

Remarkable Properties of the Eddington Number 137 and Electric Parameter 137.036 excluding the Multiverse Hypothesis

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Abstract. Considering that the Large Eddington Number has correctly predicted the number of atoms in the Universe, the properties of the Eddington electric number 137 are studied. This number shows abnormal arithmetic properties, in liaison with the 5th harmonic number 137/60. It seems that Egyptians was aware of this, as the architecture of the Hypostyle Karnak room reveals, as well as the Ptolemaic approximation $\pi \approx 2 + 137/120$, together with a specific mention in the Bible, and overwhelming connexions with musical canonic numbers. The SO(32) characteristic superstring number 496, the third perfect number, connects directly with the three main interaction parameters, and is very close to the square root of the Higgs boson-electron mass ratio, so the Higgs boson discovery excludes the Multiverse, favoring rather a unique Cosmos being a finite computer using 137 and its extension 137.036 as calculation basis. The direct liaison between the mean value of the two main cosmic radiuses and the Bohr radius through the simplest harmonic series excludes any role of chance. Precise symmetric relations involving the Kotov non-Doppler period permit to propose precise (100 ppb) values for the weak and strong interaction constants, as well as $G \approx 6.6754635 \times 10^{-11} \text{ kg}^{-1} \text{ m}^3 \text{ s}^{-2}$, at 2σ higher than the tabulated value.. This value is confirmed by a direct connection with the Supersped ratio $C/c \approx 6.945480 \times 10^{60}$.

1. Eddington and 137

Eddington has established [1] that, in reduced units, the square of the inverse electric charge must be 137. But, when it was precisely measured, it turned out to be $a \approx 137.036$, and Eddington approach was rejected. This rejection is not conform with the traditional 'approach' method of physics. Indeed, there is a direct relation between these numbers:

$$137^2 + \pi^2 \approx 137.036^2 \quad (1.1)$$

$$a/137 \approx a^{1/a^2} \quad (1.2)$$

precise respectively to 0.1 and 0.7 ppm. So, it is worth asking mathematicians 'does 137 appears as a special whole in Number Theory?' The general answer is '137 is unknown in Number Theory, it has no remarkable property' This appear as a contradiction 'How can the Nature can be driven by mathematics, when appears a number unknown by mathematician ?' Two possible answers arise:

Multiverse Solution: Such an electrical constant is a random number, characterising a Universe among a multitude, each with a different set of numerical parameters: it is the Multiverse hypothesis. So the number a would be a completely 'free' number, and there is no need to look for any special mathematical properties.

Universe Solution: 137 and a have special properties, belonging to a part of mathematics not revealed by present mathematicians.

We show here that the second way seems the right one.

Note that Armand Wyler has established a formula, from the consideration of geometrical

coefficients in hyper-spheres of higher dimensions, in relation with

$$p \approx 6\pi^5 \quad (1.3)$$

the famous empiric Lenz formula, approaching the proton-electron mass ratio p to 18.824 ppm. Note that the Wyler formula can be written in function of $V_5(1/\pi) = (8\pi^2/15)(1/\pi)^5$, the volume of the 5-sphere of radius $1/\pi$, and the volume of the 3D sphere of radius $\sqrt{\sqrt{2}}$:

$$\sqrt{a} \approx V_3\{\sqrt{\sqrt{2}}\} / V_5^{1/8}\{1/\pi\} \quad (1.4)$$

giving a to 0.61 ppm. Wyler was invited a year at Princeton by Tyson, but the american staff did not take this work seriously, in spite of its characteristic holographic character (the Holographic Principle was not expressed at the epoch), and its supplementary work was not even published by Princeton !

2. The Large Eddington Number: the most astonishing prediction in Physics of all times

Eddington believed he had identified an algebraic basis for fundamental physics, which he termed "E-numbers" (representing a certain group – a Clifford algebra). Indeed, this incorporated spacetime into a higher-dimensional structure. While his theory has long been neglected by the general physics community, similar algebraic notions underlie many modern attempts at a grand unified theory. Moreover, Eddington's emphasis on the values of the fundamental constants, and specifically upon dimensionless numbers derived from them, is nowadays a central concern of physics. In particular, he predicted a number of hydrogen atoms in the Universe [1] 136×2^{256} , or equivalently the half of the total number of particles protons + electrons. When equalized with the non-dark energy equivalent number of hydrogen atoms (the factor 10/3, as well as the critical condition, are trivial in the simplest cosmology, as recalled below [2])

$$N_H = (3/10) Rc^2/Gm_H \Rightarrow R = 13.8 \text{ Glyr} \quad (2.1)$$

this corresponds to a Universe radius $R = 13.8$ Giga light year, a value predicted for years from universal constants using an atomic-cosmic symmetry [3], and compatible with c -times the so-called Universe age 13.80(4) Gyr, as determined by the recent mission Planck (March 2003). This formula traduces the double large number correlation in the manner Eddington presented it, with $l_H = \hbar/m_H c$:

$$R/2l_H \approx \sqrt{(M/m_e)} \approx \hbar c/Gm_e m_p \Rightarrow R = 13.8 \text{ Glyr} \quad (2.2)$$

which implies directly the gravitational force in the Hydrogen atom [2][3]. The Eddington original form is $R/2\sigma = \sqrt{N}$, but Eddington was not able to deduce the above formula exhibiting the electron-proton symmetry, which was precisely one of his essential hypothesis, because of the error of an order of magnitude of the first estimation of Lemaître for the redshift constant (an erroneous value strangely confirmed later by Hubble et Humason, on the basis of an unique very far galaxy).

