

PYTHAGOREAN NATURE

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Abstract

Crucial Pythagorean scientific developments, checkable by everyone, have been missed, refuting the Universe expansion and the initial Big Bang model, imposing 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 is an 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} , resolving so 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 is 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. This confirms the Higgs mass is tied to the third perfect couple 495-496. The so-called "free parameters", as well as the Archimedes pi, are confirmed to be computation basis, in liaison with the Holography and Holic Principles, opening the way to a revolution in mathematics where the Happy Family of the sporadic groups and the Egyptian Nombrol 3570 are central. The parameter values are deduced in the ppb domain by Optimal Polynomial Relations involving the Large Lucas Prime Number, the forth (last) term of the Combinatorial Hierarchy. The photon-neutrino background manages to divide this prime number by holographic terms respecting the symmetry electron-hydrogen. The data analysis rehabilitates the Wyler's and the Eddington theory, which predicted correctly the supersymmetry Proton-Tau. The tachyonic synthesis defines the Neuron, the characteristic time of the neuro-musical Human, corresponding to 418/8 Hz, three octavus down the La bemol for the chording 442.9. The Total Quantum Physics introduces the Human Measure Mass \times Height, and connects with the Solar system, the CMB and the DNA through musical scales, introducing the Cosmobiology where the CMB is identified with the genetic code of the Universe. The classical Anthropic Principle is replaced by the "Solanthropic" one, meaning the triplet Solar System - Earth - Human is alone in the Cosmos. In the general Devolution scheme, opposite to the Darwin's myth and explaining the fall of the official science, this predicts a total of Human beings of 38 billions.

46 **Contents**

47	1 THE MISSED PHYSICS	3
48	1.1 The Single Electron Cosmology: oscillation matter-antimatter . . .	3
49	1.2 The Universe as a fusion reactor	4
50	1.3 The Diophantine Kepler Laws, the Cosmos and the Topon	8
51	1.4 The Three Minutes calculus	10
52	1.4.1 The Gravitational di-hydrogen Model	11
53	1.4.2 The Universe ("Hubble-Lemaître") radius	12
54	1.4.3 The Hubble constant	12
55	1.4.4 The steady-state cosmology single temporal parameter . .	12
56	1.4.5 The Eddington statistical radius	13
57	1.4.6 The Eddington's Large Number Formulation	13
58	1.4.7 The Critical Mass Canonic Relation	13
59	1.4.8 The Cosmic role of the Weak Bosons	13
60	1.4.9 The Connection with the Single Electron Cosmology . . .	14
61	1.5 The Holographic Background	14
62	1.6 The Kotov tachyonic oscillation	15
63	1.7 The prophetic Eddington's Fundamental Theory	16
64	1.8 The Temporal Fermi Cosmic Connection	16
65	2 THE INDUCTIVE SCIENTIFIC METHOD	18
66	2.1 The Optimal Correlation Principle	18
67	2.2 The Optimized Gravitation Constant	18
68	2.3 The Universe as a mono-atomic star	21
69	2.4 The pertinence of the Eddington's 136 and 137	21
70	2.5 Musical Relations implied by the Kotov Tachyon	22
71	2.6 The Combinatorial Hierarchy	23
72	2.7 The Physical Musical Frequency	24
73	2.8 The Decisive Egyptian number $\tau_0 = 3570$	24
74	3 HOLOPHYSICS	25
75	3.1 The Holographic Principle	25
76	3.2 The Holic Principle	26
77	3.2.1 The Holic-Holographic mono-electron radius $R1$	27
78	3.3 The Musical Cosmic Holography	27
79	3.4 The Higgs number and the Economic Formalism	28
80	3.5 The Tachyo-Holography, Photon and Graviton Masses	29
81	3.6 The Wien constant and the Bernoulli Function	30
82	3.7 The Eddington's Hyper-Symmetry Proton-Tau	31
83	4 DIOPHANTINE PHYSICS	32
84	4.1 The Systema Number and the Great Musical Scale	32
85	4.2 The Cosmic Axis and the Bosonic String Theory	33
86	4.3 The red-shift periodicity	34
87	4.4 The rehabilitation of Wyler's Formulas	34
88	4.5 The Symbolic Holographic Principle	35
89	4.6 The Electric π_q value	36
90	4.7 The Lucas and Euler Large Mersenne Numbers	36
91	4.8 The Electrical Moonshine	37

92	4.9	The Monster Group	37
93	4.10	The Atiyah's Algebra Formula	38
94	4.11	The Ramanujan-Hardy Partition Formula	38
95	4.12	The Economic Numbers	38
96	4.13	The Lucas-Lehmer series and the Pell-Fermat generator	39
97	4.14	The Monster Number π_5 in the π fractional series	39
98	4.15	The Golden Number and its powers	40
99	5	DIOPHANTINE ASTRONOMY	40
100	5.1	The Kotov, Schwabe, Milankovitch and Cosmic cycles	40
101	5.2	The Music of the Sun	41
102	5.3	The Sun-Earth couple and the Great Musical Scale	42
103	5.4	The Earth-Moon couple and the quark symbolic masses	43
104	5.5	The Solar System and the gauge couplings	44
105	6	COSMOBIOLOGY	45
106	6.1	The CMB as the genetic code of the Universe	45
107	6.2	The Cosmo-Thermal Relations	45
108	6.3	The DNA, the Cosmic Oscillation and the quarks symbolic masses	47
109	6.4	The Egyptian Meter as natural unit	48
110	6.5	The Human Measure and the Absolute Speed	48
111	6.6	The three human units, meter, kilogram and second	49
112	6.7	The Devolution Number	50
113	7	Conclusion: The Pythagorean Solanthropy	50
114	7.1	The two rival cosmologies	52
115	7.2	The merging of the two rival cosmologies	53
116		Bibliography	53

