LOGICAL PHYSICS

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Abstract

The Quantization of the third Keper's Law leads as a special case to the Arthur Hass formulation of the Hydrogen radius, 3 years before Bohr. A simpler application leads to the Universe critical mass of the steady-state cosmology without any numerical parameter, and introduces the external Cosmos. The critical condition is identified with an holographic 2D-1D relation, breaking the Planck wall by the factor 10^{61} and specifying the external Cosmos. The gravitational part 3/10 of the critical mass is very close to the Eddington Number times the neutron mass, suggesting that black matter is matter-antimatter vibration in quadrature, and that the dark energy must be replaced by the 5th force of the steady-sate model. A special holographic relation involving the Lucas Number gives the cosmic temperature consistent with the measured value. The One-Electron Cosmology connects directly with the Kotov period, confirming the G value to 10^{-8}, compatible with the BIPM's one, but larger (1.7×10^{-4}) than the official value. Several relations show outstanding connections with the Number Theory. Newton could have guessed some of these points, especially the topological symmetry between G, c and $\hbar$.

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1 Quantization of the Kepler laws

Physics is supposed to be based on known mathematics, where a multiplication is the generalization of addition [12]. However, practice has shown since Newton that different physical quantities can be multiplied, but that their addition is not meaningful. There is a flagrant paradox here, which is blurred if we postulate that the ultimate equations of Physics concern ratios, like in the Kepler's 3rd law :

$$\left(\frac{T_n}{T_1}\right)^2 = \left(\frac{L_n}{L_1}\right)^3 , \tag{1}$$

where the first orbit of period T_1 and semi-major axis L_1 are not yet defined. Considered as the Diophantine equation $X^2 = Y^3$ where unknowns X and Y

are, by definition, natural numbers n, it has an immediate solution:

$$\begin{array}{l} T_n = n^3 T_1 \\ L_n = n^2 L_1 \end{array} \quad . \tag{2}$$

The invariant L_n^3/T_n^2 is homogeneous to Gm_G, where G is Newton's gravitational constant, and m_G is a mass. The term L_n^2/T_n is proportional to n, suggesting the existence of the quantum $\hbar$ for the orbital angular momentum. Indeed the Kepler's second law (historically the first) involves that the orbital angular momentum per unit mass $\tilde{h}$ is a constant. Thus we have

$$\begin{array}{l} \dfrac{L_n^3}{T_n^2} = Gm_G \\ \dfrac{L_n^2}{T_n} = n\dfrac{\hbar}{m_\hbar} \end{array} \quad . \tag{3}$$

With $V_n = L_n/T_n$, this implies the generalized Bohr relation $m_\hbar L_n V_n = n\hbar$, defining for $n = 1$ a generalized Bohr radius $L_1 = \hbar/m_\hbar V_1$.

From (3), any mass pair $(m_G, m_\hbar)$ is thus associated to a series of Keplerian orbits (L_n, T_n, V_n) checking the quantum laws

$$L_n = \frac{(L_n^2/T_n)^2}{L_n^3/T_n^2} = n^2 \frac{\hbar^2}{Gm_G m_\hbar^2} \quad , \tag{4}$$

$$V_n = \frac{L_n^3/T_n^2}{L_n^2/T_n} = \frac{Gm_G m_\hbar}{n\hbar} \quad , \tag{5}$$

$$T_n = \frac{L_n}{V_n} = n^3 \frac{\hbar^3}{G^2 m_G^2 m_\hbar^3} \quad . \tag{6}$$

If, for $n = 1$ we impose $V_1 = c$ and $m_\hbar = m_G$, we obtain from (5) that $m_\hbar$ or m_G is the Planck mass

$$m_P = \sqrt{\frac{\hbar c}{G}} \approx 2.176\,3\,10^{-8} \text{ kg} . \tag{7}$$

The simplicity of this relation results from the fact that ratio of the topological parts of G and $\hbar$ is homogeneous to a speed. Then, consistent length L_1 and time T_1 are respectively the Planck length $l_P = \hbar^2/(Gm_P^3) = 1.616\,3\,10^{-35}$ m and the Planck time $t_P = \hbar^3/(G^2 m_P^5) = 5.391\,5\,10^{-44}$ s, and (5) confirms $V_1 = c$ as the largest velocity, whereas (4) and (6) put forward l_P and t_P as lower physical boundaries.