The elimination of \hbar in (2) leads to $M = (m_H/m_p) Rc^2/2G$, where the main term $Rc^2/2G$ is the classical formula of the horizon radius of a black hole, and corresponds to the 'cosmic critical condition', justified below. Note that the corrective factor (m_H/m_p) is eliminated, by replacing in (2), M/m_e by M/m'_e , with $m'_e = m_e/(1+1/p)$ the corrected electron mass in the Hydrogen atom. This means that the relation between M and $R/2$ is given by the elementary 3-fold (Length-Mass-Time) dimensional analysis excluding \hbar .

Note that, introducing the Planck mass m_p^4 , this critical condition writes:

$$m_p^4 = M m_e m_p m_H \quad (2.3)$$

Now, the elimination of the speed c in (2) gives the Universe radius:

$$R \approx 2\hbar^2/Gm_e m_p m_H \Rightarrow = 2Al_e \Rightarrow R = 13.8 \text{ Glyr} \quad (2.4)$$

with

$$A = \hbar c/Gm_p m_H \quad (2.5)$$

to be related with the bare Bohr radius, see below.

It follows that the half radius $R/2$ can be deduced by simple 3-fold (Length-Mass-Time) dimensional analysis excluding c , by starting from \hbar , G and the product of masses $m_e m_p m_H$, which is close to the natural choice $m_e m_p m_n$, since electron, proton and neutron are the three fundamental particles of Atomic Physics. Moreover, this is a *mandatory* calculation, since c is a far too small a speed to make coherent a so vast Universe, and what is *directly* measured in the redshift cosmic phenomena is a length (not the inverse of a time, generally called the "Hubble constant"). This was made in our first 3 minutes of a sabbatical year in Orsay University (September 1995), but was rejected by the French Academy. This was placed in a "pli cacheté," in March 1996, to be open soonly.

Moreover the above formula have the same form as the bare Bohr-radius r_0 : (the real Bohr radius has a correction factor $1+1/p$, due to the finite value of the proton-electron mass ratio p):

$$r_0 \approx \hbar^2/e^2 m_e \quad (2.6)$$

where e^2 is the square of the electric charge appearing in the force e^2/r^2 between two elementary charges separated by the distance r .

Elementary dimensional analysis shows that a force depending of the attenuation factor $1/r^2$ is proportional to $\hbar c/r^2$. So the elementary electric force writes:

$$F_{el} = e^2/r^2 = \hbar c/ar^2 \quad (2.7)$$

The simplest form of the Coulomb electric force between two elementary electric charges separated by a distance r is $e^2/r^2 = \hbar c/ar^2$, where $a \approx 137.035999074(44)$ is the precisely measured "electric parameter" (its inverse is generally known as the 'fine structure constant'). Now the gravitational force between a proton and an Hydrogen atom writes:

$$F_{ep} = Gm_p m_H/r^2 = \hbar c/Ar^2 \quad (2.8)$$

with the gravitational equivalent of $a = \hbar c/e^2$:

$$A = \hbar c / Gm_p m_H \quad (2.9)$$

so that the above redshift half-radius writes in function of the Compton electron radius $l_e = \hbar/m_e c$:

$$R/2 \approx Al_e \quad (2.10)$$

which is the symmetrical expression for the bare Bohr radius:

$$r_0 \approx al_e \quad (2.11)$$

Note that the first correct estimation of the atomic dimension was established three years before Bohr by Arthur Haas, simply by equalizing three expressions of energy, including the Planck energy form $E = hf$, and identifying the frequency $f = v/2\pi r$ with that of a circulating electron in the simplest model: this gives half the bare atomic radius : =

$$E = mv^2/2 = e^2/r = hf \quad (2.12)$$

The elimination of the electron speed v leads to the length $2\hbar^2/e^2m_e$ i.e. twice the above value.

It follows that, while it is not a-priori clear why the speed c does not enter the Bohr radius, this is mandatory for a cosmic radius. So *the cosmic calculation is simpler than the atomic one*, and this gives exactly half the redshift radius. So the above Haas equalisation was called the 'Coherence Principle', generalizing the Virial Theorem, and this leads directly to the calculation of the above factor 10/3 appearing between the total Universe energy and the matter energy. So the so-called dark energy problem is not a problem at all.

This would mean that dark matter is a special form of ordinary matter; the simplest explanation being it is vibrating in quadrature with ordinary matter-antimatter vibration.

Note that another elimination of c gives a length close to the above redshift radius. Indeed eliminating c between the Planck length $l_P = (G\hbar/c^3)^{1/2}$ and the classical electron radius $r_e = \hbar/m_Nc$, where $m_N = am_e$ is the Nambu mass, of central importance in particle physics (see below) this defines the half length $R'/2$:

$$R'/2 = r_e^3/l_P^2 = \hbar^2/Gm_N^3 \quad (2.13)$$

This value is greater than the above length $R/2$ by the factor:

$$R'/R = m_e m_p m_H/m_N^3 \approx 4/3 \quad (2.14)$$

revealing a quasi-holographic relation relating the lengths associated with the Universe Bekeinstein-Hawking entropy of a R -radius black hole:

$$\pi(R/l_P)^2 = \pi(R/l_r_e)^3 (R'/2R) \approx (2\pi/3) (R/l_r_e)^3 \quad (2.15)$$