117 1 THE MISSED PHYSICS

118 The official physics have missed several elementary, but crucial approaches. In
119 particular, this is due to a much excessive confidence to present mathematics,
120 which is always unable to explain the 30 or so "free parameters". Only Ed-
121 dington explained the origin of the number 137 in physics, but as soon as the
122 electrical constant $a \approx 137.0359991$ appeared to be slightly different, the offi-
123 cials rejected the Eddington Fundamental Theory. This forgetting of the Science
124 history (for instance the atomic masses was *not exactly* whole multiples of the
125 hydrogen mass) implied the present crisis in Physics.

126 1.1 The Single Electron Cosmology: oscillation matter- 127 antimatter

128 According to a famous discussion between Wheeler and Feynman [10], the for-
129 mer proposed that the best explanation for the identity of electrons is to admit
130 there is only one such Electron, which rapidly sweeps the landscape, with trans-
131 formation in a Positron at each backward time passage.

132 The distribution of the Haas-Bohr trajectories obeys the n^2 factor. A space
 133 paving would be more natural through a series of spheres whose radius fol-
 134 lows the direct n rule. So we consider the following *dynamic paving*, checking
 135 $2\pi m_e r_n v_n = h$:

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

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

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

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

144 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-
 145 nation of l_K and \sqrt{a} leads to the ppb holographic relation:

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

146 where $\pi_{\tau d_e/\mu} = 3 + 1/(7 + \mu/\tau d_e)$. This confirms the above symbolic holographic
 147 principle, specifying the π_q value, so the electric charge adimensional value
 148 $q = \sqrt{4\pi_q/a}$ in the ppb range.

149 A detailed study suggests that the dark matter is a dephased matter-abtimatter
 150 oscillation.

151 1.2 The Universe as a fusion reactor

152 Arguing for the steady-state cosmology, Thomas Gold proposed that the Uni-
 153 verse can be thought as a fusion reactor transforming Hydrogen in Helium in an
 154 on-going process [14], for which the energy efficiency is $1 - m_{He}/4m_H \approx 1/140$.
 155 This would imply the existence of a background field. From the total crit-
 156 ical mass $M = Rc^2/2G$, the critical mass density is $\rho_{cr} = 3c^2/(8\pi GR^2) \approx$
 157 $9.5 \cdot 10^{-27} \text{ kg m}^{-3}$. Taking account of the baryon relative density of 0.045, and a
 158 Helium mass ratio of about 0.25, this means a mass density of Helium of about
 159 $0.25 \times 0.045 \times 9.5 \cdot 10^{-27} = 1.06 \cdot 10^{-28} \text{ kg m}^{-3}$, and the radiant energy released
 160 by the fusion process has for density $(1/140) 1.06 \times 10^{-28} c^2 \approx 6.4 \cdot 10^{-14} \text{ J m}^{-3}$.
 161 Equalizing this density with the black body energy density $(\pi^2/15)(kT)^4/(\hbar c)^3$
 162 leads to $T \approx 3.0 \text{ K}$. Taking account of the above neutrino field, the factor $\pi^2/15$
 163 must be replaced by 1.106, leading to a temperature 2.7 Kelvin, sufficient close
 164 to the real value to furnish a strong argument in favor of Coherent Cosmology.

165 But it was not published at this epoch, because the two other co-authors,
 166 Hoyle and Bondi, wanted to precise the thermal mechanism, while Gold argued
 167 that Nature is always prolific in producing thermostatic agents. Hoyle recog-
 168 nized later that the whole development of cosmology would have been different
 169 if they had accepted the Gold's idea, without identifying the thermostatic agent:
 170 this model not only predicted the background , but also its *correct temperature*,

171 which was far from being the case for the Big Bang cosmology. Later, the ab-
 172 sence of such an internal agent was used against the steady-state model, while
 173 some have invoked iron whiskers [40], but were not convincing. *Of course, there*
 174 *is an external thermostatic agent: the Cosmos itself* (section 5.2).

175 The following Letter has been submitted in January 2023 to Astrophysical
 176 journals

177 Steady-state Universe as a fusion reactor

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

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

184
 185 Arguing for the steady-state cosmology (Bondy and Gold 1948; Hoyle 1948),
 186 Thomas Gold proposed in that epoch that the real Universe can be represented
 187 as a fusion reactor transforming hydrogen to helium in a permanent on-going
 188 process (see Hoyle et al. 2000). Let us examine his argument on the basis of
 189 the most recent cosmological observations (Workman et al. 2022).

