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THE MISSED PHYSICS

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Abstract

Crucial scientific developments, checkable by everyone, have been missed, excluding the Universe expansion and the initial Big Bang model, and reestablishing the cosmological steady-state model. The single electron cosmology gives a close estimation of the Hubble length, meaning the matter is in fact a matter-antimatter oscillation in a Permanent Bang cosmology, where dark matter would be out of phase oscillation. The nuclear fusion cosmic model gives the background temperature 2.73 Kelvin, validating the Hoyle’s prediction of permanent neutron creation, an ultimate limit of physics. The Diophantine treatment of the Kepler laws induces the Space-Time quantification in a Total Quantum Physics, pushing back the Planck wall by a factor 10^{61} , possibly resolving the vacuum energy dilemma. The three-body gravitational hydrogen model explains the Tachyonic Three Minutes Formula giving half the Hubble radius, thus its critical mass, showing the Universe is a Particle in the Cosmos, whose radius would be deduced from holographic Space-Time Quantification. The Kotov Doppler-free oscillation rehabilitates the tachyonic physics of the bosonic string theory in the Octonion Topological Axis prolonging the Quaternion Periodic Table, implying the string-spin identification and gives G , compatible with the BIPM measurements but 2×10^{-4} larger than the official value.

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43 1 Introduction

44 The official physics have missed several elementary, but crucial approaches. In
 45 particular, this is due to a much excessive confidence to present mathematics,
 46 which is always unable to explain the 30 or so "free parameters". Only Ed-
 47 dington explained the origin of the number 137 in physics, but as soon as the
 48 electrical constant $a \approx 137.0359991$ appeared to be slightly different, the offi-
 49 cials rejected the Eddington Fundamental Theory. This forgetting of the Science
 50 history (for instance the atomic masses was *not exactly* whole multiples of the
 51 hydrogen mass) implied the present crisis in Physics. This work is a development
 52 of BACK TO COSMOS <http://www.ptep-online.com/2019/PP-57-12.PDF> and
 53 SPACE TIME QUANTIFICATION [http://www.ptep-online.com/2022/PP-63-](http://www.ptep-online.com/2022/PP-63-11.PDF)
 54 [11.PDF](http://www.ptep-online.com/2022/PP-63-11.PDF).

55 2 The Single Electron Cosmology: oscillation 56 matter-antimatter

57 According to a famous discussion between Wheeler and Feynman (?), the former
 58 proposed that the best explanation for the identity of electrons is to admit
 59 there is only one such Electron, which rapidly sweeps the landscape, with trans-
 60 formation in a Positron at each backward time passage.

61 The distribution of the Haas-Bohr trajectories obeys the n^2 factor. A space
 62 paving would be more natural through a series of spheres whose radius fol-
 63 lows the direct n rule. So we consider the following *dynamic paving*, checking
 64 $2\pi m_e r_n v_n = h$:

$$\begin{aligned} r_n &= n\lambda_e \\ v_n &= c/n \end{aligned} \quad (1)$$

65 Suppressing the first orbit where $v_1 = c$, and assuming a classical $1/r^2$ proba-
 66 bility, the mean radius would identifies with the Haas-Bohr radius for a limiting
 67 radius R_1 such that:

$$r_{HB} = \Sigma_2^{R_1/\lambda_e} \frac{1/n}{1/n^2} \Rightarrow R_1 \approx 1.49365473 \times 10^{26} \text{ m} \quad (2)$$

68 This induces a rapid oscillation matter-antimatter resolving at last the anti-
 69 matter problem. To answer the objection of Feynman that there is no balance
 70 between the electron and positron number, Wheeler answered that the positron
 71 could be hidden in the proton. Of course, *this balance is granted in our mater-*
 72 *antimatter oscillation.*

73 The mass ratio Muon/Electron appears as a calculation basis in, with the
74 holographic term $p_P = 1840.978 = (3P)^{1/7}$:

$$\frac{R_1}{2r_{HB}} \approx \left(\frac{p_P^3}{\mu^2}\right)^7 \Rightarrow \frac{R_1}{l_P} \left(\frac{\mu^2}{a}\right)^7 \approx \frac{2 \times 3^3 P^4}{a^6} \quad (3)$$

75 From $l_K/\lambda_e = P\mu^2/a$ and the Cosmos radius $R_c = R_{hol}^2/2l_P$:

$$(l_K/\lambda_e)^7 \approx \frac{3^3 R_c}{p^2 R_1} \quad (4 \text{ ppm}) \quad (4)$$

76 This confirms both the tachonic Kotov length, the Cosmos radius and the mono-
77 electron radius : *the matter-antimatter oscillation is confirmed.*

78 Moreover, $R_1 \approx \sqrt{R R_{hol}}$, and from $p_{hol} = (4a^3/3)^{1/2} \approx (4\pi)^2 \sqrt{a}$, the elimi-
79 nation of l_K and \sqrt{a} leads to the ppb holographic relation:

$$(4\pi_q/3)(aa_w)^3 \approx 4\pi_{\tau_{d_e}/\mu}(P/a)^2 \quad (5)$$

80 where $\pi_{\tau_{d_e}/\mu} = 3+1/(7+\mu/\tau_{d_e})$. This confirms the above symbolic holographic
81 principle, specifying the π_q value, so the electric charge adimensional value
82 $q = \sqrt{4\pi_q/a}$ in the ppb range.