This corresponds to half the redshift sphere volume/. By introducing the length l such that

$$l^3 = l_P^2 R^3 / 3r_e^3 \approx R^2 r_e / 2 \quad (2.16)$$

This introduces a double full-sphere holographic system:

$$\pi(r/l_P)^2 = (4\pi/3) (R/l_r_e)^3 \quad (2.17)$$

$$\pi(R/l)^2 \approx 2\pi R/l \quad (2.18)$$

This length is l corresponds to a light time of 9684.17 s, too close to the Kotov period of the non-Doppler oscillations (called the 'coherent period') $t_c \approx 9600.61$ s, observed in several quasars. Such a phenomena is such a rupture to traditional physics that it is not taken seriously by ordinary

physicists. But in the real of a coherent cosmology, as said above, speeds far greater than c are needed. So, such a phenomena was anticipated by the author, and, since the ratio to the electron time $1/c$ is of the order P , the mass ratio Planck-electron, it took only seconds to find the first part of the relation:

$$t_c/t_e \approx PF/\sqrt{pH} \approx \mu^2/a \quad (2.19)$$

with F the Fermi mass $573007.33 m_e$. defined to 0.25 ppm. The second part involves the muon-electron mass ratio $\mu \approx 206.76829$ (30 ppb). Thus a cosmic precise phenomena is directly associated with precise parameters of particle physics. At the epoch of this discovery, F was defined only in the 10 ppm range, so the relation permitted to anticipate correctly about a factor 40 in the determination of F . Now this parameter is precisely deduced from the muon lifetime T_μ by its relation with the muon period $t_\mu = \hbar/m_\mu c^2$:

$$T_\mu/t_\mu = (8\pi^2\sqrt{3})^2(F/\mu)^4/\pi \quad (2.20)$$

Now (19) implies

$$F/\mu = \mu\sqrt{pH}/a \quad (2.21)$$

so that (20) is independent of μ under the form:

$$T_\mu/t_\mu = (8\pi^2\sqrt{3})^2F^2pH/\pi a^2 \quad (2.22)$$

3. The Black Atom model

In the Black Atom model [3], [4], [7], the quantification of kinetic momentum leads to the following formula for the mean distance between proton and electron, With $l_e = \hbar/m_e c$ as unit length, the sums running between 2 and $N = \sqrt{(RR')}/l_e$, one gets, with the Euler constant $\gamma \approx 0.577215665$:

$$\Sigma(1/n)/\Sigma(1/n^2) = (\ln N + \gamma - 1)/(\pi^2/6 - 1) = 137.1145 \approx (1+1/p) \times 137.040(8) \quad (3.1)$$

This is precisely, in the 1% precision of R , the Bohr radius, which is $r_B = a(m_H/m_p)\hbar/m_e c$, taking into account the classical correction $1+1/p \approx H/p$. This formula interprets the rough estimation $a \approx \ln(a_G)$, which is central in the famous article of Carr and Rees [8], but destroys completely their 'anthropic' interpretation favoring the Multiverse.

4. The largest primes in Harmonic Numbers

Coming back to fundamental, 137 is the 33ième prime number. Now the distribution of prime numbers is tied to the zeta Riemann function, itself a generalisation of the harmonic series $\Sigma(1/n)$. Now, let us decline the maximal prime numbers emerging in numerators of these harmonic numbers:

3, 11, 5, 137, 7, 11, 761, 7129, 61, 863, 509, 919, 1117, 41233, 8431, 1138979, 39541, 7440427, 11167027, 18858053, 227, 583859, 467183, 312408463, 34395742267, 215087, 375035183, 4990290163,

$$17783, 2667653736673, 535919, 199539368321 \dots \quad (4.1)$$

Believe it or not, 137 appears as an arithmetic monster, not detected by our brilliant mathematicians during a century ! One reason for this is that at the epoch of the mathematical fundators, the number 137 was not revealed by physical measurements. And after 137 was finally revealed by physics, modern mathematicians generally do not care with the special numbers appearing in physics.

In fact, the above series is described in the 'on-line encyclopedia of integer sequences' under the following complicated definition: 'largest prime factor of Stirling numbers of first kind $s(n,2)$ ', unstead of the simple one 'largest prime factor in the numerator of harmonic series'. Note, that considering the numerators of the harmonic numbers, without simplification, 4 is the only composite number (no prime) which does not divides this numerator : $1 + 1/2 + 1/3 + 1/4 = 50/24$, and $50/4$ is half integer, with strange properties (see below). Note that $n = 5$ is the smallest odd number for which $s(n,2) = 2 \times 137$ is greater than $s(n,3) = (3 \times 5)^2$, with a difference of 7^2 . This indicates a special property of 137:

$$2 \times 137 = 15^2 + 7^2 \quad (4.2)$$

In fact, $n = 6$ is the smallest number for which $s(n,2) = (6 \times 7)^2$ is greater than $s(n,3) = 2 \times 28 \times 29$, with a difference of 140. For the next value $n = 7$, the difference is negative : - 64. This strange particularity, which singularizes the first Stiling Numbers seems to have been unnoticed by mathematicians.