2 Haas-Bohr electric radius versus Haas-Sanchez's gravitational radius

To the n orbit is associated the angular frequency $\omega_n = 2\pi/T_n = 2\pi V_n/L_n$, equivalently the Planck energy quatum $\hbar\omega_n = 2\pi V_n/L_n$

The coherence principles lead to equate Planck eneergy quantum $\hbar\omega$ The canonic Planck energy form $n\hbar V_n/L_n$ writes :

$$n\frac{\hbar V_n}{L_n} = m_\hbar V_n^2 = \frac{Gm_\hbar m_G}{L_n} \quad . \tag{8}$$

Now, Arthur Haas [6, 7, 8, 9] had based its calculation of the Hydrogen atom radius three years before Bohr, thus the total spectrum when n is larger than 1, according to a special case of the relations (8), where $m_\hbar$ is substituted with the electron mass m_e and the potential energy $Gm_\hbar m_G/L_n$ with the electric potential energy between two elementary electric charges, namely $\hbar c/(aL_n)$ with the electric parameter $a = 137.036$:

$$n\frac{\hbar V_n}{L_n} = m_e V_n^2 = \frac{\hbar c}{aL_n} \quad . \tag{9}$$

The identification of $Gm_e m_G/L_n$ with $\hbar c/(aL_n)$ yields $m_G = \hbar c/(aGm_e) = m_P^2/m_N$, where $m_N = am_e$ is the Nambu mass.

The first term of this double equality was put on by Haas by reference to the Planck's relation $E = nh\nu$. Thus, Hass used without calling it a Coherence Principle, essential in practical holography. In the hydrogen atom, the quantization of the angular momentum of the electron orbit is:

$$m_e L_n V_n = n\hbar \ . \tag{10}$$

For $n = 1$, one obtains the bare Hass-Bohr radius r_{HB}, while the corrected one (r_B) takes into account the effective mass :

$$\begin{aligned} r_{HB}/\lambda\!\!\!^{-}_e = L_1/\lambda\!\!\!^{-}_e &= \frac{a\hbar}{m_e c} \\ r_B/a\lambda\!\!\!^{-}_e = 1 + 1/p \ &\approx H/p \end{aligned} \tag{11}$$

where $\lambda\!\!\!^{-}_e = \hbar/(m_e c)$ is the Electron Compton wavelength.

This Coherence Principle (9) was extended to the gravitational Hydrogen molecule model : three-bodies orbiting on a circle of radius R (hydrogen atom, proton,electron). The latter bearing the kinetic energy, while the formers are tied by the gravitational energy: [13, p.391]:

$$n\frac{\hbar V_n}{L_n} = m_e V_n^2 = \frac{\hbar c}{a_G L_n} \quad . \tag{12}$$

So the electric coupling constant a is replaced by the gravitational coupling constant a_G which present a stunning numerical property: $a_G \approx 2^{127} - 1$ (0.5 %), the Lucas Large Prime Number, the most famous number of Arithmetics , which is also the last term of the Combinatorial Hierarchy, while the sum of the three first terms is 137, the Eddington's evaluation for a.

So, with the reduced electron wavelength there is a symmetry between the electric Hydrogen atom and the gravitational Hydrogen molecule :

$$a_G = \frac{\hbar c}{Gm_H m_p} = \frac{m_P^2}{m_H m_p} \quad . \tag{13}$$

For $n = 1$, L_1 is the Haas-Sanchez gravitational radius r_G, corresponding to $m_G = m_e, m_\hbar = \sqrt{(}m_p m_H)$:

$$r_{HS} = a_G \lambda\!\!\!^{-}_e = \frac{\hbar^2}{Gm_e m_p m_H} \tag{14}$$

where the speed c is eliminated: for this reason a precise approximation was guessed by "dimentionnal analysis", from the ternary symmetry Electron-Proton-Neutron.

3 Cosmological meaning of the Haas-Sanchez's gravitational radius and the cosmological background

With a value of about $0.65\,10^{26}$ m or 6.8 Gly, the Haas-Sanchez's gravitational radius is a cosmological distance. Actually, the Hubble radius $R_0 = c/H_0$, where H_0 is the Hubble constant, is precisely $2r_G = 1.31\,10^{26}$ m in the uncertainty affecting H_0 (see Table 2). As the Hubble radius is believed to be variable, this implies that the present approach favors the steady-state cosmology, obeying the critical condition $R = 2GM/c^2$, so, with $R/2 = r_{HS}$:

$$r_{HS} = \frac{GM}{c^2} = \frac{\hbar^2}{Gm_e m_p m_H} \quad , \tag{15}$$

yielding

$$M = \frac{(\hbar c)^2}{G^2 m_e m_p m_H} = \frac{m_P^4}{m_e m_p m_H} \quad . \tag{16}$$