83 A detailed study suggests that the dark matter is a dephased matter-abtimatter
84 oscillation.

85 3 The Universe as a fusion reactor

86 Arguing for the steady-state cosmology, Thomas Gold proposed that the Uni-
87 verse can be thought as a fusion reactor transforming Hydrogen in Helium in an
88 on-going process (?), for which the energy efficiency is $1 - m_{He}/4m_H \approx 1/140$.
89 This would imply the existence of a background field. From the total crit-
90 ical mass $M = Rc^2/2G$, the critical mass density is $\rho_{cr} = 3c^2/(8\pi GR^2) \approx$
91 $9.5 \cdot 10^{-27} \text{ kg m}^{-3}$. Taking account of the baryon relative density of 0.045, and a
92 Helium mass ratio of about 0.25, this means a mass density of Helium of about
93 $0.25 \times 0.045 \times 9.5 \cdot 10^{-27} = 1.06 \cdot 10^{-28} \text{ kg m}^{-3}$, and the radiant energy released
94 by the fusion process has for density $(1/140) 1.06 \times 10^{-28} c^2 \approx 6.4 \cdot 10^{-14} \text{ J m}^{-3}$.
95 Equalizing this density with the black body energy density $(\pi^2/15)(kT)^4/(\hbar c)^3$
96 leads to $T \approx 3.0 \text{ K}$. Taking account of the above neutrino field, the factor $\pi^2/15$
97 must be replaced by 1.106, leading to a temperature 2.7 Kelvin, sufficient close
98 to the real value to furnish a strong argument in favor of Coherent Cosmology.

99 But it was not published at this epoch, because the two other co-authors,
100 Hoyle and Bondi, wanted to precise the thermal mechanism, while Gold argued
101 that Nature is always prolific in producing thermostatic agents. Hoyle reckog-
102 nized later that the whole development of cosmology would have been different
103 if they had accepted the Gold's idea, without identifying the thermostatic agent:
104 this model not only predicted the background , but also its *correct temperature*,
105 which was far from being the case for the Big Bang cosmology. Later, the ab-
106 sence of such an internal agent was used against the steady-state model, while
107 some have invoked iron whiskers (?), but were not convincing. *Of course, there*
108 *is an external thermostatic agent: the Cosmos itself* (section 5.2).

109 The following Letter has been submitted in January 2023 to Astrophysical
110 journals

Steady-state Universe as a fusion reactor

F.M. Sanchez, V.A. Kotov, C. Bizouard, C. Marchal

Résumé : In the steady-state Universe, considered as a nuclear fusion reactor, the thermalized photon-neutrino radiation has a temperature of about 2.7 K, compatible with that of the observed cosmic microwave background and the Galaxy thermalized stellar radiation. It is proposed this background is also an emanation of the external thermostat, i. e. the Cosmos.

Arguing for the steady-state cosmology (Bondy and Gold 1948; Hoyle 1948), Thomas Gold proposed in that epoch that the real Universe can be represented as a fusion reactor transforming hydrogen to helium in a permanent on-going process (see Hoyle et al. 2000). Let us examine his argument on the basis of the most recent cosmological observations (Workman et al. 2022).

The helium mass proportion in the observed Universe is close to 0.24, and the steady-state theory postulates this fraction must be constant in time. According to the hydrogen atom mass, $m_H = 1.00784$ amu (atomic mass unit: 1 amu = 1.66054×10^{-27} kg), and that of a helium atom, $m_{\text{He}} = 4.00260$ amu, this fusion reaction is accompanied by the mass defect

$$\Delta m = 4m_H - m_{\text{He}} = 4 \times 1.00784 - 4.00260 = 0.02876 \text{ amu}, \quad (6)$$

with the energy release Δmc^2 , and the corresponding efficiency

$$\frac{\Delta m}{4m_H} = 1 - \frac{m_{\text{He}}}{4m_H} \approx \frac{1}{140}. \quad (7)$$

In the hypothesis that any helium atom in the Universe is produced by hydrogen, the value of about 1/140 of its mass must be attributed to radiation.

With the Universe obeying critical condition, the total Universe's mass $M = Rc^2/2G$, where $R = 1.372(10) \times 10^{26}$ m (or 14.5×10^9 light-years) is the Hubble length (the standard error is shown in brackets, and notations are usual), and this leads to the critical mass density

$$\rho_{cr} = \frac{3c^2}{8\pi GR^2} \approx 8.539 \times 10^{-27} \text{ kg m}^{-3}. \quad (8)$$

Taking into account the baryon relative density of nearly 0.045, and the helium mass abundance ratio of about 0.24, one gets for the permanent helium mass density:

$$\rho_{\text{He}} = 0.24 \times 0.045 \times \rho_{cr} \approx 0.922 \times 10^{-28} \text{ kg m}^{-3}. \quad (9)$$

Supposing that this density results exclusively from the creation-fusion process, where the steady-state creation produces hydrogen atoms only (or neutrons, with the relative energy release excess of $(m_n - m_H)/m_H \approx 8.3 \times 10^{-4}$), but no quarks, one gets the released energy density

$$u_f = \frac{1}{140} \rho_{\text{He}} c^2 \approx 5.919 \times 10^{-14} \text{ J m}^{-3}. \quad (10)$$

The cosmic microwave background (CMB) exhibits the thermal equilibrium spectral distribution at the temperature $T_{CMB} = 2.7255(6)$ K, corresponding to the black body energy density

$$u_{CMB} = \frac{\pi^2 (kT)^4}{15 (\hbar c)^3}. \quad (11)$$

146 The temperature for which the two densities are identical, is

$$T = \frac{1}{k} \left(\frac{15}{140\pi^2} \rho_{He} \hbar^3 c^5 \right)^{1/4} \approx 2.97 \text{ K}. \quad (12)$$

147 But this temperature would be slightly modified if we take into account the
148 neutrino field with the energy density (Ryden 2017, Eq. 5.16)

$$u_\nu = n_\nu \frac{7}{8} \left(\frac{4}{11} \right)^{4/3} u_{CMB}, \quad (13)$$

149 where $n_\nu = 3$, the number of neutrino species. Thus, the total energy density
150 of the “photon plus neutrino” background is equal to

$$u_{rad} = \left[1 + \frac{21}{8} \left(\frac{4}{11} \right)^{4/3} \right] u_{CMB} \approx 1.68 u_{CMB}. \quad (14)$$

151 Thus, the factor $\pi^2/15 \approx 0.66$ in Eqs. (6) and (7) must be replaced by
152 $(\pi^2/15) \times 1.68 \approx 1.105$, producing $T = 2.61$ K, remarkably close to the observed
153 value. This gives the strong argument in favor of the steady-state cosmology.