190 The helium mass proportion in the observed Universe is close to 0.24, and the
 191 steady-state theory postulates this fraction must be constant in time. According
 192 to the hydrogen atom mass, $m_H = 1.00784$ amu (atomic mass unit: 1 amu =
 193 1.66054×10^{-27} kg), and that of a helium atom, $m_{^4_2\text{He}} = 4.00260$ amu, this
 194 fusion reaction is accompanied by the mass defect

$$\Delta m = 4m_H - m_{^4_2\text{He}} = 4 \times 1.00784 - 4.00260 = 0.02876 \text{ amu}, \quad (4)$$

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

$$\frac{\Delta m}{4m_H} = 1 - \frac{m_{^4_2\text{He}}}{4m_H} \approx \frac{1}{140}. \quad (5)$$

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

198 With the Universe obeying critical condition, the total Universe's mass $M =$
 199 $Rc^2/2G$, where $R = 1.372(10) \times 10^{26}$ m (or 14.5×10^9 light-years) is the Hubble
 200 length (the standard error is shown in brackets, and notations are usual), and
 201 this leads to the critical mass density

$$\rho_{cr} = \frac{3c^2}{8\pi GR^2} \approx 8.539 \times 10^{-27} \text{ kg m}^{-3}. \quad (6)$$

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

$$\rho_{\text{He}} = 0.24 \times 0.045 \times \rho_{cr} \approx 0.922 \times 10^{-28} \text{ kg m}^{-3}. \quad (7)$$

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

$$u_f = \frac{1}{140} \rho_{He} c^2 \approx 5.919 \times 10^{-14} \text{ J m}^{-3}. \quad (8)$$

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

$$u_{CMB} = \frac{\pi^2 (kT)^4}{15 (\hbar c)^3}. \quad (9)$$

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

$$T = \frac{1}{k} \left(\frac{15}{140\pi^2} \rho_{He} \hbar^3 c^5 \right)^{1/4} \approx 2.97 \text{ K}. \quad (10)$$

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

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

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

$$u_{rad} = \left[1 + \frac{21}{8} \left(\frac{4}{11} \right)^{4/3} \right] u_{CMB} \approx 1.68 u_{CMB}. \quad (12)$$

217 Thus, the factor $\pi^2/15 \approx 0.66$ in Eqs. (6) and (7) must be replaced by
218 $(\pi^2/15) \times 1.68 \approx 1.105$, producing $T = 2.61$ K, remarkably close to the observed
219 value. This gives the strong argument in favor of the steady-state cosmology.

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

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

$$\sqrt{2n_{ph}/n_H} \approx u_{cr}/u_R \Rightarrow T \approx 2.73 \text{ Kelvin} \quad (13)$$

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

$$\hbar c/Gm_em_p = \sqrt{M/m'_e} = R/2\lambda_H \quad \Rightarrow \quad R \approx 13.8 \text{ Gly} \quad (14)$$

240 Strangely enough, Eddington did not remark that the above Large Number is
 241 close to the most famous mathematical Large number, the prime Lucas num-
 242 ber $N_L = 2^{127} - 1$. The computer shows, with the normalized Fermi mass
 243 $F = m_F/m_e$, defined by the Fermi constant $G_F = \hbar^3/m_F^2 c$, and with the
 244 Single-Electron universe radius R_1 , which depends only on the Compton electron
 245 wavelength λ_e and the Bohr radius $r_B = a\lambda_e(1 + 1/p)$, where $a \approx 137.0359991$,
 246 $p \approx 1836.152673$ and $p_W = 6\pi^5$

$$N_L \approx (2\pi\lambda_{hol}/\lambda_e)(\pi(\lambda_{hol}/\lambda_H)^2) \quad \Rightarrow \quad T_{hol} = \frac{\hbar c}{k\lambda_{hol}} \approx 2.7258205 \text{ Kelvin} \quad (15)$$

$$\frac{F^5}{6} = \left(\frac{\lambda(F)}{\lambda_e}\right)^3 \quad \Rightarrow \quad T(F) = \frac{\hbar c}{k\lambda(F)} \approx 2.725820(3) \text{ Kelvin} \quad (16)$$

$$\lambda_1 = (p+1) \left(\frac{R_1 l_P}{2\pi p_W}\right)^{1/2} \quad \Rightarrow \quad T_1 = \frac{\hbar c}{k\lambda_1} \approx 2.7258206 \text{ Kelvin} \quad (17)$$

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

$$r_{HB} = \frac{\sum_{n=2}^{R_1/\lambda_e} 1/n}{\sum_{n=2}^{R_1/\lambda_e} 1/n^2} \Rightarrow R_1 \approx 1.49365473 \times 10^{26} \text{ m} \approx 15.774311559 \text{ Gal} \quad (18)$$

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

$$m_P^4 \approx Mm_em_pm_H. \quad (19)$$

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

$$R = 2GM/c^2 \quad \Rightarrow \quad \pi(R/l_P)^2 = 2\pi R/d \quad (20)$$

255 So the inflation hypothesis is not necessary to explain the critical character.
 256 This has not been emphasized because d is much smaller (2.5×10^{-61}) that
 257 the Planck length. This may be considered as a Space quantum (Sanchez et al
 258 2022).