To resume, the 5th harmonic number exhibits 137:

$$1 + 1/2 + 1/3 + 1/4 + 1/5 = 137/60 \quad (4.3)$$

Now 137 is also a 'central polygonal number', i.e. of the type $x(x+1)/2 + 1$, with $x = 16$ for 137. This means that cutting a cake in 16 strikes give a maximal of 137 parts. In turn, 16 is the number of parts for 5 strikes. Let us write this:

$$137 = C(16) = C(C(5)) \quad (4.4)$$

while

$$C(60) = 1831 \quad (4.5)$$

and one observes:

$$\sqrt{(C^2(60) + C^2(16))} = \sqrt{(1831^2 + 137^2)} \approx 6\pi^5 \quad (4.6)$$

which is, to 43 ppb, the famous above Lenz approximation of the proton-electron mass ratio.

5. The number 11 of superstring dimensions

The number 11 appears two times in the above harmonic series, so it appears also as a monster, and, moreover, it is both the number of dimensions in the superstring theory and $11 = C(4) = C(C(C(1)))$. So the question: is there a relation tying 11 and 137 ? Indee, the above relation writes :

$$137 = ((11+4)^2 + (11-4)^2) / 2 = 11^2 + 4^2 \quad (5.1)$$

So 137 have the *triple property*, tied to $x = 4$ and $y = x+1 = 5$:

$$\begin{aligned}
137 &= 1 + x^2(x^2+1)/2 = x^2 + (x(x+1)/2 + 1)^2 \\
&= 1 + (1 + y(y+1)/2)(2 + y(y+1)/2)/2
\end{aligned}
\tag{5.2;3;4}$$

the two first relations reduce in

$$(x-4)(x+1)^2 = 0 \tag{5.5}$$

showing $x = 4$ is the only positive solution. So 11 (superstring dimension number) and 4 (usual dimension number) are tied together, through 137, which can be considered a number of dimensions in Eddington's Theory. Moreover their ratio $11/4$ is, in the standard cosmic statistical theory, the ratio of the temperatures of the background fields (photons / neutrinos). It seems that Nature uses it as an approximation of the optimal base 'e'. Indeed, with $d \approx 1.001159652$, the abnormal electron magnetic moment coefficient, and $a_F \approx 573007.4$ the Fermi-electron mass ratio :

$$11/4 \approx e d^{10} \approx \sqrt{(6a_F)/alna} \tag{5.6}$$

Now $C(11) = 67$, which is related to 137 and the other monster '61' in the above 'harmonic series':

$$2 \times 67 + 3 = 137 \tag{5.7}$$

$$67 = 61 + 6 \tag{5.8}$$

Where 6 is the first perfect number. Note also that the mass of the scalar boson, by respect to the electron one, is closed to,

$$\sqrt{s} \approx \sqrt{(134 p)} \approx 496 \approx a_F/a_s a \tag{5.9}$$

with a_F the above Fermi ratio and a_s the inverse of the strong interaction constant $a_s \approx 1/0.1184(7)$: where $496 = 2^4 (2^5 - 1)$ is the third perfect number, tied to the Mersenne prime $31 = 2^5 - 1$. Now, the number 496 is a very important number in superstring theory. In 1984, Michael Green and John Schwarz realized that one of the necessary conditions for a superstring theory to make sense is that the dimension of the gauge group of type 1 string theory must be 496. The group is therefore $SO(32)$. Their discovery started the first superstring revolution. This would confirm the central importance of the scalar boson (or Brout-Englert-Higgs). *But the present work shows it is a strong argument against the Multiverse.*

6. The Harmonic series and Egyptians

Note that Egyptians used only entire fractions of unity, so they probably was aware of the above singular property of 137, tied to the harmonic series. Indeed, the Hypostyle Room in the Amon Temple of Karnak shows 134 huge columns placed between *the second and the third pillars* of the Amon Temple. On each side of the main axis (called 'divine') there are 61 columns + 6 huge ones, which is precisely the above relation (16). The 61 colums are separated by a 'royal axis' into 28 and 33 ones

$$61 = 33 + 28 \tag{6.1}$$

Now 137 is the 33th prime number, while 28 is, after 6, the second perfect number (equal to the sum of its divisors, including 1).

Note that on each side, in the row of 6 huge columns, the extremal one is partly inserted in the wall, as if the architech has tried to represent the root of 137, which is very close to $11+1/\sqrt{2}$. In fact

the approximation is better for \sqrt{a} :

$$\sqrt{a} \approx 11 + 1/\sqrt{2} \quad (6.2)$$

Note that the 61 columns show a square of seven ones, with the separation $61 = 7^2 + 2 \times 6$, showing that 7 is a privileged number. Indeed:

$$2 \times 67 = 134 = 7 + 127 \quad (6.3)$$

where 127 is the Mersenne number of order 7. And 7 itself is the one of order 3. This is known as the Catalan sequence. So the sum of this Series (known as the Combinatorial Hierarchy [4]) gives 137, indeed, from $3 = M(2)$:

$$137 = 3 + M(3) + M(M(3)) \quad (6.4)$$

The following term is $M(M(M(3))) = 2^{127} - 1$, which is known to be also a prime, is about half the Hubble radius, by using the electron wavelength $l_e = \hbar/m_e c$ as unit, to 0.6%:

$$(2^{127} - 1) l_e \approx 13.9 \text{ Glyr} / 2 \quad (6.5)$$

One may consider that Egyptians have devined that this term was of cosmic significance, because the story tells that the pharaon was accustomed to meditate at the center (the common point of the divine and royal axis) of this Hypostyle room [4].