154 These calculations were not published at that epoch, because the two co-
155 authors, Bondy and Hoyle, wanted to precise the thermal mechanism, while
156 Gold insisted that Nature itself is always prolific in producing thermostatic
157 agents. Later on Hoyle (1948) recognized that the whole development of cos-
158 mology would have been quite different if they accepted the Gold’s idea, with-
159 out identifying the thermostatic agent: besides thermal background, this model
160 predicted as well its *correct temperature*, which occurred far from that in the
161 case of the Big Bang cosmology. Later on the absence of such internal agent
162 was employed against the steady-state model, while some authors have invoked
163 iron whiskers (see, e. g., Wickramasinghe 2006), but that was not convincing.
164 Recently, it has been showed that the Galaxy contribution to the microwave
165 background radiation has a temperature 2.81 Kelvin (Pecker 2015).

166 In the standard cosmology, an essential parameter is the ratio between the
167 CMB photon number n_{ph} over the Universe atomic number $n_H = M/m_H$. We
168 have noted that this ratio is about the square of ratio between the energy density
169 ratio u_{cr}/u_{CMB} . By taking account of the standard Neutrino background there
170 is a precise correlation:

$$\sqrt{2n_{ph}/n_H} \approx u_{cr}/u_R \Rightarrow T \approx 2.73 \text{ Kelvin} \quad (15)$$

171 This formulation is analog to the statistical one of the Eddington’s critical *initial*
172 Universe (Eddington 1936), his interpretation to the double large number cosmic
173 correlation, where $m'_e = m_e/(1 + 1/p)$ is the reduced electron mass

$$\hbar c/Gm_e m_p = \sqrt{M/m'_e} = R/2\lambda_H \Rightarrow R \approx 13.8 \text{ Gly} \quad (16)$$

174 Strangely enough, Eddington did not remark that the above Large Number is
175 close to the most famous mathematical Large number, the prime Lucas num-
176 ber $N_L = 2^{127} - 1$. The computer shows, with the normalized Fermi mass

177 $F = m_F/m_e$, defined by the Fermi constant $G_F = \hbar^3/m_F^2 c$, and with the
 178 Single-Electron universe radius R_1 , which depends only on the Compton electron
 179 wavelength λ_e and the Bohr radius $r_B = a\lambda_e(1 + 1/p)$, where $a \approx 137.0359991$,
 180 $p \approx 1836.152673$ and $p_W = 6\pi^5$

$$N_L \approx (2\pi\lambda_{hol}/\lambda_e)(\pi(\lambda_{hol}/\lambda_H)^2) \Rightarrow T_{hol} = \frac{\hbar c}{k\lambda_{hol}} \approx 2.7258205 \text{ Kelvin} \quad (17)$$

$$\frac{F^5}{6} = \left(\frac{\lambda(F)}{\lambda_e}\right)^3 \Rightarrow T(F) = \frac{\hbar c}{k\lambda(F)} \approx 2.725820(3) \text{ Kelvin} \quad (18)$$

$$\lambda_1 = (p+1) \left(\frac{R_1 l_P}{2\pi p_W}\right)^{1/2} \Rightarrow T_1 = \frac{\hbar c}{k\lambda_1} \approx 2.7258206 \text{ Kelvin} \quad (19)$$

183 both three values compatible with the measurement $T_{CMB} = 2.7255(6)$ Kelvin.
 184 The definition of R_1 is recalled

$$r_{HB} = \frac{\sum_{R_1/\lambda_e}^{R_1/\lambda_e} 1/n}{\sum_2^2 1/n^2} \Rightarrow R_1 \approx 1.49365473 \times 10^{26} \text{ m} \approx 15.774311559 \text{ Gal} \quad (20)$$

185 With m_P the Planck mass, the 2 factor in Eq(11) eliminates in

$$m_P^4 \approx M m_e m_p m_H. \quad (21)$$

186 putting the observable Universe in the same status as a particle. Introducing the
 187 Universe Compton wavelength $d = \hbar/Mc$, the critical condition means that the
 188 Universe Bekenstein-Hawking entropy writes as a 2D-1D holographic relation :

$$R = 2GM/c^2 \Rightarrow \pi(R/l_P)^2 = 2\pi R/d \quad (22)$$

189 So the inflation hypothesis is not necessary to explain the critical character.
 190 This has not been emphasized because d is much smaller (2.5×10^{-61}) that
 191 the Planck length. This may be considered as a Space quantum (Sanchez et al
 192 2022).

193 The Topological Axis (Sanchez et al 2019) suggests that the Universe is
 194 the last gauge boson in an external Cosmos. Moreover, this Hubble radius is
 195 compatible with c times the standard so-called universe age, possibly meaning
 196 that standard calculations are correct but not their interpretation. In fact the
 197 Big Bang idea may be conserved, but not its primordial character, to be re-
 198 placed by a *Permanent Bang*, a very rapid oscillation matter-antimatter. So
 199 the antimatter dilemma would be resolved.