The Planck length $l_P = \sqrt{G\hbar/c^3}$ intervenes as well in the micro-macrophysical connection. As noticed in the first section, l_P can be obtained from relation (4) with $m_G = m_\hbar = m_P$: $l_P = \hbar^2/(Gm_P^3)$, so that using (15) and (16) the ratio r_G/l_P writes

$$\frac{r_G}{l_P} = \frac{m_P^3}{m_e m_p m_H} = \frac{M}{m_P} \quad . \tag{17}$$

We notice that $r_G/l_P \approx 3^{127}$ (3%) whereas $a_G = r_G/\lambda\!\!\!^{-}_e \approx 2^{127}$ (0.5%).

According to Section 1, the radius r_G can be interpreted as an element of the series (4) with $L_1 = l_P$: $r_G = n^2 l_P$, leading to $n \approx \varphi^{145}$ within $2\,10^{-4}$, where φ is the Golden number.

On the other hand, the Universe radius $R = 2r_G$ implies a stunning perimeter-surface holographic relation with the Planck area $l_P^2 = G\hbar/c^3$,

$$2\pi\frac{R}{\lambda\!\!\!^{-}_e} = 2\pi\frac{2\hbar^2 c^3}{G\hbar\, m_p c\, m_H c} = 4\pi\frac{\lambda\!\!\!^{-}_p \lambda\!\!\!^{-}_H}{l_P^2} \quad , \tag{18}$$

where $\lambda\!\!\!^{-}_H$ is the reduced wavelength of the hydrogen atom. This can be extended to a volume holographic relation involving the reduced wavelength of the Cosmological Background (CMB) $\lambda\!\!\!^{-}_{CMB} = \hbar c/T_{CMB}$:

$$2\pi\frac{R}{\lambda\!\!\!^{-}_e} = 4\pi\frac{\lambda\!\!\!^{-}_p \lambda\!\!\!^{-}_H}{l_P^2} = \frac{4\pi}{3}\left(\frac{\lambda\!\!\!^{-}_{CMB}}{\lambda\!\!\!^{-}_{H_2}}\right)^3 \quad , \tag{19}$$

where $\lambda\!\!\!^{-}_{H_2}$ is the reduced wavelength of the Dihydrogen molecule H_2, leading to:

$$T_{CMB} \approx \left(\frac{8G\hbar^4}{3\lambda\!\!\!^{-}_p{}^5}\right)^{1/3} \frac{1}{k} \approx 2.729\text{K}. \tag{20}$$

which is once more, apart the holographic factor 8/3, a c-free dimensional analysis, giving the energy from the constants $G, \hbar, \lambda_p$ giving the CMB temperature of the at milli-degree level. By considering, instead of a_G, the Large Lucas Prime

Number $N_L = 2^{127} - 1$, the Wyler approximation for the Proton-Electron mass ratio appears, leading to a new holographic expression (the area of a 4D sphere):

$$N_L \approx 2\pi^2 \lambda_{CMB}^3 / \lambdabar_e \lambdabar_H^2 \quad \Rightarrow \quad T = hc/k\lambda_{CMB} \approx 2.7258205 \tag{21}$$

which is compatible with the measured value, showing the central role in Physics of the Lucas Number, the most famous large Prime Number.

From (16) $M = m_P^4/[m_e m_p(m_p + m_e)]$ letting appear the factors of the reduced mass of an electron orbiting around a proton, namely $m'_e = m_e m_p/(m_e + m_p)$, so that $M/m'_e = m_P^4/(m_e m_p)^2$. This relation is completed by the relation $m_P^2/(m_e m_p) = \hbar c/(G m_e m_p) = r_G/\lambdabar_H$ according to (**??**). Finaly we get the double relation

$$\frac{m_P^2}{m_e m_p} = \left(\frac{M}{m'_e}\right)^{1/2} = \frac{r_G}{\lambdabar_H} \ , \tag{22}$$

expressing the double large number correlation.