Note that 3 and $7 = M(3)$ which are considered as magic numbers in all epochs, appear in the above prime number series, and moreover, 7 is the numbers of parts in a 3 strikes maximal cut. So they form a very particular duality, and their sum is historically known as the 'tetractis':

$$3 + 7 = 1 + 2 + 3 + 4 = 10 \quad (6.6)$$

By symmetry one must consider the sum completd by the 5 and 11,

$$3+5+7+11 = 26 = 10 + 16 \quad (6.7)$$

to get 26, the dimension number of the bosonic string theory.

One cannot escape the conclusion that the ancian egyptians have a predilection for perfect numbers 6 and 28, and they managed to make a correspondance with 137 and its ordinal number 33, containing the 11, with also the liaison to the Catalan Sequence. This is also called the Combinatorial Hierarchy, but for the later, the following term $2^{127} - 1$ is the *ending* one. Note that the Ptolemaic approximation for π contains also the fifth harmonic number $137/60$:

$$\pi \approx 377/120 = 2 + 137/120 \quad (6.8)$$

Let us recall that, among non-resolved mathematical problems is that of the fractional development of π : 3,7,15,1,292.6346, this last 'monstruous' term being $n/2\pi$ within 4 ppm imprecision, where $n \approx 1838.6836$ is the neutron-electron mass ratio.

7. The Bible and 137

From the above observations, the author proposed long ago that the number 137 would be known by ancient civilisations. Indeed, according to the Bible, while Jesus lived 33 years (137 is the 33th prime), the two sons of Abraham lived for 137 and 180 years, relating 137 with 60. Now 180 is very close to $(n/a)^2$, and:

$$180 = 5 \times 6^2 \quad (7.1)$$

corresponding to one quark $u = 5$ and two quarks $v = 6$. In this numerical hypothesis [5], the proton would corresponds to $6 \times 5^2 = 150$. Indeed , to 0.4 ppm:

$$(6 \times 5^2)^{3/2} \approx 6\pi^5 + 1 \quad (7.2)$$

where $6\pi^5$ is the above famous Lenz approximation for p , the proton-electron mass ratio. Eliminating it with n gives:

$$a^2 \approx 6 \times 5^5 \quad (7.3)$$

which has the same form that $p \approx 6\pi^5$, showing a geometrical interpretation: the product of the volume of a cube by its surface. For p it is a cube of side π , and for a^2 it is a cube of side 5. Considering a cube of side p , one observes :

$$6p^5 \approx a^8 \quad (7.4)$$

This means $6^{2/5}\pi^5 \approx 5^4$, or $p \approx 6\pi^5 \approx 6^{3/5}5^4$, which is also very close to $6^4\sqrt{2}$, see below.

8. The Musical Numbers and 137

The fact that the harmonic number 137/60 contains 60, which is an historical multidivisible number (the Babylone basis), could provoke the apparition of 137 in musical numbers. It is really the case : the 137th comma (about the 9th root of the tone 9/8) is close to 6. More precisely, the third optimal scale (the indian one) contains 53 = 9×6 - 1 equal parts in the octave 2 and 84 in the interval 3, so that 137 is tied to the perfect number 6:

$$2^{1/53} \approx 3^{1/84} \approx 6^{1/137} \quad (8.1)$$

From J. Jeans [7], the optimal musical scales are, apart the primitive chinese of 5 notes:

n° 1: 12 notes: occidental scale

n° 2: 41 notes: Systema scale

n° 3: 53 notes: hinduist scale

n° 4: 306 notes: ' π^5 ' scale

n° 5: 665 notes: 'extra-ordinary' scale (not mentioned in Jean's book)

The scale n°3 was emphasised by Thiebault Moulin, leader of the Systema group. What is remarkable is that the conjunction $3^{41} \approx 2^{65}$ writtes in the symmetric way:

$$(3^3)^{(3^3)} \approx (4/3) 2^{(2^7)} \quad (8.2)$$

these two large numbers approaches R'/l_e (to 0.03%) and R/l_e (to 0.6%), involving the two principal cosmical radiuses: R being the normal redshift radius, while R' is the radius of the holographic sphere representing the Grandcosmos behind [7].

The scale $n^\circ 4$ is with $306 \approx \pi^5 \approx p/6$ notes. This writes $2^{1/306} \approx 3^{1/485}$, or $2^{485} \approx 3^{306} \approx a^{a/2}$. So

$$3^{p/3} \approx a^a \quad (8.3)$$

Replacing 3 by the optimal base e , with $d \approx 1.001159652$ the abnormal electron magnetic moment:

$$e^{1836/d\sqrt{d}} \approx a^a \quad (8.4)$$

Note that the definition of the optimal base e is the value for which $x^{1/x}$ is maximal. So the above formula have clearly an informative signification. Now the number $1836/d\sqrt{d}$ shows a double remarkable singularity :

$$1836/d\sqrt{d} \approx e^2 (2\pi)^3 \approx 6^4 \sqrt{2} \quad (8.5)$$

The two last expressions show a deviation close to $p/6\pi^5$, so:

$$p \approx e^2 \pi^8 / 3^3 \sqrt{2} \quad (8.6)$$

precise to 0.8 ppm, and the following remarkable relation shows symmetry between \prec and its biblic value 3. :

$$(\pi^2/2)^3 \approx (3^2/e)^4 \approx 5 ! \quad (8.7)$$

The large number associated to the above 'extraordinary $n^\circ 5$ musical scale' shows an overwhelming relation with $\mu \approx 206.7683$ the muon mass (with electron mass as unity), f the Fermi mass, and Z , W the weak boson masses [5]:

$$3^{665} \approx \mu^a \approx a^{exp(5)} \approx p^{Z/p} \approx W^{2f/137^2} \quad (8.8)$$