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

266 This Hubble radius is also equivalent to the radius defined in our grav-
 267 itational hydrogen molecule model, which is characterized by the following
 268 holographic formulation, where l_P is the Planck length, $\lambda_e = \hbar/m_e c$, $\lambda_p =$
 269 $\hbar/m_p c$, $\lambda_H = \hbar/m_H c = 2\lambda_{2H}$, $T_{hol} = \frac{\hbar c}{k\lambda_{hol}}$

$$2\pi \frac{R}{\lambda_e} = \pi \frac{\lambda_p \lambda_H}{l_P^2} = (4\pi/3) \left(\frac{\lambda_{hol}}{\lambda_{2H}} \right)^3 \Rightarrow T_{hol} \approx 2.731 \text{ Kelvin.} \quad (21)$$

270 where the term c^3 eliminates, both in 1D-2D and the 2D-3D holographic
 271 relations. So the simple non- c dimensional analysis starting from \hbar, G, m_0 , where
 272 m_0 is the geometric mean between the 3 main atomic particles, electron, proton,
 273 neutron, gives directly half the Hubble radius $R/2$. This was deposited in March
 274 1997 at the Paris Academy. And the simple non- c dimensional analysis starting
 275 from \hbar, G, kT gives $G\hbar^4/(kT)^3$ as the five power of the hydrogen Compton
 276 wavelength, with a numerical coefficient close to 8/3. So, the above 1D-2D-3D
 277 holographic relations could have been discovered by elementary study.

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

$$\sqrt{R/2\lambda_e} \approx (11/4)(\lambda_{CMB}/\lambda_e)^2 \Rightarrow T_{CMB} \approx 2.7266 \text{ Kelvin} \quad (22)$$

279 The classical gravitational energy of the critical Universe is

$$E_{grav} = -(3/5) \frac{GM^2}{R} \quad ; \quad R = 2GM/c^2 \Rightarrow E_{grav} = -(3/10)Mc^2 \quad (23)$$

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

$$-E_{grav}/m_H c^2 = 136 \times 2^{256} \Rightarrow R_{Ed} \approx 13.8 \text{ Gly} \quad (24)$$

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

$$\sqrt{R_{mam} l_P} \approx \lambda_{mam} \Rightarrow R_{mam} \approx 13.8 \text{ Gly} \quad (25)$$

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

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

292

293 1.3 The Diophantine Kepler Laws, the Cosmos and the 294 Topon

295 We have shown that the quantification of Length and Time in Kepler's laws
 296 implies an angular momentum quantum, identified with the reduced Planck's
 297 constant, showing a mass-symmetry with the Newtonian constant G . This leads

298 to the *Diophantine Coherence Theorem* which generalizes the synthetic resolu-
 299 tion of the Hydrogen spectrum by Arthur Haas, three years before Bohr [30].
 300 Any mass pair (m_G, m_{\hbar}) is associated to a series of Keplerian orbits :

$$L_n = \frac{(n \hbar)^2}{G m_G m_{\hbar}^2} \quad . \quad (26)$$

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

$$m_G = \frac{m_P^2}{m_N} = m_A \quad ; \quad m_{\hbar} = m_e \quad (27)$$

303 This means that another choice $m_G = m_e; m_{\hbar} = m'_P$ is a priori possible, by in-
 304 troducing *the Planck-Nambu mass* $m'_P = m_P/\sqrt{a}$, which is close to the *Human*
 305 *Oocyte mass*. Indeed, with a biological density of 1.05 g/ml [9], the Planck-
 306 Nambu mass corresponds to a sphere of diameter 0.15 mm: this is exactly the
 307 diameter of the oocyte in its maximal extension. Note that the Planck mass is
 308 very large by respect to the standard particles, and this is called the Hierarchy
 309 problem in Particle Physics. It is strange that nobody, including the tenants of
 310 the classical Anthropic Principle did not insist on its proximity with the Human
 311 oocyte mass.

312 The following lengths are tied by the Bekenstein-Hawking holographic rela-
 313 tion:

$$R_{hol} = \frac{2\hbar^2}{G m_N^3} \quad ; \quad R_C = \frac{2\hbar^2}{G m_P'^3} \quad (28)$$

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

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

$$u = R_{hol}/R = pH/a^3 \quad (29)$$

317 With $M_{hol} = R_{hol}c^2/2G$, the critical mass of the sphere of radius R_{hol} ,
 318 one observes the Geo-Dimensional Cosmos-Universe Couple Relation, where
 319 $t_H = R/c$ is the Hubble time constant of the exponential galaxy recession :

$$\ln^2(R_C/\lambda_e) - \ln^2(M_{hol}/m_e) \approx \ln^2(R/\lambda_e) + \ln^2(t_H/t_e) = 2 \ln^2(t_H/t_e) \quad (30)$$

320 which confirms the G value to 10 ppm precision [31].