The ratio m_P/m_e in the former relation also corresponds to the mass of Universe M compared to the typical mass of a star $m_\star$. Indeed, we have $m_\star = M m_e/m_P = 3.68\,10^{30}$ kg, that is 1.84 solar masses. The number of Hydrogen atoms in such a star is

$$\frac{m_\star}{m_H} = \frac{M m_e}{m_P m_H} = \frac{m_P^3}{m_p m_H^2} \approx \left(\frac{m_P}{m_H}\right)^3 , \tag{23}$$

where the third member was obtained by using (16). But, according to (13), this ratio is very close to $a_G^{3/2}$:

$$a_G^{3/2} = \frac{m_P^3}{(m_p m_H)^{3/2}} \approx \left(\frac{m_P}{m_H}\right)^3 . \tag{24}$$

This confirms the central place of a_G in Astrophysics. The number $a_G^{3/2}$ also characterizes the square of the human mass $m_{hum}(\approx 78.5$ kg) compared to that one of an Hydrogen atom. In summary

$$a_G^{3/2} \approx \frac{m_\star}{m_H} \approx \left(\frac{m_P}{m_H}\right)^3 \approx \left(\frac{m_{hum}}{m_H}\right)^2 \approx \frac{(m_1/2m_e)^2}{a} \tag{25}$$

where last member lets appear the kilogram m_1, specifying the Anthropic Principle, [3], which would becomes the Solo-Anthropic Principle, meaning we are alone in the Universe.

In this steady-state cosmological model, the Hubble constant $H_0 = c/R$ takes the value 70.3 (km/s) / Mpc, which is consistent with the most recent measures (Table 2). Moreover, R is compatible with c times the so-called "Universe Age'. This would mean that standard calculations are correct, but the interpretation is false: there is a confusion between a distance and a time, a mistake often provoked by the theoretical physicists pet convention $c = 1$. Eddington used also this connandrum : it is why he did not realize that his correct formula for the Universe radius eliminates the speed c.

In this light, we propose that the Big Bang is actually a *Permanent Bang*, that is a stable oscillation between matter and antimatter at the frequency of $7.5\,10^{103}$ Hz. That is the frequency associated with the matter wave of the

Universe with the reduced wavelength $d = \hbar/Mc = 4\,10^{-96}$, that appears also in the expression of the Bekenstein-Hawking entropy for a black hole of radius R [2]:

$$\pi \left(\frac{R}{l_P}\right)^2 = 2\pi \frac{R}{d} \tag{26}$$

In standard Cosmology standard, that simple holographic relation was not applied to the critical radius of the Universe for two reasons: on one hand, it is supposed to be variable, on the other hand its wavelength d breaks the Planck wall $l_P = 1.61\,10^{-35}$ m by a factor 10^{61}.

Moreover, the standard model does not involve the gravitational energy of the Universe, while it is well defined in the steady-state Cosmology [1, 10]: $E_p = -(3/5)GM^2/R = -(3/10)Mc^2$. It was shown that the opposite quantity $(3/10)Mc^2$ is also the non-relativist kinetic energy of an homogeneous critical Universe expanding with velocity $v = R/c\ d$ from $d = 0$ to $d = R$. Now, expressing this energy in term of the mass energy of a neutron we find

$$\frac{3}{10}\,\frac{M}{m_n} \approx 136 \times 2^{256}\ , \tag{27}$$

namely the Eddington's large number [4] within 0.1 % (Table 2). Compared to the mass energy of the Universe Mc^2, the ratio 3/10 of the gravitational potential energy is close to the one determined for the dark matter energy (about 27% according to WMAP observations). So, the nature of the dark matter must be directly connected with ordinary matter, the simplest being that it is a matter-antimatter vibration in quadrature with the ordinary.

Moreover, the complementary factor 0.7 is identified with the rate of the so-called official "dark energy", advantageously replaced by a repulsive force between galaxies, proportional to the distance, which explains the acceleration of the recession and the stability of the galaxy clusters. Indeed, with the simplest law of recession [2, 1], where the distance d is proportional to $e^{t/T}$ and depends only on the parameter $T = R/c$, the repulsive force between galaxies with an average mass m of 1500 billions solar masses ($m \approx 3\,10^{42}$ kg) is $F = m\ddot{d} = md/T^2$, which becomes greater than the mutual attractive force Gm^2/d^2 for $d > (GmT^2)^{1/3} \approx 3.5$ millions light-years which is indeed the typical dimension of a galaxy cluster.

4 The outer Cosmos

Let us recall that one of the arguments to refute the permanent cosmology was the apparent absence of source for the background radiation. We show here that this source is the outer Cosmos. In light of the above stunning relation, should we not consider that T_{CMB} is actually constant, and that the observable Universe is in thermodynamic equilibrium with the outer Cosmos?

