5; p_4 = 7\) enters the following development, particularizing the dimension 4D:

\[
7(N_1 + p_1 + N_2 + p_2) + N_3 + p_3 + N_4 + p_4 = 91 + 15 + 31 = 106 + 31 = 137
\]

However, this Atiyah series presents an imperfection: the absence of the term \(2^1\), corresponding to the complex algebra. One observes that the total sum taking account of the four algebra is \(139 \approx \pi^{e/2} = e^{7/2}\). So the origin of 137 would be the mean between 139 and 135, the latter being the product of the two co-perfect numbers 5 and 3\(^5\), very close to 16\(a_e\). Indeed, one observes, in the ppb domain:

\[
137 = (16a_e + i^{e/2})/2 - 1/d_e + 2^0
\]

So the optimised value of \(a_e \approx a_\mu/2\pi(pH)\)\(^3/2\) is confirmed in the ppb domain. This tight connection with the electron excess magnetic moment \(d_e \approx 1.001159652\), which is the best confirmation of the quantum theory, opens future research.

### 6 The Sporadic Groups Connections

The 26 sporadic groups include 20 "happy" groups tied to the Monster, and 6 "pariah" groups. Many relations with the physical parameters were published \[19\], two of them implying formula for \(R\) and \(R_C\) (Tables 2 and 3). The main connections implying the Monster Group order \(O_M\) are (3.8, 1.4 and 6 ppm):

\[
\begin{align*}
\{ & e^a \approx 2O_MZ^2p/1839W \\
& e^{1/2a} \approx O_M/(2a^2p^2)^2 \approx \mu_3^2W/2a^2Z \quad \Rightarrow \quad g_0 = R_C/2R \approx p^2FW/O_MZ
\end{align*}
\]

Thus *The Monster Group is related to the CMB through the holographic term \(e^a\) and the Lucas Number through the gravitational coupling \(g_0\).* Moreover, one observes the relations tying the electric, strong and weak couplings \(a, a_e, anda_w = F^2\), to 10, 7, 150 and 300 ppm:

\[
F/aa_e \approx (137/a)\pi^{3/2}/2\mu \approx 495 \times 2^{1/(24\times20)} \approx K_{26}/f(10) \approx O_M^{1/20}
\]

with \(K_{26} = 141877\). Now \(f(10)^{10} \approx l_{nl}/\lambda_e\) and \(K_{26}^{20}\) is of order \(R_C/\lambda_e\). This implies again a pertinence for the canonic string dimensions 26 and 10, calling for further study. The order \(O_M\) of the Monster group connects with the Lepton mass ratios and the final Euler number \(\zeta_{65}\):

\[
O_M^9 \approx \tau_{37} \approx \mu^3\zeta_{65}^2/\sqrt{2} \approx 4\sqrt{2} \times 210^{210}/\zeta_{65}
\]

This confirms that \(\mu_0 = 2 \times 3 \times 5 \times 7 = 210\) is the pertinent arithmetic approximation of \(\mu\). With the symmetric approximation \(\tau_0 = (2 + 3 + 5 + 7) \times 2 \times 3 \times 5 \times 7:\n
\[
(p_i/n_jd)_i(\tau/\tau_0)^{137} \approx \sqrt{2}p^3/a^2H^2(H - p) \approx \pi^\pi
\]

confirming to the ppb range the Koide tau value \[35\], where \(n_i/p_i\) is the mass ratio neutron-proton. *So the sporadic groups are at the heart of the overall unification, opening further study.*
7 Conclusions and Predictions

This article confirms the pertinence of the Topological Axis [5], with its invariant Hubble radius, as a key for debunking theoretical physics, by revealing two new decisive points. Firstly, the DNA bi-codon, imposed by the Holic Principle, corresponds to the central dimension \(d = 16\). This milits for a general cosmic DNA Life. Secondly, the supergravity dimension \(d = 11\), corresponding to the “strange” particle Kaon, is tied to the 10 superstring dimensions through the base 3 Fermat-Mirimanoff relation \(11 - 1 = 10\). This implies unambiguously the Arithmetic Monster 137, the Golden ratio, and the old chinese musical scale This milits for a return to an harmonious Cosmos, meaning the generality of intelligent Life [13].

This article permits to connect the main “free” physical parameters with different domains of the Number Theory. In particular, the two base 2 Fermat-Wieferich primes: 1093 and 3511 connect directly with the Relative Radiation Ratio, which connects also with the gauge couplings. This confirms the unification role of the Radiation Background (photons + neutrinos), common to the c-observable Universe and the Cosmos. Besides the two Pillars of Physics, the third pillar, the Statistical Physics, shows a prominent role.

This article rehabilites several discarded physical theories: those of Eddington [10], Noyes [8], Wyler [40] and Atiyah [30]. It has been proved that the standad so-called standard “free” parameters are calculation bases in the computing Cosmos. Indeed high powers of them appear in the Hubble and Cosmos tables, with special importance of the symmetrical combinaison of the four basic primes 210, specially the term 210

\[ 210 = 2^2 \times 3 \times 5 \times 7, \]

confirming the unification role of the Radiation Background (photons + neutrinos), common to the c-observable Universe and the Cosmos. Besides the two Pillars of Physics, the third pillar, the Statistical Physics, shows a prominent role.

The Cosmology must be completely re-interпрeted, with the unifying concept of “Permanent Sweeping Holographic Oscillation Bang Matter-Antimatter Cosmology”. Considering the visible Universe as a quantum entity, the simple consideration of its wavelength (Topon) leads to the Toponic Holography, which breaks down the Planck wall by the factor \(C/c \approx 10^{60}\), explaining at last the giant factor (10

\[ 10 \]

for the baryon+dark matter density, the latter being an anti-phase oscillation of normal baryons.

The DNA bi-codon mass is central in the Cosmos, confirming again, and with a high degree of precision, the pertinence of the dimension 16, showing how the Topological Axis has been predictive. Thus, the DNA molecule would be more than just a simple memory as anticipated by Schrödinger [46]. It must be a bio-computer, probably activated by real holography. Indeed, electric current is observed in DNA [47]. So physical laws are identical to biological ones, again ruling out the Multiverse model. The DNA molecule would be, like the Cosmos, a 1D sweeping hologram, opening the way for “biocomputers”.

The standard point of view, which considers Life as an “emergent” phenomena is incomprehensible and sterile. This study shows that, quite the contrary, Life, as well as the c-Universes, is an “immerging” cosmic phenomena. The fact that the term “immergence” is a perfect neologism proves the excess of reductionism that has been adopted by the standard formalists. So, the relation, for \(k = 4\) (\(d = 18\)), between the cosmic temperature and the mammal one \(T_{\text{man}} = jT_{\text{CMB}}\), where \(j = 8\pi^2/ln2\) is the scale constant [5] takes a renewed importance, as well as the relation with the triple points of Hydrogen, Oxygen and Water. It is foreseen that future theory will be able to calculate these triple points, a task nowadays impossible.

The overwhelming connections confirm that the pure mathematics must now pursue unification, by concentrating on the mathematical properties of physical parameters. Such connections between apparently separated mathematical domains has been already introduced by Physics [48]. In particular, research must concentrate on the Algebra of Eddington’s E Numbers [10] [49], the Euler ideal numbers, the Wieferich and Mirimanoff primes, the additive...
series of prime numbers, the Rule 23 Wolfram cellular automaton, the multi-dimensional crystallography and sporadic groups.

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