321 There is a direct holographic pbp connection between the cosmic reduced
 322 holographic radius and the Neuron:

$$4\pi\eta(t_N/t_e)^2 \approx 2\pi R_{hol}/\lambda_e \quad (\eta = 1 + 2/(3 \times 139)) \quad (31)$$

323 Now the question is: what is the passage from the above 2D-1D holography
 324 to the 3D world ? This was predicted in a "closed draft" at the French Academy
 325 (March 1997), in addition to the 3 minutes formula: *a sphere is generated by the*
 326 *rotation of a disk around a diameter* [31], in the spirit of the scanning holography
 327 which showed so efficient in practical holography, where a spherical reference
 328 wave is generated by a laser beam rotating around its beam waist. Thus, the
 329 above entropy relation is simply extended:

$$\pi(R_{hol}/l_P)^2 = 2\pi R_C/d_0 = 2\pi N_m R_C/\lambda_m \quad ; \quad \lambda_m = N_m d_0 \quad (32)$$

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

332 There is a dramatic holographic confirmation of the pertinence of this Cosmic
 333 holographic reduced radius :

$$4\pi(R_{hol}/\lambda_{Wi})^2 \approx e^a \quad (33)$$

334 where λ_{Wi} is the Wien CMB wavelength (Table 1). This perfect holographic
 335 formula shows that the CMB, despite its thermal spectral distribution, supports
 336 information, as is confirmed by the CMB Anisotropy Distribution which follows
 337 a precise statistical function [1]. *This suggests that the background field must be*
 338 *considered as the cosmo-genetic code of the Universe, as confirmed below.*

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

$$m_A/m_e \approx a_w^2 n_t^6 \approx (4/3)\tau^{12}, \quad (34)$$

341 leading to the symbolic holographic relation :

$$\pi_q a_w^2 \approx (4\pi/3)\sqrt{(a/137)(\tau^4/n_t^2)^3} \quad (5.3 \text{ ppm}). \quad (35)$$

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

$$\frac{R_C}{l_P} \approx \beta \tau_0^{(\beta a)^2/4 \times 137} \quad (0.7 \text{ ppm}) \quad (36)$$

344 The improbability of this relation excludes any possibility of chance : the Co-
 345 herent Cosmology [31] is confirmed.

346 1.4 The Three Minutes calculus

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

$$F_{qq} = \frac{\hbar c}{al^2} \quad a \approx 137.0359991 \quad (37)$$

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

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

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

373 According to Henri Poincaré (Dernières Pensées, Conférence de Londres,
 374 1913), the main universal constants are invariant, because any variation would
 375 deny the Physics existence.

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

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

- 388 1. The cosmology was never considered before as a normal physical theory.
- 389 2. The rejection of c , corresponding to tachyonic physics, was never consid-
 390 ered before.
- 391 3. This calculus gives the single parameter of the steady-state cosmology,
 392 13.8 Giga years, showing that the Hubble radius is invariant: no more
 393 Universe expansion nor Initial Bang.
- 394 6. No-one take care of this result: the officials are too confident to established
 395 theory.

396 1.4.1 The Gravitational di-hydrogen Model

397 Three years before Bohr, Arthur Haas obtained the atom radius r , simply by
 398 the identification of three energy forms, where v_e is the electron speed, and
 399 $\lambda_e = \hbar/m_e c$ the electron's Compton's wavelength:

$$\begin{aligned}
 m_e v_e^2 &= \hbar c / ar = \hbar v_e / r \\
 \Rightarrow v_e &= c/a \quad ; \quad r = a \lambda_e
 \end{aligned}
 \tag{38}$$

400 Consider the tiny gravitational force between a proton and an hydrogen
 401 atom, both orbiting on a circle of invariant radius R , where an electron is also
 402 circulating with the speed v_e . *Such a 3-body problem is declared insoluble in*

403 *official physics.* But the extension of the Haas method produces the correct
 404 result:

$$\begin{aligned}
 m_e v_e^2 &= G m_p m_H R = \hbar v_e / R \\
 \Rightarrow v_e &= G m_p m_H / 2 \quad ; \quad R = 2 \hbar^2 m_e m_p m_H
 \end{aligned}
 \tag{39}$$

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

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

$$\hbar c / G m_e m_p = R / 2 \lambda_H = \sqrt{M / m'_e}
 \tag{40}$$

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

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

413 1.4.2 The Universe ("Hubble-Lemaître") radius

414 This 3 minutes Hubble radius is $R = 13.8$ billion light-years, correcting the 13.7
 415 value of the epoch, and was deposed in a closed draft at the French academy in
 416 March 1998. It was published with much difficulty in 2006 by Pecker, against
 417 the opposition of Narlikar [29]. Laurent Gueroult placed this formula on the
 418 French Wikipedia, in the section 'Analyse Dimensionnelle', but there was not
 419 any reaction, proving the general apathy of the scientific community. Of course,
 420 13.8 Giga years is not an Universe age but the time constant of renewal of the
 421 new-born galaxies.

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

425 1.4.3 The Hubble constant

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

433 1.4.4 The steady-state cosmology single temporal parameter

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

$$E_G + E_{kin} = 0 \quad E_G = -(3/10) M c^2
 \tag{41}$$

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

438 **1.4.5 The Eddington statistical radius**

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

443 **1.4.6 The Eddington's Large Number Formulation**

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

$$\frac{\hbar c}{Gm_e m_p} = \frac{R}{2\lambda_p} = \sqrt{\frac{M}{m_e^{(red)}}} \quad (42)$$

448 where the reduced electron mass $m_e^{(red)} = m_e/(1+1/p)$ is identified to $m_e m_p/m_H$
 449 (14 ppb). This replacement of neutron by Hydrogen in the 3 minutes formula
 450 is justified by the gravitational di-Hydrogen model, entering the Holophysics
 451 which was deduced from it, since the holographic interpretation is direct from
 452 the formula, the factor 2 being identified with the Archimede testimony one,
 453 the ratio of the perimeter to the area of a unit radius disk.