The series (4) implies the existence of an outer Cosmos of radius R_C. For the first term of that series, we have favored the half radius of the Universe r_G, with the mass combinations $m_G = m_e, m_\hbar = \sqrt(m_p m_H)$.Now, we can consider "variants" for r_G, in particular the length r_e^3/l_P^2 obtained by eliminating c between the classical electron radius $r_e = \hbar/(am_ec)(\approx 2.918\,10^{-15}$ m) and the Planck length, which then corresponds in (4) to $m_G = m_\hbar = am_e$ called the

Nambu mass. The corresponding radius of Universe is

$$R_e = 2\frac{r_e^3}{l_P^2} \quad , \tag{28}$$

and presents the ratio

$$\frac{R_e}{R} = u = \frac{pH}{a^3} \approx 1.310841 \, , \tag{29}$$

We observe the proximity $u \approx e^{2/e^2} \approx ((e-1)/\sqrt{H-p})^{1/2}$ respectively to 1.6 ppm and 0.15 ppm.

To define the radius R_C of the Cosmos we extend the holographic relation (26) where we substitute R with R_e in order to consider the sphere of radius R_e as the hologram of the external Cosmos:

$$\pi\left(\frac{R_e}{l_P}\right)^2 = 2\pi\frac{R_e}{d} = 2\pi\frac{R_C}{l_P} \quad . \tag{30}$$

This R_C value connects with the CMB wavelength, prolongating the above relation Eq. (25): by the expression (0.5 ppm):

$$\frac{R_C/\bar{\lambda}_e}{(\lambda_{CMB}/l_P)^3} = \frac{\lambda_e H/l_P a^3}{N_L} \approx (p_W/p)^4 135/2 \tag{31}$$

The standard Cosmology predicts a Neutrino background with temperature $T_{CNB} = T_{CMB} \times (4/11)^{1/3} \approx 1.946$ Kelvin, very difficult to detect. Now, the CMB photon number by Hydrogen atom is a central invariant in the standard model. The total CMB photon number is $N_{ph} = (\xi(3)/\pi)(R/\bar{\lambda}_{CMB})^3$, while the total Hydrogen number is $A = R\lambda_H/2l_P^2$. But, by respect to energy, there is a domination of matter. So one must consider also the ratio between the critical density $u_{cr} = c^2\rho_{cr} = 3c^4/8\pi GR^2$ and the total background energy density $u_{CMB+CNB} = yu_{CMB}$, with $y = 1 + (21/8)(4/11)^{4/3}$ and $u_{CMB} = ((\pi^2/15)\hbar c/\bar{\lambda}_{CMB}^4$. Now one observes that these ratios are tied by an Eddingon's type relation:

$$\sqrt{2N_{ph}/A} \approx u_{cr}/u_{CMB+CNB} \tag{32}$$

leading to $T_{CMB} \approx 2.724 Kelvin$. This confirms the existence of the Neutrino background. Now assuming that the total background Photon + Neutrino is the result of an on-going Hydrogen-Helium transformation, producing 6.40×10^{14} Joule for one kilogram of Helium, and that the Helium density is $0.25 \times \rho_{bar}$, with $\rho_{bar} = 0.045\rho_{cr}$, one gets $T_{CMB} \approx 2.70 Kelvin$. This rules out, one more time, the current Big Bang interpretation.

5 The Non-Doppler Oscillation and the G value

The above study shows the symmetry between the Hass-Bohr and Hass-Sanchez radiuses, by respect to the Electron Compton wavelength $\bar{\lambda}_e = \hbar/m_e c$:

$$\begin{aligned} {}_{HB} &= (aH/p)\bar{\lambda}_e \\ r_{HS} &= 2a_G\bar{\lambda}_e \end{aligned} \tag{33}$$

Now the parameters a and a_G are close to 137 and $2^{127}+136$ which are the third and fourth (final) terms of the Combinatorial Hierarchy, based on the Mersenne-Catalan series $3, 7, 127, 2^{127}-1 = N_L$. This means that $\bar{\lambda}_e$ is a central length unit, as confirmed by the Topological Axis.