200 This Hubble radius is also equivalent to the radius defined in our grav-
 201 itational hydrogen molecule model, which is characterized by the following
 202 holographic formulation, where l_P is the Planck length, $\lambda_e = \hbar/m_e c$, $\lambda_p =$
 203 $\hbar/m_p c$, $\lambda_H = \hbar/m_H c = 2\lambda_{2H}$, $T_{hol} = \frac{\hbar c}{k\lambda_{hol}}$

$$2\pi \frac{R}{\lambda_e} = \pi \frac{\lambda_p \lambda_H}{l_P^2} = (4\pi/3) \left(\frac{\lambda_{hol}}{\lambda_{2H}}\right)^3 \Rightarrow T_{hol} \approx 2.731 \text{ Kelvin.} \quad (23)$$

204 where the term c^3 eliminates, both in 1D-2D and the 2D-3D holographic
 205 relations. So the simple non- c dimensional analysis starting from \hbar, G, m_0 , where
 206 m_0 is the geometric mean between the 3 main atomic particles, electron, proton,
 207 neutron, gives directly half the Hubble radius $R/2$. This was deposited in March
 208 1997 at the Paris Academy. And the simple non- c dimensional analysis starting
 209 from \hbar, G, kT gives $G\hbar^4/(kT)^3$ as the five power of the hydrogen Compton
 210 wavelength, with a numerical coefficient close to 8/3. So, the above 1D-2D-3D
 211 holographic relations could have been discovered by elementary study.

212 The above statistical ratio 11/4 appears directly in the correlation

$$\sqrt{R/2\lambda_e} \approx (11/4)(\lambda_{CMB}/\lambda_e)^2 \Rightarrow T_{CMB} \approx 2.7266 \text{ Kelvin} \quad (24)$$

213 The classical gravitational energy of the critical Universe is

$$E_{grav} = -(3/5)\frac{GM^2}{R} \quad ; \quad R = 2GM/c^2 \Rightarrow E_{grav} = -(3/10)Mc^2 \quad (25)$$

214 So the separation 0.3 / 0.7 of the Universe energy is quite natural : the propor-
 215 tion 0.7 of the so-called dark energy must be invariant, so identifies with the
 216 cosmological constant. Moreover the corresponding atomic number identifies
 217 with the Eddington large number $N_{Ed} = 136 \times 2^{256}$

$$-E_{grav}/m_H c^2 = 136 \times 2^{256} \Rightarrow R_{Ed} \approx 13.8 \text{ Gly} \quad (26)$$

218 Considering the lethal mammal temperature 40° Celcius, or $T_{mam} \approx 313$
 219 Kelvin, and its nominal wavelength hc/kT_{mam}

$$\sqrt{R_{mam}l_P} \approx \lambda_{mam} \Rightarrow R_{mam} \approx 13.8 \text{ Gly} \quad (27)$$

220 This strong anthropic argument was ignored, due to the believing in the vari-
 221 ability of the Hubble radius.

222 The thermalizing process is not yet identified, but we conjecture that our
 223 Universe is enclosed in fact in a thermal bath — the real external Cosmos
 224 (Sanchez et al. 2019, 2022), *which is so directly observable through the CMB*
 225 *field, contrary to the non-scientific multivers.*

226

227 4 The Diophantine Kepler Laws, the Cosmos 228 and the Topon

229 We have shown that the quantification of Length and Time in Kepler's laws
 230 implies an angular momentum quantum, identified with the reduced Planck's
 231 constant, showing a mass-symmetry with the Newtonian constant G . This leads
 232 to the *Diophantine Coherence Theorem* which generalizes the synthetic resolu-
 233 tion of the Hydrogen spectrum by Arthur Haas, three years before Bohr (?).
 234 Any mass pair (m_G, m_{\hbar}) is associated to a series of Keplerian orbits :

$$L_n = \frac{(n \hbar)^2}{Gm_G m_{\hbar}^2} \quad . \quad (28)$$

235 For the Hydrogen atom, for which $L_n = n^2 \lambda_e a$, the Diophantine analysis leads
 236 to:

$$m_G = \frac{m_P^2}{m_N} = m_A \quad ; \quad m_{\hbar} = m_e \quad (29)$$

237 This means that another choice $m_G = m_e; m_{\hbar} = m'_P$ is a priori possible, by in-
 238 troducing the *Planck-Nambu mass* $m'_P = m_P/\sqrt{a}$, which is close to the *Human*
 239 *Oocyte mass*. Indeed, with a biological density of 1.05 g/ml (?), the Planck-
 240 Nambu mass corresponds to a sphere of diameter 0.15 mm: this is exactly the
 241 diameter of the oovocyte in its maximal extension. Note that the Planck mass is
 242 very large by respect to the standard particles, and this is called the Hierarchy
 243 problem in Particle Physics. It is strange that nobody, including the tenants of
 244 the classical Anthropic Principle did not insist on its proximity with the Human
 245 oocyte mass.

246 The following lengths are tied by the Bekenstein-Hawking holographic rela-
 247 tion:

$$R_{hol} = \frac{2\hbar^2}{Gm_N^3} \quad ; \quad R_C = \frac{2\hbar^2}{Gm'_P{}^3} \quad (30)$$

$$\pi(R_{hol}/l_P)^2 = 2\pi R_C/d_0 \quad ; \quad d_0 = \hbar^2/Gm'_P{}^3$$

248 where d_0 is interpreted as the space quantum (Topon), while R_C is the Cosmos
 249 radius, and R_{hol} its holographic reduced radius, close to the Hubble radius, with
 250 the canonic deviation:

$$u = R_{hol}/R = pH/a^3 \quad (31)$$

251 With $M_{hol} = R_{hol}c^2/2G$, the critical mass of the sphere of radius R_{hol} ,
 252 one observes the Geo-Dimensional Cosmos-Universe Couple Relation, where
 253 $t_H = R/c$ is the Hubble time constant of the exponential galaxy recession :

$$\ln^2(R_C/\lambda_e) - \ln^2(M_{hol}/m_e) \approx \ln^2(R/\lambda_e) + \ln^2(t_H/t_e) = 2\ln^2(t_H/t_e) \quad (32)$$

254 which confirms the G value to 10 ppm precision (?).

