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 canonic numbers of the string and superstring theories including overwhelming relations with musical canonic numbers. The liaison with the harmonic series is so tight that it seems that Egyptians was aware of them, as the architecture of the Hypostyle Karnak room reveals. The direct liaison between the mean value of two Universe radiuses and the Bohr radius through the simplest harmonic series excludes any role of chance. It is concluded that the Cosmos is a finite computer using 137 and its extension 137.036 as calculation basis.

1. 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). These in effect 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 [2])

$$N_H = (3/10)\, Rc^2/Gm_H \quad => \quad R = 13.8 \text{ Glyr} \tag{1}$$

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 Eddingon presented it, with $l_H = \hbar/m_H c$:

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

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 deduces the above formula exhibiting the electron-proton symmetry, which was 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 by Hubble et Humason).

2. Eddington and 137

Eddington has demonstrated [1] that, in reduced units, the square of electric charge must be 137. When it was precisely measured, it turned to be 137.036, and Eddington approach was rejected. This rejection is not conform with the traditional 'approach' method of physics. Indeed , there is a dircet relation bvetween these numbers:

$$137^2 + \pi^2 \approx 137.036^2 \qquad (3)$$

So, it is worth asking mathematician 'does 137 appear special 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

Multiverse Solution : Such an electrical constant is a random number, characterising a Universe among a multitude : it is the Multivers hypothesis. So the number is a completely 'free' number, and there is no need to look for any special mathematical properties.

Universe Solution : 137 has special properties belonging to a part of mathematics undechifred by present mathematicians.

We show here that the second way seems the right way

3. The largest primes in Harmonic Numbers

Indeed, 137 is the 33ième prime number. Now the distribution of prime numbers is tied to the zéta Riemann function, itself a generalisation of the harmonic series $\Sigma(1/n)$. Now, let us decline the 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... (4)

Believe it or not, *137 appears as an arithmetic monster, not detected by our brillant 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 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'. But this identification was not published**.**

4. 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 the number of dimensions in the superstring theory. So the question: is there a relation tying 11 and 137 ? Indeed :

$$11^2 + 4^2 = 137 \qquad (5)$$

Moreover 11 and 137 have a common geometrical property: they are each of the type $x(x+1)/2+1$, with $x = 4$ for 11, and $x = 16$ for 137. This means that cutting a cake in 4 strikes give a maximal of 11 parts, and the same for a 16 cuts would give a maximal of 137. Now 16 is the result of 5 strikes, so 137 have the *triple property*, tied to $x = 4$ and $y = x+1 = 5$:

$$\begin{aligned} 137 &= 1+ x^2(x^2+1)/2 = x^2 + (x(x+1)/2 +1)^2 \\ &= 1+ (1+ y(y+1)/2)(2+ y(y+1)/2)/2 \end{aligned} \qquad (6\text{-}8)$$

the two first relations reduce in

$$(x-4)\,(x+1)^2 = 0 \tag{9}$$

showing x = 4 is the only positive solution. So 11 (superstring dimension number) and 4 (normal 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 backgroud 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, and $a_F \approx 573007.4$ the Fermi-electron mass ratio :

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

There is more to say about the cutting process: 11 is the result of 4, and 4 is the result of 2 and 2 the result of 1. Now what is the next term, the cutting by 11 strikes ? : it is 67, which is related to 137 and the other monster '61' in the above 'harmonic series':

$$2 \times 67 + 3 = 137 \tag{11}$$

$$67 = 61 + 6 \tag{12}$$

Where 6 is the fist perfect number. Note also that the mass of the scalar boson, by respect to the electron one, is closed to, with f the Fermi ratio and as the inverse of the strong interaction constant $a_s \approx 1/0.1184(7)$

$$\sqrt{s} \approx \sqrt{(134\,p)} \approx 496 \approx a_F/a_s a \tag{13}$$

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.*

5. The Harmonic series and Egyptians

Now 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 Karnak shows 134 huge columns placed between *the second and the third pillars* of the Amon Temple. On each side of the main axis there are 61 columns + 6 huge ones. The 61 colums are separated by a 'royal axis' into 28 and 33 ones

$$61 = 33 + 28 \tag{14}$$

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 $\sqrt{a}$:

$$\sqrt{a} \approx 11+1/\sqrt{2} \tag{15}$$

Note that the 61 columns show a square of seven ones, with the separation $61 = 7^2 + 2 \times 6$. Now

$$2 \times 67 = 134 = 7 + 127 \tag{16}$$

where 127 is the Mersenne number or order 7. And 7 itself is the one of order 3. So the sum of the Series (kown as the Combitational Hierarchy CH) gives 137, from 3 = M(2):

$$137 = 3 + M(3) + M(M(3)) \tag{17}$$

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%.:

$$(2^{127} - 1)\, l_e \approx 13.9 \text{ Glyr} / 2 \tag{18}$$

One may consider that Egyptians have devined that this term (which is the ending one in the CH) was of cosmic significance, because the story tells that the pharaon was acustomed to meditate at the center of this Hypostyle room [4].
Note that 3 and 7 = M(3) which are considered as magic numbers in all times, 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 histotically known as the 'tetractis':

$$3 + 7 = 1 + 2 + 3 + 4 = 10 \tag{19}$$

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

$$3+5+7+11 = 26 = 10 + 16 \tag{20}$$

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 contains also the fith harmonic number 137/60:

$$\pi \approx 377/120 = 2 + 137/120 \tag{21}$$

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 4×10^{-9} imprecision, where $n \approx 1838.6836$ is the mass ratio neutron-electron.