This article rehabilitates the Haas method, but shows that it applies in a simpler way to the Universe than to the atom, since the velocity c does not intervene there. Hence the attention must be paid to the Doppler-free oscillation of some quasars, whose period is identified with the solar period t_K of Kotov. It has been observed that this period, related to that of the electron, involves the elimination of c between the above gravitational coupling a_G and the electroweak coupling [3] $a_w = \hbar^3/(G_F m_e^2 c)$ where G_F is the Fermi constant :

$$t_K = t_e\sqrt{a_G a_w}\ . \tag{34}$$

This relation is very accurate: it allows us to deduce a value of $G \approx 6.675\,45$ SI compatible with that of the BIPM, thus disagreeing by 10^{-4} with the official value, taken inconsiderately as an average between incompatible measurements.

6 The Single Electron Cosmology

Wheeler remarked to Feynman [5], that the identity between electrons could mean that it is unique, and that the World is a sweep of a unique electron, able to go back in time as a positron. Feynman replied that in this case, there should be as much antimatter as matter, but, oddly enough, without involving the above matter-antimatter oscillation. Indeed, the single-electron Cosmology is relevant. Consider an electron sweeping concentric spheres of radius $r_n = n\bar{\lambda}_e$ with n varying from 2 to $N = R/\bar{\lambda}_e$ (the orbit $n = 1$ is excluded because it implies the light velocity $\hbar/(m_e\bar{\lambda}_e) = c$), the probability to intercept it at a given location of area dS on those spheres is decreasing as $1/n^2$. This density probability leads to the average radius [13]

$$< r > /\bar{\lambda}_e = \frac{\sum_{n=2}^{N}(1/n^2)n}{\sum_{n=2}^{N}1/n^2} = \frac{\sum_{n=2}^{N}1/n}{\sum_{n=2}^{N}1/n^2} = \frac{\ln N + \gamma - 1}{\pi^2/6 - 1}\ \bar{\lambda}_e \approx 136.905\ . \tag{35}$$

This radius $< r >$ is thus identified with the Bohr radius, the precision reaching 28 ppm when we replace R by $(RR_e)^{1/2}$, which confirms the importance of R_e as a reduced holographic radius of the Cosmos.The radius corresponding to the corrected Bohr radius $r_B = a(1+1/p)\bar{\lambda}_e$is $R_1 \approx 0.997815(RR_e)^{1/2}$.

There is a direct relation between the above mono-electron radius radius R_1 and the Kotov length $l_K = ct_K$:

$$\sqrt{(}R_1/l_K) = 4\pi F p/p_W\ . \tag{36}$$

with $p_W = 6\pi^5$ the Wyler approximation of the Proton/Electron mass ratio p, this confirms the above determination of G in the 10^{-8} domain, and rehabilitate the Wyler approach.

Table 1: Predictions of Eddington (Fundamental Theory, 1945) and Sanchez (pli cacheté 1998) pertaining to the Hubble radius R (INVARIANT) and the corresponding Hubble constant $R/c\times$(Mpc/km $= 3.086 \times 10^{19}$), compared to official (VARIABLES) values starting from those recommended by the PDG (Particle Data Group, 1998,2002) and finishing by the one obtained by the Planck mission (2014).

Quantity	Value	Unit	Uncertainty (ppb)
Lucas Number N_L	$2^{127} - 1$	-	exact
Electric coupling constant a	137.035999084(21)	-	0.15
Proton / electron mass ratio p	1836.152 673 43	-	0.06
Wyler Proton / electron mass ratio p_W	$6\ \pi^5$	-	exact
Neutron/ electron mass ratio nt	1838.683 661 7	-	0.5
Hydrogen / electron mass ratio H	1837.152 660 14	-	0.06
Planck reduced constant $\hbar$	$1.054\,571\,81\,10^{-34}$	J s	exact
Euler-Mascheroni constant γ	0.57721566490153	-	exact
Optimized gravitation constant G	$6.675\,453\,75\,10^{-11}$	$\mathrm{kg}^{-1}\ \mathrm{m}^3\ \mathrm{s}^{-2}$	$G(off) = 6.674\,30$
Light velocity	299 792 458	$\mathrm{m\ s}^{-1}$	exact
Fermi constant G_F	$61.435\,85110^{-62}$	$\mathrm{J\ m}^3$	500
Electron mass m_e	$9.109\,383\,701\,510^{-31}$	kg	0.3
Boltzmann constant k	1.38064910^{-23}	$\mathrm{J\ K}^{-1}$	exact
Electron reduced wavelength λ_e	$3.861\,592\,675\,10^{-13}$	m	0.3
Electron classical radius $r_e = \lambda_e/a$	$2.817\,940\,322\,10^{-15}$	m	0.45
CMB temperature T_{CMB}	2.725 820 138 [14]	K	$T_{CMB}(mes) = 2.725\,5(6)$
CMB Wien wavelength	$1.063\,082\,472\,10^{-3}$ [14]	m	
Wien constant w ($\lambda_W = hc/(w\,kT)$	4.965 114 232	-	exact