255 There is a direct holographic ppb connection between the cosmic reduced
 256 holographic radius and the Neuron:

$$4\pi\eta(t_N/t_e)^2 \approx 2\pi R_{hol}/\lambda_e \quad (\eta = 1 + 2/(3 \times 139)) \quad (33)$$

257 Now the question is: what is the passage from the above 2D-1D holography
 258 to the 3D world ? This was predicted in a "closed draft" at the French Academy
 259 (March 1997), in addition to the 3 minutes formula: *a sphere is generated by the*
 260 *rotation of a disk around a diameter* (?), in the spirit of the scanning holography
 261 which showed so efficient in practical holography, where a spherical reference
 262 wave is generated by a laser beam rotating around its beam waist. Thus, the
 263 above entropy relation is simply extended:

$$\pi(R_{hol}/l_P)^2 = 2\pi R_C/d_0 = 2\pi N_m R_C/\lambda_m \quad ; \quad \lambda_m = N_m d_0 \quad (34)$$

264 *This the Universal Resonance: each particle of mass m has a Compton wave-*
 265 *length a whole multiple of the Topon $d_0 \approx 3.0 \times 10^{-96}m$.*

266 There is a dramatic holographic confirmation of the pertinence of this Cosmic
 267 holographic reduced radius :

$$4\pi(R_{hol}/\lambda_{Wi})^2 \approx e^a \quad (35)$$

268 where λ_{Wi} is the Wien CMB wavelength (Table 1). This perfect holographic
 269 formula shows that the CMB, despite its thermal spectral distribution, supports

270 information, as is confirmed by the CMB Anisotropy Distribution which follows
 271 a precise statistical function (?). *This suggests that the background field must*
 272 *be considered as the cosmo-genetic code of the Universe, as confirmed below.*

273 The above mass m_A plays a central role in the Solanthropic Principle. One
 274 notes:

$$m_A/m_e \approx a_w^2 n_t^6 \approx (4/3)\tau^{12}, \quad (36)$$

275 leading to the symbolic holographic relation :

$$\pi_q a_w^2 \approx (4\pi/3)\sqrt{(a/137)}(\tau^4/n_t^2)^3 \quad (5.3 \text{ ppm}). \quad (37)$$

276 A dramatic confirmation of the above Cosmos radius R_C is the following
 277 relation involving the number $\tau_0 = 3570$:

$$\frac{R_C}{l_P} \approx \beta \tau_0^{(\beta a)^2/4 \times 137} \quad (0.7 \text{ ppm}) \quad (38)$$

278 The improbability of this relation excludes any possibility of chance : the Co-
 279 herent Cosmology (?) is confirmed.

280 5 The Three Minutes calculus

281 The Conceptual Synthesis compares the essential measurements with the syn-
 282 thesis of three universal constants. The Three Basic Concepts are the Length,
 283 the Time and the Mass. Detailed Analysis show that the electricity can be
 284 reduced to these mechanical concepts. Indeed, the electrical force between two
 285 elementary electric charge separated by the distance l is:

$$F_{qq} = \frac{\hbar c}{al^2} \quad a \approx 137.0359991 \quad (39)$$

286 The electrical constant a is hidden in the cumbersome electrical units of the
 287 International System of Unit. It is why ingeneers and researchers cannot com-
 288 municate, explaining in part the present blockage of the technology. Another
 289 reason of the blockage is the lack of comprehension of the quantum Physics,
 290 which must be connected to the steady-state Cosmology, as proved by the 3-
 291 minutes calculus, recalled below.

292 The inverse of a is often used, called the fine structure constant". It has
 293 only historical interest, as the Diophantine Analysis confirms below. Indeed a is
 294 closed to the prime number 137, which receive an explanation by Eddigton. The
 295 fact that this was rejected prove that physicists have forgotten one of the pillar
 296 principle of Physics : the Approach Principle, stating that one can progress
 297 without knowing the ultimate theory.

298 It is the Americans, these impudent colonizers of Science, who are responsible
 299 for this serious logical anomaly, of not using the mass of the electron as a unit
 300 of mass. This is how the Mars Climate Orbiter probe, which was to orbit Mars
 301 in 1999, crashed to the ground, due to an error in the braking parameters of the
 302 Lockheed-Martin company's thrusters. The company was using units in miles,
 303 feet and pound-force, as opposed to NASA's metric system. This loss of 125
 304 million dollars should have encouraged the Americans to convert to the metric
 305 system. And the International System of Units should have eliminated all these
 306 parasitic electrical units like Coulomb, Ampere, Volt, etc...

307 According to Henri Poincaré (Dernières Penseés, Conférence de Londres,
 308 1913), the main universal constants are invariant, because any variation would
 309 deny the Physics existence.

310 Curiously enough, this Principle was not emphasized. For example, Paul
 311 Dirac dared to propose a temporal variation of the gravitational constant G ,
 312 while George Gamow coined a variation of the electrical constant a . Due to the
 313 relative slowness of the light celerity c , the astrophysical observations reveal the
 314 past, and no such variations was never observed.