454 *The Holographic Principle explains the critical condition.* It was not possible
 455 for Eddington since, strangely enough, the holography, this fundamental
 456 property of waves, was discovered only in 1947 [12] (section 2.1).

457 **1.4.7 The Critical Mass Canonic Relation**

458 This factor 2 disappears in the symmetric relation:

$$m_p^4 = M m_e m_p m_H. \quad (43)$$

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

463 **1.4.8 The Cosmic role of the Weak Bosons**

464 Moreover, the Hydrogen gravitational molecule model specifies the product
 465 $W \times Z$, symmetrizing the noted fact that a_G is of order W^8 [7], where the
 466 gravitational coupling is $a_G = R/2\lambda_e$:

$$\frac{R}{\sqrt{\lambda_p \lambda_H}} \approx (WZ)^4 \approx \frac{a a_w^{7/2}}{2\sqrt{5}} \quad (0.2 \text{ ppm}) \quad (44)$$

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

470 THE MAIN APPLICATION OF THE PRINCIPLE OF CONCEPTUAL
 471 SYNTHESIS TO COSMOLOGY: THE "THREE-MINUTE CALCULATION"

472 GIVES THE HALF-RADIUS AND THUS THE CRITICAL MASS OF THE
 473 UNIVERSE. Wikipedia, dimensional analysis in cosmology. Believing to dom-
 474 inate the theory, and forgetting the Principle of Approach, the officials have
 475 neglected the conceptual natural approach to cosmology. It is enough to ex-
 476 clude the light speed c , much too slow for the cosmic Coherence, replacing it
 477 by the average of the atomic masses to obtain the half radius of the Universe,
 478 directly measurable (Box n°4) thus its critical mass, which implies, consider-
 479 ing the canonical gravitational ratio $10/3$, a number of neutrons equal to the
 480 Eddington Great Number $1362^2 56$:

481 1.4.9 The Connection with the Single Electron Cosmology

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

$$R_1^3 \approx R_c R l_P \sqrt{3} (H/p)^2 (\pi\mu/\pi) \quad ; \quad \pi\mu = 3 + 1/(7 + 1/\sqrt{\mu}) \quad (45)$$

483 1.5 The Holographic Background

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

$$2\pi \frac{R}{\lambda_e} \approx \pi \left(\frac{\lambda_p \lambda_H}{l_p^2} \right)^2 \approx (4\pi/3) \left(\frac{\lambda_{cmb}}{\lambda_{H_2}} \right)^3 \quad (46)$$

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

$$N_L \approx \pi \frac{\lambda_{cmb}}{\lambda_e} \left(\pi \frac{\lambda_{cmb}}{\lambda_H} \right)^2 \Rightarrow T_{cmb} \approx 2.725\,820 \text{ Kelvin} \quad (47)$$

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

495 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 :

$$F \frac{R l_K}{\lambda_e^2} \approx (2\pi^2 \left(\frac{\lambda_{cmb}}{\lambda_e} \right)^3)^2 \frac{137(a-1)\beta^2}{2a^2} \quad (0.3 \text{ ppm}) \quad (48)$$

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

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

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

503 This failure is the result of the choice of the physics community, to follow
 504 Einstein instead of Poincaré who have insisted on the inadequacy of differential
 505 equations in cosmology, because this would induce a multiplicity of universes

506 (now, the official Multiverse). The introduction of Diophantine equations was
 507 the real motivation to introduce the above Holic Principle, permitting to dis-
 508 tinguish Time, Length and Mass ratios in these Diophantine Equations. The
 509 section will recall how the simplest Diophantine Equation identifies with the
 510 third Kepler's law, leading to an essential symmetry between the Newton and
 511 Planck constants.

512 In the standard cosmology, an essential parameter is the ratio between the
 513 CMB photon number n_{ph} over the Universe atomic number $n_H = M/m_H$. We
 514 have noted that this ratio is about the square of ratio between the energy den-
 515 sity ratio u_{cr}/u_{CMB} . By taking account of the standard Neutrino background
 516 $u_{CNB} = u_{CMB} \times (n_\nu/8)(4/11)^{4/3}$ in the energy ratio. With the number of
 517 neutrino species $n_\nu = 3$ one observes another Eddington's type relation using
 518 the total energy density :

$$\sqrt{\frac{2n_{ph}}{n_H}} \approx \frac{u_{cr}}{u_{cmb} + u_{cnb}} \quad (0.4 \%) \quad (49)$$

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

522 Moreover, the statistical ratio 11/4, which is the cube of the temperature
 523 ratio between the CMB and the Neutrino Field, appears directly in the cor-
 524 relations, leading to an holographic relation involving $\lambda_0 = (\lambda_e \lambda_H \lambda_{CMB})^{1/3} \approx$
 525 $r_e \lambda_e / \lambda_F$: where r_e is the Electron classical radius and λ_F the Fermi wavelength:

$$\sqrt{R/2\lambda_e} \approx (11/4)(\lambda_{cmb}/\lambda_e)^2 H / \sqrt{ppw} \quad (0.3 \text{ ppm}) \quad (50)$$