Table 2: Predictions of Eddington (Fundamental Theory, 1945) and Sanchez (pli cacheté 1998) pertaining to the Hubble radius R (INVARIANT) and the corresponding Hubble constant $R/c\times$(Mpc/km $= 3.086 \times 10^{19}$), compared to official (VARIABLES) values starting from those recommended by the PDG (Particle Data Group, 1998,2002) and finishing by the one obtained by the Planck mission (2014).

Date	Source	Universe Age Gyr	Hubble radius Glyr m	Hubble constant km/s/Mpc
1945	Nombre Eddington N_E $N_E = 136 \times 2^{256} = (3/10)M/m_n$ $R = Mc^2/2G$		13.8	70.8
1927	Lemaître	1.6	1.6	
1929 1956	Hubble Humason, Mayal and Sandage			540 180
1958	Sandage			75
1998	$R = \dfrac{2\hbar^2}{Gm_em_pm_H}$ [13, p.391] `http://holophysique.free.fr`		13.8	70.8
1998 2002	PDG (Particle Data Group) PDG	11.5 $12 - 18$		$60 - 80$
2005	Hubble Space Telescope	13.7	13.4	72 ± 8
2012	WMAP	13.8	13.5	72.3
2014	Planck mission	13.8	14.5	67.5

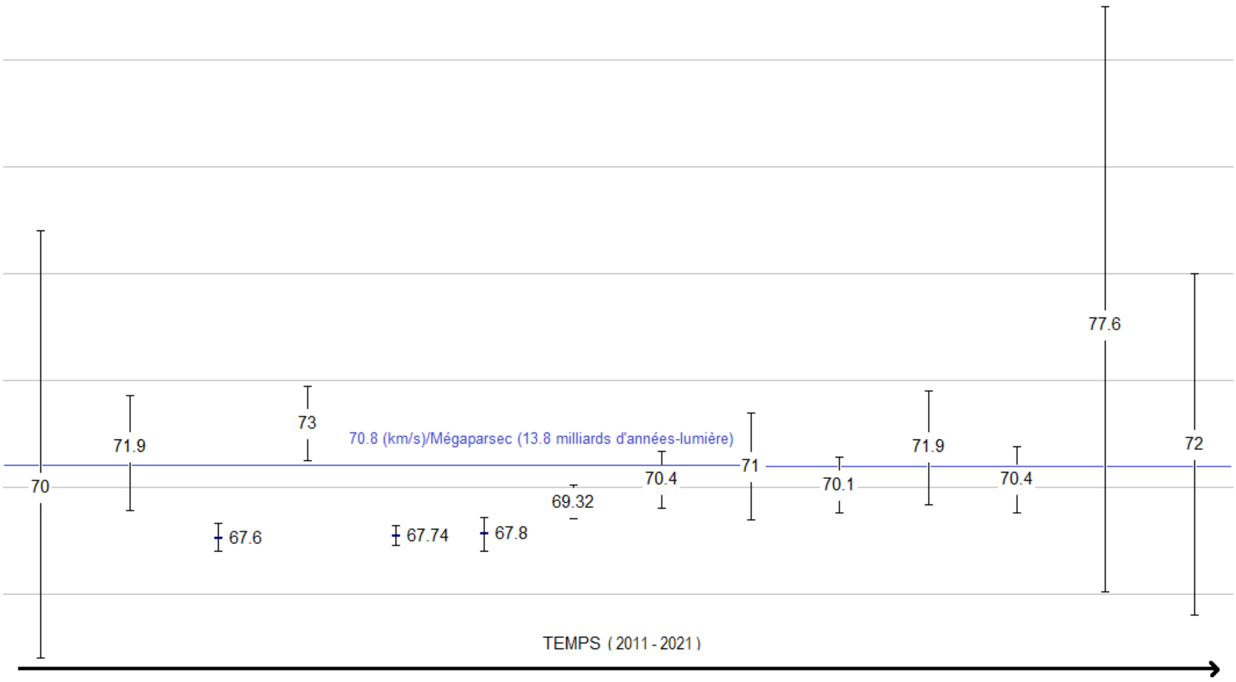

Figure 1: Measurements of the Hubble constant over the last 10 years, with their confidence intervals, whose discrepancies cause a major crisis in official cosmology. The 3 lowest values are those of the Planck mission (the European satellite launched in 2009). The value 73 is the one given by the type 1a supernovae which allowed to discover the acceleration of the galactic recession. The Lemaître and Hubble estimates were wrong by a ratio of 8.9 and 7.6 respectively compared to our value 70.8, deposited in March 1998, in a sealed envelope at the Academy of Sciences.