Curiously, the triangular number 666 is mentioned in the Bible as a 'demoniac number'. Note the relations, with H the Hydrogene-electron mass ratio:

$$p/\sqrt{(H6\pi^5)} \approx 137/a \quad (8.9)$$

$$(R'/R)^{3/2} = (pH/a^3)^{3/2} \approx (3H/2p)(6\pi^5/p)^{1/3} \quad (8.10)$$

precise *both* in the ppb range. This means p , $6\pi^5$, H , 137 and a are tied in the ppb range (10^{-9}). Now, H is eliminated in (8.10) leading to:

$$p^6/(6\pi^5)^{5/3} \approx A(3 \times 137^2/2) \quad (8.11)$$

with

$$A \approx 3a^{7/2} \quad (8.12)$$

Coming back to the very origin of quantum mechanics, it was assumed that the electron in the Hydrogen atom do not radiate power. The latter would be precisely

$$P_H = (m_e c^2)^2 / (A \hbar) \quad (8.13)$$

So, it seems significative that this canonic number A enters Eq. (40) in the ppb range (10^{-9}). The relation (8.11) will be used in Section 14 to confirm the G value proposed in Section 13.

9. The Golden Number ϕ and 137

137 and 60 are also related by:

$$1+1/2+1/3+1/4+1/5 = 137/60 \approx \phi^4 / 3 \quad (9.1)$$

It follows that the generalised Fibonacci series, beginning by 1, 4, is very particular, containing both 60, 127 and 137 :

$$1, 4, 5, 9, 14, 23, 37, 60, 97, 157, 2 \times 127, 3 \times 137, 665 \dots \quad (9.2)$$

which contains also the remarquable above number

$$665 = 666 - 1 = 36 \times 37 / 2 - 1 \quad (9.3)$$

All this cannot be due to chance. This milits for the unicity of the Universe, a strong argument against this scientific deviation, called the Multiverse.

Also

$$a \approx \phi^{(a^2 / (1836 + 1/\phi))} \quad (9.4)$$

precise to 2 ppm, while $1836 + 1/\phi \approx 6\pi^5 + 1/2$, to 41 ppb.

10. The Ratio $a/137$

The Ratio $a/137$ shows overwhelming properties. First of all, it is a characteristics part of the indian comma $2^{1/53}$, in the following ppb formula:

$$a/137 \approx 2^{9/7.64.53} \quad (10.1)$$

Secondly, the number of dimension $\mathbf{N} = 196883$ of the 'monster' in group theory seems to appear in the expression of P , the ratio between the Planck and electron masses:

$$1.22 P \approx (a/137)^{\mathbf{N}} \quad (10.2)$$

Analysis of deviation, using $P/p \approx 2^{127/2}$ leads to:

$$\sqrt{\pi} (a/137)^{\mathbf{N}} / a^3 \approx 2^{65} / 1836 \approx 5^{28} / p_{hol} \quad (10.3)$$

exhibiting the above Systema Scale, where $p_{hol} \approx 1853.8563$ is the holographic value for the proton-electron mass ratio, defined by :

$$(4\pi/3) (r_B/l_e)^3 \approx \pi p_{hol}^2 \quad (10.4)$$

where the ratio of the Bohr radius to the reduced Compton electron radius is $r_B/l_e = a(1+1/p) \approx H/p$.

The proof that this is no chance is revealed in the dramatic, with F the Fermi mass ratio $573007.3 \approx \mathbf{N}\sqrt{a}/4$:

$$a/137 \approx 3^{a/F} \approx a^{1/a^2} \approx \varphi^{1/p} \quad (10.5)$$

confirming that 3 is a principal basis of a computing Nature.

11. Cosmical confirmations

But by far the most decisive relation is the Grandcosmos volume formula, where the Grandcosmos is defined [3], [8] by the simplest holographic extension of the Bekeinstein entropy of the sphere with Hubble-Nambu radius R' , where $R'/2$ is defined by the elimination of c between two main formula, the electron classical radius and the Planck length.

$$V / r_0^3 \approx a^a / \pi \approx (1/\ln 2)^{1836.5} \quad (11.1)$$

with the bare Bohr radius r_0 as length unit [8]. The dramatic term $\ln 2$ is the classical unit of Shannon information. This militates once more for a Cosmos driven by an "Information Great Theory".

With P , p , H the Planck, proton and Hydrogen masses, with $m_e = 1$, which are related to the Universe mass M by [2]:

$$P^4 = MpH \quad (11.2)$$

the sphere of radius R' is characterised also by its relation with the Wien wavelength l_{wi} of the Cosmic Microwave Background :

$$4\pi(R'/l_{wi})^2 \approx e^a \approx 4\pi(2PpH)^2 \quad (11.3)$$

This holographic formula suggests that the CMB bears a decisive information, contrary to the information loss principle of thermal radiation. This confirms that the Grandcosmos, piloted by R' , whose thermal radiation identifies with the CMB (not the trace of any Primordial Big Bang as is believed generally), is an holographic computer preserving information [8].