315 After the publication at Cambridge of his Holic Principle, Francis Michel
 316 Sanchez obtained a sabbatical year at the Orsay University. Revisiting cosmology,
 317 by applying the most basic physical method, the dimensional analysis, he
 318 got in his 3 first minutes (Sept. 1997) half the Hubble Radius. The chosen
 319 constants were the evident choice : \hbar, G and the product of the masses of the
 320 three main atomic particles : electron, proton, neutron. Indeed, the rejection
 321 of c is quite natural in the spirit of a non-local cosmology. This proves that:

- 322 1. The cosmology was never considered before as a normal physical theory.
- 323 2. The rejection of c , corresponding to tachyonic physics, was never consid-
 324 ered before.
- 325 3. This calculus gives the single parameter of the steady-state cosmology,
 326 13.8 Giga years, showing that the Hubble radius is invariant: no more
 327 Universe expansion nor Initial Bang.
- 328 6. No-one take care of this result: the officials are too confident to established
 329 theory.

330 5.1 The Gravitational di-hydrogen Model

331 Three years before Bohr, Arthur Haas obtained the atom radius r , simply by
 332 the identification of three energy forms, where v_e is the electron speed, and
 333 $\lambda_e = \hbar/m_e c$ the electron's Compton's wavelength:

$$\begin{aligned}
 m_e v_e^2 &= \hbar c / a r = \hbar v_e / r \\
 \Rightarrow v_e &= c / a \quad ; \quad r = a \lambda_e
 \end{aligned}
 \tag{40}$$

334 Consider the tiny gravitational force between a proton and an hydrogen
 335 atom, both orbiting on a circle of invariant radius R , where an electron is also
 336 circulating with the speed v_e . *Such a 3-body problem is declared insoluble in*
 337 *official physics*. But the extension of the Haas method produces the correct
 338 result:

$$\begin{aligned}
 m_e v_e^2 &= G m_p m_H R = \hbar v_e / R \\
 \Rightarrow v_e &= G m_p m_H / 2 \quad ; \quad R = 2 \hbar^2 m_e m_p m_H
 \end{aligned}
 \tag{41}$$

339 This means that the above electric constant a must be replaced by its grav-
 340 itational corresponding term $a_G = \hbar c / G m_p m_H$, and the gravitational energy
 341 writes $\hbar c / 2 a_G R$

342 Taking account of the critical condition, this writes in a symmetric way :

$$\hbar c/Gm_em_p = R/2\lambda_H = \sqrt{M/m'_e} \quad (42)$$

343 where $m'_e = m_em_p/(m_e + m_p)$ is the electron reduced mass.

344 This corresponds to the Eddington's approach, based on the *non standard*
345 *proton-electron symmetry*, where the statistical term involves the *total number of*
346 *electrons in the Universe*, introducing the following Single-Electron Cosmology.

347 5.2 The Universe ("Hubble-Lemaître") radius

348 This 3 minutes Hubble radius is $R = 13.8$ billion light-years, correcting the 13.7
349 value of the epoch, and was deposed in a closed draft at the French academy in
350 March 1998. It was published with much difficulty in 2006 by Pecker, against
351 the opposition of Narlikar (?). Laurent Gueroult placed this formula on the
352 French Wikipedia, in the section 'Analyse Dimensionnelle', but there was not
353 any reaction, proving the general apathy of the scientific community. Of course,
354 13.8 Giga years is not an Universe age but the time constant of renewal of the
355 new-born galaxies.

356 The standard cosmology has a part of truth, since its so-called Universe age
357 is precisely 13.8 Giga years. This Permanent Bang concept confirms the rapid
358 oscillation matter-antimatter of the Single electron Cosmology.

359 5.3 The Hubble constant

360 *Presently, 25 years after this discovery, the predicted value for the Hubble con-*
361 *stant, 70.8 (km/s)/Mpc, corrects the tension between the theoretical Hubble ra-*
362 *dius and its direct measurement. This is the rejection of the c-speed limitation*
363 *taboo, which is rather a frontier between two domains, the bradyons and the*
364 *tachyons. As predicted, it is exactly what the first observations of the Webb*
365 *Telescope reveals. So 3 minutes of real physics has done better than a whole*
366 *scientific community during a century.*

367 5.4 The steady-state cosmology single temporal parame- 368 ter

369 he steady-state cosmology is governed by a single temporal parameter, which is
370 identified to $t = R/c$. Considering the non-relativist gravitationnal and energy
371 of the receding galaxies, one shows that the critical condition is equivalent to

$$E_G + E_{kin} = 0 \quad E_G = -(3/10)Mc^2 \quad (43)$$

372 So the complement (7/10) is quite natural, identified to the dark energy.

373 5.5 The Eddington statistical radius

374 The 3 minutes formula Universe radius R is compatible with the Eddington's
375 statistical formulation of its *initial* Universe radius (rejecting the Big Bang but
376 admitting the Universe expansion), but without emphasis on the elimination of
377 c , using the cumbersome $c = 1$ in his equations.

378 5.6 The Eddington's Large Number Formulation

379 Eddington has interpreted the double correlation of the large numbers in physics
 380 as a statistical relation, while we use the Holographic principle which valid the
 381 critical condition, adopted by Eddington for different reason. Its best symmetric
 382 formulation involves the gravitational force between Proton and Electron:

$$\frac{\hbar c}{Gm_e m_p} = \frac{R}{2\lambda_p} = \sqrt{\frac{M}{m_e^{(red)}}} \quad (44)$$

383 where the reduced electron mass $m_e^{(red)} = m_e/(1+1/p)$ is identified to $m_e m_p/m_H$
 384 (14 ppb). This replacement of neutron by Hydrogen in the 3 minutes formula
 385 is justified by the gravitational di-Hydrogen model, entering the Holophysics
 386 which was deduced from it, since the holographic interpretation is direct from
 387 the formula, the factor 2 being identified with the Archimede testimony one,
 388 the ratio of the perimeter to the area of a unit radius disk.