Appendix 1

Newton was aware that his attractive force would cause the collapse of the universe. Therefore, he relied on divine action to counterbalance the universal attraction. He had therefore anticipated the repulsive force causing the accelerated recession of the galaxies. Moreover, he had delayed the publication of his Principia, because he was trying to extend his theory to the microcosm. When Roemer met him at Cambridge in 1679 to announce his determination of the speed of light, he could have realized that this constituted a second universal constant, which was identified with the ratio of the topological units of his constant G and the angular momentum induced by Kepler's law of areas. So that a mass would emerge by the simplest ternary relation, the Planck mass, which is the "hierarchical problem" in particle physics, but is closed both to the mass of an human ovocyte mass and a eye measurable dust.

Appendix 2

By identifying the Kotov length with the canonical half-form $\hbar^2/(2Gm^3)$, we deduce that

$$2\left(\frac{m}{m_e}\right)^3 = \frac{\sqrt{m_p m_H}}{m_e}\left(\frac{G_F}{G}\right)^{1/2}\frac{c}{\hbar}\ . \tag{37}$$

We observe that m is close to m_p^2/m_e, justifying the factor 2 above. Now this mass has been identified as that of the DNA bicodon [13]. This one could thus be a time-line hologram, which, traversed by an electric current, would emit organizing signals in the metabolism.

Appendix 3

That invariability of the CMB temperature is reinforced by the following complementary relations Its Wien wavelength λ_W enters the direct holographic relation involving this sphere of radius R_e :

$$4\pi\left(\frac{R_e}{\lambda_W}\right)^2 \approx e^a\ . \tag{38}$$

The strict equality implies $\lambda_W =$ and $T = hc/(w\,k\lambda_W) \approx 2.727$ K (w is the Wien constant).

Moreover:

$$\frac{\lambda_W}{l_P} = RR_e\left(\frac{l_P}{2\lambdabar_e^2}\right)^2 \quad \to T \approx 2.727\text{ K} \tag{39}$$

$$\frac{\lambda_W}{l_P} \approx \pi^{64} \to T \approx 2.728\text{ K} \tag{40}$$

confirming the symmetry between radius R and R_e, and the central importance of the Compton wavelength of the Electron $\lambdabar_e = \hbar/m_e c$, which is confirmed later.

The relevance of the R_e radius, and thus that of the Cosmos, is validated by injecting (28) in (30):

$$R_C = \frac{2r_e^6}{l_P^5} = \left(\frac{r_e}{l_P}\right)^3 R_e \ . \tag{41}$$

Let us recall that about thirty so-called "free" parameters remain unexplained in the standard model of particles, so that the current mathematics is incomplete, which is in line with Gödel's analysis. But the radius of Cosmos verifies, with the Bohr radius r_B :

$$\frac{4\pi^2}{3}\left(\frac{R_C}{r_B}\right) \approx a^a \ (0.3\%) \approx (2+3^{1/2})^{2^9} \ (3\%) \approx (1+2^{1/2})^{3\times(2^9-1)} \tag{42}$$

where $2+3^{1/2}$ is the generator of the Lucas-Lehmer series [11], and $1+1/2^{1/2}$ that of the Pell-Fermat equation. Now the product of the cardinals of the 20 sporadic groups of the Monster family is close to $u \times a^a$, to within 0.015%. These relations suggest that a is a preferred basis for calculation. Number theory thus gives meaning to the electrical parameter $a \approx 137.036$.

The solution of the initial Diophantine Equation relies on the co-primality of the numbers 2 and 3, respectively assigned to the concepts of Time and Space. To the next pair of prime numbers $(5,7)$ it is therefore intuitive to assign the concepts of Mass and Field. Note that the pairs (2,3) and (5,7) are the basic solutions of the Pell-Fermat equation. The Diophantine solution then involves n^{210} instead of n^6. The number 210 is involved in the relation $R/\lambda\!\!\!^{-}_e \approx (2/u)^{210}$ (0.3%)

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