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

526 1.6 The Kotov tachyonic oscillation

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

$$\frac{t_K}{Pt_e} = \frac{\sqrt{a_G a_w}}{P} = \frac{F}{\sqrt{pH}} = \frac{\mu^2}{a} = \frac{2\pi a_s p H}{F} \approx \frac{FWZan_t^2}{P} \approx \frac{(2\pi\Pi_+)^2 p H}{Z^2} \quad (51)$$

532 From the Optimal Correlation Principle, these relations were considered firstly
 533 (2004) as definitions of F and a_s , from the very precise determination of the
 534 Muon mass, *specifying the Fermi mass F with 2 more digits, which were con-*
 535 *firmed 8 years later.* The introduction of the Atiyah constant Γ was determinant
 536 to fix the a_w value through [31]:

$$a_w = F^2 = (2 \times 137 \times \Gamma)^3 \quad (52)$$

537 This permits to specifies the strong coupling a_s and the muon mass to the
 538 ppb precision. The latter implies the tau mass through the Koide relation [17]
 539 which involves the sum $(\tau + \mu + 1) = (2/3)(\sqrt{\tau} + \sqrt{\mu} + 1)^2$, which checks:

$$p_K = (1 + \mu + \tau)/2 = (1 + \sqrt{\mu} + \sqrt{\tau})/3 \approx 4\pi(apH)^{1/4} \text{ (0.5 ppm)} \quad (53)$$

540 calling for a real consideration of the Koide relation.

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

$$\begin{aligned} R_1/l_K &= a_w(4\pi p/p_W)^2 \\ \Rightarrow (4\pi p/p_W)^2 l_K^3 &= RR_1 \lambda_e/2 \end{aligned} \quad (54)$$

543 where $p_W = 6\pi^5$

544 1.7 The prophetic Eddington's Fundamental Theory

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

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

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

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

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

571 1.8 The Temporal Fermi Cosmic Connection

572 In the 3 minutes calculation, from the constants $\hbar, G, m_0 = (m_e m_p m_H)^{1/3}$,
 573 looking for a time instead of a length, leads to :

$$\frac{\hbar^3}{G^2 m_0^5} \approx 5.52 \times 10^{57} \text{ s} \quad (55)$$

574 It is well known that the cosmic critical density is tied to the Hubble time
575 $t_H = R/c$ by : $\rho_c = 3/8\pi G t_H^2$. So it is natural to compute the time given by
576 the triplet : \hbar, ρ_c, G_F , involving the Fermi constant instead of G . One obtains:

$$t_{\hbar, \rho_c, G_F} = \frac{\hbar^4}{\rho_c^{3/2} G_F^{5/2}} \approx 5.48 \times 10^{57} \text{ s} \approx t_K(O_M/\sqrt{2} \approx e^a/F) \quad (56)$$

577 where O_M is the Monster Group cardinal. The proximity of these times indicates
578 a fundamental property of the parameters. Introducing the R value in the first
579 expression, the identification leads to,:

$$t_{\hbar, \rho_c, G_F} = \frac{\hbar R}{2Gm_0^2} \Rightarrow (m'_0/m_e)^{3/2} \approx (4\pi)^2 \sqrt{a} \quad (42 \text{ ppm}) \quad (57)$$

580 this number is close to the last Euler idoneal number 1848, noted in a preceeding
581 analysis [32]. Note the liaison:

$$e\Phi^3 \approx \frac{495}{\sqrt{1848}} \quad (7 \text{ ppm}) \approx \frac{60\sqrt{a}}{61} \quad (43 \text{ ppm}) ; 61/60 \approx \left(\frac{n_t}{p}\right)^{12} \quad (0.3 \text{ ppm}) \quad (58)$$

582 Interestingly enough, the above relation was induced through the following re-
583 mark, implying the Human oocyte (section 3.1):

$$\frac{P}{\sqrt{a}} \approx \frac{m_{oocyte}}{m_e} \approx \Phi^{102} ; \frac{P}{e} \approx \Phi^{105} \Rightarrow \sqrt{a} \approx e\Phi^3 \quad (59)$$

584 Introducing the above Neuron t_N , this leads to:

$$\left(\frac{Pt_N}{\sqrt{2} t_H (8\pi/3)^{3/4}}\right)^3 \approx (4\pi)^4 a \quad (84 \text{ ppm}) \quad (60)$$

585 The numerical term shows the correlation:

$$(8\pi/3)^{9/4} \approx (g_2/g_1)(8Hp/n_t p_W)^2 \quad (1.4 \text{ ppm}), \quad (61)$$

586 while the temporal ratio shows:

$$\frac{Pt_N}{t_H} \approx \frac{495}{\sin \theta} \approx \frac{l_1 \cos \theta}{\lambda_{cmb}} \approx \frac{3^3 \times 137}{2^2 \cos \theta} \approx \frac{\tau a_s^2 \cos \theta}{\mu} \quad (62)$$

587 where appears the wavelength of the CMB and the number 495, which is the
588 antecedent of the third perfect number 496, the dimension of the SO32 group,
589 and also tied to the Mathieu group order: $495 = M_{11}/16$. Its square is the
590 candidate for the mass ratio Higgs/Electron. The length l_1 is the unit distance
591 meter, which was related to the Earth radius by the Egyptians (section 5.4).