389 *The Holographic Principle explains the critical condition.* It was not possible
 390 for Eddington since, strangely enough, the holography, this fundamental
 391 property of waves, was discovered only in 1947 (?) (section 2.1).

392 5.7 The Critical Mass Canonic Relation

393 This factor 2 disappears in the symmetric relation:

$$m_P^4 = M m_e m_p m_H. \quad (45)$$

394 *The Universe appears in the same footing that usual particles, electron, proton
 395 and Hydrogen. This means there is an external Cosmos, whose radius will
 396 be deduced by the Diophantine physics, showing it is defined by the standard
 397 monochromatic holography using l_P (section 3.1).*

398 6 The Cosmic role of the Weak Bosons

399 Moreover, the Hydrogen gravitational molecule model specifies the product
 400 $W \times Z$, symmetrizing the noted fact that a_G is of order W^8 (?), where the
 401 gravitational coupling is $a_G = R/2\lambda_e$:

$$\frac{R}{\sqrt{\lambda_p \lambda_H}} \approx (WZ)^4 \approx \frac{a a_w^{7/2}}{2\sqrt{5}} \quad (0.2 \text{ ppm}) \quad (46)$$

402 The central place of these weak bosons in standard model is quite justified.
 403 Also the seventh power of the weak coupling enters the Holic Principle
 404 predictions (section 2.1). This is confirmed in the following section.

405 THE MAIN APPLICATION OF THE PRINCIPLE OF CONCEPTUAL
 406 SYNTHESIS TO COSMOLOGY: THE "THREE-MINUTE CALCULATION"
 407 GIVES THE HALF-RADIUS AND THUS THE CRITICAL MASS OF THE
 408 UNIVERSE. Wikipedia, dimensional analysis in cosmology. Believing to dominate
 409 the theory, and forgetting the Principle of Approach, the officials have
 410 neglected the conceptual natural approach to cosmology. It is enough to exclude
 411 the light speed c , much too slow for the cosmic Coherence, replacing it

412 by the average of the atomic masses to obtain the half radius of the Universe,
 413 directly measurable (Box n°4) thus its critical mass, which implies, consider-
 414 ing the canonical gravitational ratio 10/3, a number of neutrons equal to the
 415 Eddington Great Number $1362^2 56$:

416 7 The Connection with the Single Electron Cos- 417 mology

418 With the above Cosmos radius R_c , the connection is:

$$R_1^3 \approx R_c R l_P \sqrt{3} (H/p)^2 (\pi\mu/\pi) \quad ; \quad \pi\mu = 3 + 1/(7 + 1/\sqrt{\mu}) \quad (47)$$

419 8 The Holographic Background

420 The Hydrogen gravitational molecule model induces an 1D-2D holographic re-
 421 lation involving the three wavelengths l_p, λ_e and $\sqrt{\lambda_p \lambda_H}$. The holographic
 422 natural extension 1D-3D involves the three wavelengths: λ_e, λ_{H_2} (the Hydrogen
 423 Molecule Compton wavelength) and the reduced wavelength of the Microwave
 424 background λ_{cmb} :

$$2\pi \frac{R}{\lambda_e} \approx \pi \left(\frac{\lambda_p \lambda_H}{l_P^2} \right)^2 \approx (4\pi/3) \left(\frac{\lambda_{cmb}}{\lambda_{H_2}} \right)^3 \quad (48)$$

425 The deviation 0.6 % is very close to the ratio $R/2^{128}$, and implies the factor
 426 p/p_W , where $p_W = 6\pi^5$ (section 3.5). This results in the following 4D holo-
 427 graphic formula involving the Lucas Number $N_L = 2^{127} - 1$:

$$N_L \approx \pi \frac{\lambda_{cmb}}{\lambda_e} \left(\pi \frac{\lambda_{cmb}}{\lambda_H} \right)^2 \Rightarrow T_{cmb} \approx 2.725\,820 \text{ Kelvin} \quad (49)$$

428 which is compatible with the most precise official cosmologic measurement, the
 429 background temperature 2.7255(6) Kelvin. *Note how Nature manages to divide*
 430 *the prime number N_L , with holographic factors.*

431 Eliminating H between $N_L \approx 2\pi^2 (\lambda_{cmb}/\lambda_e)^3 H^2$ and $R/l_K \approx 4H^4$ leads to :

$$F \frac{R l_K}{\lambda_e^2} \approx (2\pi^2 \left(\frac{\lambda_{cmb}}{\lambda_e} \right)^3)^2 \frac{137(a-1)\beta^2}{2a^2} \quad (0.3 \text{ ppm}) \quad (50)$$

432 *So the more precise official quantity (λ_{cmb}) connects with the most overall*
 433 *precise one (l_K), confirming the Hubble-radius R .*

434 After the acceleration of galaxy recession, the critical Universe, and the non-
 435 expansion of the Universe, all predicted by the steady-state cosmology, a forth
 436 prediction of Permanent Cosmology will arise:

437 *The next chocking surprise for the officials will be when the Webb telescope*
 438 *will show that the temperature is the same everywhere.*

439 This failure is the result of the choice of the physics community, to follow
 440 Einstein instead of Poincaré who have insisted on the inadequacy of differential
 441 equations in cosmology, because this would induce a multiplicity of universes
 442 (now, the official Multiverse). The introduction of Diophantine equations was

443 the real motivation to introduce the above Holic Principle, permitting to dis-
 444 tinguish Time, Length and Mass ratios in these Diophantine Equations. The
 445 section will recall how the simplest Diophantine Equation identifies with the
 446 third Kepler's law, leading to an essential symmetry between the Newton and
 447 Planck constants.