12. Relations deduced from the Lyuty-Kotov and Wolf solar periods

The Lyuty-Kotov period of Coherent Oscillations $t_{cc} \approx 9600.6$ s, observed in several quasars without any Doppler effect, apart stable dephasages, *must* be an essential cosmic period. Now the solar Wolf period ($t_{wf} \approx 11$ years) shows overwhelming connections with t_{cc} , $T = R/c$, and the Bohr time $t_B = r_B/c$:

$$t_{wf} \approx (t_{cc}^2 T)^{1/3} \approx (t_B T^3)^{1/4} \quad (12.1)$$

Eliminating t_{wf} , the study of deviation leads to the remarkable relation:

$$(T/t_{cc})^5 \approx \pi^{1/2} \pi (t_{cc}/t_B)^3 \approx \pi^{a+1/\pi} \approx (1/2)(3/\sqrt{2})^{2 \times 3 \times 5 \times 7} \quad (12.2)$$

Now there is a dramatic connexion implying 136, the original Eddington's value, and the minor third 6/5:

$$\pi^{1/2} \pi \approx (a - 136)^5 \approx e^{5^2/a} \approx 6/5 \approx 3^{1/6} \quad (12.3)$$

leading to the discovery:

$$3^{1/150} \approx 137.036/136.036 \quad (12.4)$$

showing a new musical property of a , clearly distinct from 137.

13. Predictions for G , a_F and a_s

The coherent period t_{cc} was identified [3] in a formula eliminating c between the gravitational and the weak interaction constants. With the Planck time $t_p = \sqrt{(G\hbar/c^5)}$ and $t_e = \hbar/mc^2$, the above electron time, a further identification was made, with the well measured (30 ppb) muon ratio $\mu \approx 206.76829$:

$$X = t_{cc} t_p / t_e^2 \approx F / \sqrt{(pH)} \approx \mu^2 / a \quad (13.1)$$

So, the value

$$F \approx 573007.3857 \text{ (60 ppb)} \quad (13.2)$$

was predicted years before its recent precise measurement from 9 ppm to to 250 ppb: 573007.33. This permitted also to propose a value for G :

$$G \approx 6.6754635 \times 10^{-11} \text{ kg}^{-1} \text{ m}^3 \text{ s}^{-2} \quad (13.3)$$

at 2σ from the tabulated value, which is subject to serious objections. This value for G is consolidated by the following observation, implying the radius $R = cT$, with $T = 2t_e P^2 / pH \approx 13.812 \text{ Gyr}$ of the Hubble (or redshift sphere) [3] [4]:

$$(4\pi/3) (R/ct_e)^3 \approx 2 \pi^H / e^p \approx 2\pi (\pi/e)^p \quad (13.4)$$

where the proton-electron mass ratio p appears to 0.5 ppm (with the official G value, this is about 3.5 ppm). This seems to imply that both the optimal mathematical basis e and the geometrical one π are used in a computing Cosmos. Now H is related to X by an holographic relation $H \approx X^3/9$. With $d \approx 1.001159652$, the electron abnormal magnetic coefficient, study of deviation leads to the highly symmetric relation:

$$X^3 \approx 9pnH/6\pi^5 d \approx 2\pi F \quad (13.5)$$

in the 100 ppb range. This permits to predict the value for f , only known presently to 2% :

$$f \approx 8.43450353 \approx 1/0.118560624 \quad (13.6)$$

with a direct relation with the muon-electron mass ratio:

$$a_s \approx \mu^{2/5} \quad (13.7)$$

at 0.03%. These predictions, if confirmed, would be a supplementary argument for the existence of a Great Theory unifying gravitation and standard particle model, refuting the Multiverse Hypothesis.

14. Dramatic confirmation of the prediction for G .

Coming back to the ppb relation (8.11) :

$$p^6 (p/(6\pi^5))^{5/3} \approx (3/2)^2 137^2 a^7 \quad (8.11-14.1)$$

The dramatic third root of $6\pi^5$ calls for an elevation to high power of a , which is consistent with the hypothesis it is a valuation basis and producing large numbers. Adding the gravitational large number $P = m_p/m_e$ (with the above selected value for G), in the search for correlation, between $3/2$, a , 137 , p , P and $(6\pi^5)^{1/3}$, the computer shows, in less than the ppm domain :

$$a^6 p^5 (p/(6\pi^5))^{4/3} \approx P(3/2)^2 137^3 \quad (14.2)$$

permitting an elimination of the numerical factor $3/2$ in :

$$a^{13} \approx 137 P p (p/(6\pi^5))^{1/3} \quad (14.3)$$

Introducing the number $B = a^7/137$, this means a special relation involving the large numbers P , B , a^6 , with p and $6\pi^5$:

$$P^3 p^4 \approx (6\pi^5)(Ba^6)^3 \quad (14.4)$$

Adding the mass ratio Hydrogen H and n , by respect to the electron mass, a new relation appears, eliminating B and $6\pi^5$:

$$Pn \approx (H/p)^3 (a^6)^2 \quad (14.4)$$

Introducing the Superspeed ratio $D = C/c = R_{GC}/R = P^3 p H/a^6$, this means :

$$p \approx B^5/D \quad (14.5)$$

$$n \approx (PH/B)^5/D \quad (14.6)$$

Note that the delicate balance permitting to stable stars to exist is (Davies, The Accidental Universe, p. 73), is of the holographic form :

$$A \approx (P/p)^2 \approx a^{12} p^{4/3} \quad (14.7)$$

Taking account of the other holographic relation [4]: $3P \approx H^7$, the above relation (14.7) corresponds to Eq. (14.4).