6. The Bible and 137

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

$$180 = 5 \times 6^2 \tag{22}$$

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

$$(6 \times 5^2)^{3/2} \approx 6\pi^5 + 1 \tag{23}$$

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

$$a^2 \approx 6 \times 5^5 \tag{24}$$

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 $\prec$, and for a^2 it is a cube of side 5. Considering a cube of side p, one observes :

$$6p^5 \approx a^8 \tag{25}$$

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

7. The Musical Numbers and 137

The fact that

$$1+1/2+1/3+1/4+1/5 = 137/60 \tag{26}$$

where 60 is an historical multidivisible number (the Babylone basis), could provoke the apparition of 137 in musical numbers. It is really the case : the 137^{th} comma (the 9^{th} root of the tone 9/8) is close to 6. More precisely, the third optimal scale (the indian one) contains $53 = 9\times6 - 1$ equal parts in the octave 2 and 84 in the interval 3, so that

$$2^{1/53} \approx 3^{1/84} \approx 6^{1/137} \tag{27}$$

From J. Jeans [6], 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: 'pi^5' scale

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

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

$$(3^3)\text{^}(3^3) \approx (4/3)2\text{^}128 \tag{28}$$

these two large numbers approches 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° 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

$$3^{p/3} \approx a^a \tag{29}$$

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

$$e^{1836/ed\sqrt{d}} \approx a^a \tag{30}$$

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 :

$$1836/d\sqrt{d} \approx e^2 (2\pi)^3 \approx 6^4\sqrt{2} \tag{31}$$

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

$$p \approx e^2\pi^8/3^3\sqrt{2} \tag{32}$$

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

$$(\pi^2/2)^3 \approx (3^2/e)^4 \approx 5\ ! \tag{33}$$

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

$$3^{665} \approx \mu^a \approx a^{exp(5)} \approx p^{Z/p} \approx W^{2f/137^2} \tag{34}$$

Curiously, the triangular number 666 is mentioned in the Bible as a 'demoniac number'. Note the relation, with H = p+1, the Hydrogène-elecyron mass ratio :

$$a/137 \approx \sqrt{(H6\pi^5)}/p \tag{35}$$

precise to 80 ppb.

8. The Golden Number φ and 137

137 and 60 are also related by:

$$1+1/2+1/3+1/4+1/5 = 137/60 \approx \varphi^4/3 \tag{36}$$

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

$$1, 4, 5, 9, 14, 23, 37, 60, 97, 157, 2\times 127, 3\times 137, 665 \ldots \tag{37}$$

which contains also the remarquable above number

$$665 = 666 - 1 = 36\times 37/2 - 1 \tag{38}$$

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

$$a \approx \varphi\hat{}(a^2/(6\pi^5+1/2)) \tag{39}$$

precise to 2 ppm.

9. Cosmical confirmations

But by far the most decisive relation is the Grandcosmos volume formula, with the bare Bohr radius r_0 as length unit [7] :

$$V / r_0^3 \approx a^a / \pi \tag{40}$$

where the Grandcosmos is defined [3] 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.

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

$$P^4 = MpH \tag{41}$$

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

$$4\pi(R'/l_{Wi})^2 \approx e^a \approx 4\pi(PpH)^2 \tag{42}$$

This holographic formula suggests that the CMB bears a decisive information, contrary to the information loss principle of thermical 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 [7].

10. Back to the Harmonic Series : the Black Atom model

In the Black Atom model, 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 $\gamma \approx 0.577215665$:

$$\Sigma(1/n)/\Sigma(1/n^2) = (\ln N + \gamma - 1)/(\pi^2/6 - 1) = 137.1145 \approx (1+1/p) \times 137.040(8) \tag{43}$$

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 $H/p \approx 1+1/p$. 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 in favor of the Multiverse.

11. 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 Wolff period ($t_{Wf} \approx 11$ years) shows overwhelming connections with t_{cc}, $T = R/c$, and *the Bohr time* $t_B = r_B/c$:

$$t_{Wf} \approx (t_{cc}^2 T)^{1/3} \approx (t_B T^3)^{1/4} \tag{44}$$

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

$$(T/t_{cc})^5 \approx \pi^{1/2\pi}(t_{cc}/t_B)^3 \approx \pi^{a+1/\pi} \approx (1/2)(3/\sqrt{2})^{2\times3\times5\times7} \tag{45}$$

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

$$\pi^{1/2\pi} \approx (a - 136)^5 \approx e^{5^2/a} \approx 6/5 \approx 3^{1/6} \quad (46)$$

leading to the discovery:

$$3^{1/150} \approx 137.036/136.036 \quad (47)$$

Showing a new musical property of *a*, distinct from 137.

12. A synthetic Formula for *a*

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 $i^{-lni} = \exp(\pi^2/4)$, leads to the discovery of the formula, presented in Detember 2001 at the French Academy:

$$a = u - 1/2\pi u \qquad u = i^{-lni}\sqrt{a - 1} \quad (48)$$

$$a = 137.035999548200160$$

Such an elegant formula is too good an approach (3.4×10^{-9}) for the experimental value 137.035999074(44) to be fortuite. The point that can be modified is the precise value for π since a physical cosmos cannot use the mathematical value, which is a non-physical idealisation.

13. A dramatic relation between *a* and *p*

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

$$\ln p/\ln a \approx 2R/R' \approx \sqrt{(a_F/s)} \approx 2a^3/p^2 \quad (49)$$

one deduces:

$$(a^2)\hat{}(a^3) \approx p\hat{}(p^2) \quad (50)$$

which shows an overwhelming combination property: on the left hand, in a cube of side *a,* the combinaison of a 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 a calculation basis. This is an additive argumednt against the general Multiverse hypothesis, for which *a* and *p* are only random parameters.

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

$$N_e = e\hat{}(e\hat{}e) \approx lnp\hat{}lnp \approx (p/H)e\hat{}(N_e/a\sqrt{(pH)}) \quad (51)$$

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

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