448 In the standard cosmology, an essential parameter is the ratio between the
 449 CMB photon number n_{ph} over the Universe atomic number $n_H = M/m_H$. We
 450 have noted that this ratio is about the square of ratio between the energy den-
 451 sity ratio u_{cr}/u_{CMB} . By taking account of the standard Neutrino background
 452 $u_{CNB} = u_{CMB} \times (n_\nu/8)(4/11)^{4/3}$ in the energy ratio. With the number of
 453 neutrino species $n_\nu = 3$ one observes another Eddington's type relation using
 454 the total energy density :

$$\sqrt{\frac{2n_{ph}}{n_H}} \approx \frac{u_{cr}}{u_{cmb} + u_{cnb}} \quad (0.4 \%) \quad (51)$$

455 This shows that the Cosmic Neutrino background takes an important part in
 456 the *total background which will be interpreted as a Cosmos Information Field in*
 457 *section 5.1.*

458 Moreover, the statistical ratio 11/4, which is the cube of the temperature
 459 ratio between the CMB and the Neutrino Field, appears directly in the cor-
 460 relations, leading to an holographic relation involving $\lambda_0 = (\lambda_e \lambda_H \lambda_{CMB})^{1/3} \approx$
 461 $r_e \lambda_e / \lambda_F$: where r_e is the Electron classical radius and λ_F the Fermi wavelength:

$$\sqrt{R/2\lambda_e} \approx (11/4)(\lambda_{cmb}/\lambda_e)^2 H / \sqrt{p\overline{pW}} \quad (0.3 \text{ ppm}) \quad (52)$$

$$\Rightarrow 2\pi \frac{R}{\lambda_p} \approx (4\pi/3) \left(\frac{2\lambda_{CNB}}{\lambda_0 \lambda_0} \right)^3$$

462 9 The Kotov tachyonic oscillation

463 According to the patent tachyonic character of the Kotov period t_K , which do
 464 not show Doppler shift for several quasars, the elimination of c between the
 465 gravitational and weak coupling constants is considered and found compatible
 466 with the identification: $\sqrt{a_G a_w} = t_K / t_e$, with $t_e = \hbar / m_e c^2$. The study of this
 467 expression leads to:

$$\frac{t_K}{P t_e} = \frac{\sqrt{a_G a_w}}{P} = \frac{F}{\sqrt{p\overline{H}}} = \frac{\mu^2}{a} = \frac{2\pi a_s p H}{F} \approx \frac{FW Z a n_t^2}{P} \approx \frac{(2\pi \Pi_+)^2 p H}{Z^2} \quad (53)$$

468 From the Optimal Correlation Principle, these relations were considered firstly
 469 (2004) as definitions of F and a_s , from the very precise determination of the
 470 Muon mass, *specifying the Fermi mass F with 2 more digits, which were con-*
 471 *firmed 8 years later.* The introduction of the Atiyah constant Γ was determinant
 472 to fix the a_w value through (?):

$$a_w = F^2 = (2 \times 137 \times \Gamma)^3 \quad (54)$$

473 This permits to specifies the strong coupling a_s and the muon mass to the
 474 ppb precision. The latter implies the tau mass through the Koide relation (?)
 475 which involves the sum $(\tau + \mu + 1) = (2/3)(\sqrt{\tau} + \sqrt{\mu} + 1)^2$, which checks:

$$p_K = (1 + \mu + \tau)/2 = (1 + \sqrt{\mu} + \sqrt{\tau})/3 \approx 4\pi(apH)^{1/4} \text{ (0.5 ppm)} \quad (55)$$

476 calling for a real consideration of the Koide relation.

477 It is observed that the Kotov length $l_K = ct_K$ correlates with the Single
 478 electron Radius::

$$\begin{aligned} R_1/l_K &= a_w(4\pi p/p_W)^2 \\ \Rightarrow (4\pi p/p_W)^2 l_K^3 &= RR_1\lambda_e/2 \end{aligned} \quad (56)$$

479 where $p_W = 6\pi^5$

480 10 The prophetic Eddington's Fundamental The- 481 ory

482 In the spirit of Pythagoras, the father of the Natural Philosophy, the central
 483 parameters, apart such basic constants as π and e , must be whole numbers, and,
 484 in the first place, the number 137. Indeed, Physics is based on Mathematics, but
 485 the later is based on *Arithmetics, the queen of Mathematics, as Gauss stated.*

486 The number 137 has been justified, among other parameters, by Sir Stanley
 487 Eddington. He also predicted the Tau Lepton, with a right estimation of mass
 488 and, from the large number correlations, he deduced an optimal Universe, whose
 489 horizon is confirmed by the most recent measurements of the Hubble radius. It
 490 has been discarded because of the factor 7 error in the initial Hubble measure-
 491 ment of the observable universe radius. This Eddington cosmology connects
 492 gravitation and quantum theory, the two pillars of physics which cannot be tied
 493 by the standard physics.

494 This number 137 is encountered in the Bible: in particular the lifetime of
 495 Ismaël, Lévi and Amram.

496 Prisoners of an Unique Thought, Dogmatism and Censorship, the standard
 497 system has not realized that the new measurements of the Hubble constant
 498 rehabilitates the Eddington's theory. The standard system also neglected the
 499 necessary simplification of Units. This leads nowadays to a separation between
 500 physicists and engineers: technology is rising up but not the fundamental knowl-
 501 edge: the first article on the laser has been refused to publication, opening 20
 502 years of procedure. As the laser effect is always unexplained, this means a block-
 503 age in the quantum physics interpreta tion, which must begin by cosmology, as
 504 the three minutes calculus shows.

505 In particular, the standard unit of mass in theoretical physics is the cumber-
 506 some electron-volt. Instead, the choice of the electron mass permits to observes
 507 dramatic relations between the *so called free-parameters.*