15. Canonic large number

Note that the above value for G corresponds to a set up of the Cambridge relation (Sanchez 1995) :

$$P^2(n/H) \approx (3/\sqrt{2})^{137.03595} \quad (15.1)$$

$$R/l_e \approx p^{139.35} \quad (15.2)$$

Now, considering the simplest economic large number, constructed from the optimal basis e , it shows singular properties:

$$u = \sqrt{(e^{(e^e)})} \quad (15.3)$$

$$2^{(2^7)} \approx u^{\sqrt{137.107}} \quad (15.4)$$

$$e^{((2^{(26/4))})/6} \approx u^{\sqrt{137.0923}} \quad (15.5)$$

$$(2\pi^2 a^3)^5 \approx u^{\sqrt{137.0885}} \quad (15.6)$$

$$(3^3)^{(3^3)} \approx (4/3) u^{\sqrt{137.0367}} \quad (15.7)$$

$$R'/l_e' = P^2 p/a^3 H \approx (4/3) u^{\sqrt{137.035993}} \quad (15.8)$$

with the corrected electron wavelength $(4/3)$: $l_e' = l_e/(1+1/p)$, the last one gives a within 44 ppb. It is remarkable that the best precise relation involves the cosmic radius R' . Considering the simplest economic large number of order 4, it shows singular properties:

$$(e^{(e^{(e^e)})})^{1/4} \approx (Pn/H)^{136.0354} \quad (15.9)$$

$$e^{(e^{(e^e)})} \approx a^{(\sqrt{Z}(p-1))} \approx a^{(\sqrt{W}e^{(e^e)})} \approx a^a a^2 e^e \quad (15.10)$$

clearly showing that a is calculation basis, from which one deduces, with $p_G \approx P/2^{127/2}$:

$$Z/W \approx e^{(e^e)}/p_G 6\pi^5 \quad (15.11)$$

p_G appears in the dramatic double relation:

$$p_G^{3/2} F \approx aZ \sqrt{(pH)} \approx P/Wn^2 \quad (15.12)$$

permitting to predict the following values $Z \approx 178451.209$ and $W \approx 157334.3376$.

16. A Synthetic Formula for a

A first estimation was given about 2000, by recognizing that a is related to the factor appearing in the black body formula e^g with $g = 5(1 - e^{-g}) \approx 4.965114232$, the reduced Wien coefficient :

$$a \approx e^g - 2\pi \quad (16.1)$$

So, it was looked for a trigonometric formula, leading to the discovery of the 65 ppb formula :

$$a \approx 44\pi - \cos(1/e) \quad (16.2)$$

This formula was given on a personal website, and reproduced by many, but without the indication of the discoverer.

A systematic study, driven by the proximity of the electron abnormal magnetic moment with $1 + 1/2\pi a$ and the singular mathematical forms: $i = e^{i\pi/2}$, $\ln i = i\pi/2$, and $i^{-\ln i} = \exp(\pi^2/4)$, leads to the discovery of the formula, presented in Detember 2001 at the French Academy:

$$a = u - 1/2\pi u \quad u = i^{-\ln i} \sqrt{a - 1} \quad (16.3)$$

$$a \approx 137.035999548200160$$

Such an elegant formula (the form $u - 1/2\pi u$ is a classical variable change) is too good an approach (3.4×10^{-9}) from the experimental value $137.035999074(44)$ to be fortuite. The point that can be modified is the precise value for π : indeed a physical Cosmos cannot use the mathematical value, which is a non-physical idealisation (the classical hypotheis of continuity is excluderd in a quantum Cosmos [3], [8])

17. A dramatic relation between a and p

From the observation, implying again R , R' and the scalar boson ratio s :

$$\ln p / \ln a \approx 2R/R' \approx \sqrt{(a_F/s)} \approx 2a^3/p^2 \quad (17.1)$$

one deduces:

$$(a^2)^{\wedge}(a^3) \approx p^{\wedge}(p^2) \approx P^{2s} \quad (17.2)$$

which shows an overwhelming combination property: on the left hand, in a cube of side a , the combinaison of face area, using its volume as a calculation basis. On the right side, in a square of side p , the combinaison, of a side, using the area as calculation basis. This is an additive argument against the general Multiverse hypothesis, for which a and p are only random parameters.

Also, considering the 'economic large number' $N_e = e^{\wedge}(e^{\wedge}e)$, one observes

:

$$N_e = e^{\wedge}(e^{\wedge}e) \approx \ln p^{\wedge} \ln p \approx (p/H) e^{\wedge}(N_e / a \sqrt{pH}) \quad (17.3)$$

within 0.4% and 1.3×10^{-5} , where $H = p+1$, about the Hydrogen-electron mass ratio.

18. Conclusion: a refutation of the standard cosmology and the Multiverse Hypothesis

Such a series of remarkable mathematical properties cannot be due to chance. This confirms the Eddington approach and the Large Number Hypothesis of Dirac, but the latter was wrong in trying to save the Primordial Big Bang hypothesis by assuming a variation of G .

The present work means that a very special part of mathematics have been oversseen, probably tied with the superstring theory

This is a clear refutation of :

Primordial Big Bang hypothesis

Every variation of physical parameters

Role of any Anthropic Principle in Cosmology

Any concept of Multiverse

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