592 This is a dramatic multi-correlation around the number 1054 of notes in the
593 Great Musical Scale (section 3.2).

594 Any possibility of intervention of hazard is ruled out by the relation:

$$g_Z = \sqrt{g_1^2 + g_2^2} = \frac{m_Z}{m_{Higgs}} = \frac{Z}{495^2} \approx \frac{1838.5}{\tau_0/\sqrt{2} = \sqrt{R_T/l_1}} \quad (25 \text{ ppb}) \quad (63)$$

595 This last relation confirms the mass ratio Higgs/electron to be 495^2 , while 1838.5
596 is the half whole value close to the bicondon-Hydrogen mass ratio (section 5.3),
597 and $\tau_0 = 3570$ is the Egyptian number, whose connection with the Earth radius
598 R_T and the unit meter l_1 is explained in the following section.

599 *The intervention of the Earth radius confirms the Solanthropic Principle.*

600 2 THE INDUCTIVE SCIENTIFIC METHOD

601 The history of Science has showed that the Inductive Scientific Method was
602 often complementary to the classical hypothetico-deductive one. There are 4
603 steps:

- 604 1. Observations
- 605 2. Measurements
- 606 3. Correlations between the measurements, using central parameters
- 607 4. Looking for the useful mathematical structures.

608 This was the "hypotheses non fingo" Newton procedure, which led to the
609 infinitesimal calculus, but Newton, and, rather strangely, also Poincaré, missed
610 the Total Quantum Physics, an evident consequence of the Diophantine treat-
611 ment of the Kepler's laws [30].

612 The two first steps of the above program are realized by the Particle Physics,
613 which has accumulated considerable and precise data. But the third step is
614 lacking: there is no serious correlation study. Indeed, even the dramatic Koide
615 relation between the Leptons masses, which revealed so predictive for the Tau
616 mass, is not seriously considered.

617 2.1 The Optimal Correlation Principle

618 The scientific system is piloted by formalists, which use only the hypothetico-
619 deductive method from *known* mathematical structures. This leads to the
620 present blockage of Physics: about 30 parameters emerge, which are not recog-
621 nized by mathematicians. Even the whole number 137, *justified by Eddington*, is
622 unknown in Number Theory. This proves the deficiency of present Arithmetics,
623 so explains the present failure of the hypothetico-deductive method. This article
624 is devoted to confirm that hidden arithmetical structures are at work in Physics,
625 and propose that they are related to Eddington's Fundamental Theory.

626 The general belief is that there are no simple relations between the particle
627 masses, arguing there are tied through complex mathematics with the quark
628 masses, which are not directly measurable.

629 But this is reductionist thinking, the simplest idea being to consider these 30
630 parameters as optimal calculation bases. So they must be tied by the *Optimal*
631 *Correlation Principle*. This leads to the optimal physical values in the ppb range
632 (Table 1) [31].

633 But, more surprising, there are also very precise relations between the general
634 parameters and some biological and Human parameters, as well as particular
635 properties of the Sun, the Earth, and the 10 planets solar system. This suggests
636 the Solanthropic Principle must replace the current rough Anthropic one, ill-
637 founded on a refuted expansion cosmology.

638 2.2 The Optimized Gravitation Constant

639 The gravitation constant G , deduced from the canonical c - free relation $k_K/\lambda_e =$
640 $\sqrt{a_G a_w}$, is compatible with the BIPM measurements, but is 2×10^{-4} larger than
641 the official value, wrongly taken as a mean between discordant measurements.

642 Considering the proximity of the Lucas Large prime Number $N_L = 2^{127} - 1$ with
 643 $R/2\lambda_e$, we introduces $p_G = P/\sqrt{N_L} \approx 1831.531$. From the Polynomial Optimal
 644 Correlation Principle, the computer indicates [31]:

$$\left(\frac{H}{p}\right)^5 = \left(\frac{p}{p_G d_e}\right)^2 \Rightarrow G \approx 6.67545706 \times 10^{-11} \text{ S. I.}, \quad (64)$$

645 This formula is confirmed and the photon-neutrino background field, with
 646 $\lambda_{CMB} = \lambda$:

$$N_L = \pi \left(\frac{\lambda}{\lambda_H}\right)^2 (2\pi \frac{\lambda}{\lambda_e}) \approx \frac{R}{2\lambda_e} (d_e(H/p)^2)^2 \approx \left(\frac{\lambda_{CMB}^3 d_e H^2}{\lambda \lambda_e^2 p^2}\right)^2 p_W/p \quad (65)$$

647 *Interestingly enough, Nature tries to divide the Prime Lucas Number.* This
 648 implies that the background obeys the 2π and d_e - free formula:

$$\frac{R}{2\lambda_e} \approx \left(\frac{\lambda_{CMB}^3}{\lambda \lambda_e^2}\right)^2 \frac{p p_W}{H^2} \quad (66)$$

649 The above G value is at 33 ppb from the following value, with $\beta = 1/(H -$
 650 $p) = (1 - 1/2a^2)^{-1} \approx 1.000026626$ the hydrogen relativist factor:

$$\sqrt{\frac{H}{p}} = \frac{2F p^4 n_t \beta}{P d_e^2} \quad (67)$$

651 The last relation was deduced from the observation, with l_K the Kotov length:

$$\sqrt{\frac{R}{l_K}} = 2\sqrt{\frac{a_G}{a_w}} = \sqrt{\frac{2P}{F\sqrt{pH}}} \approx 2(H/p)^2 p_G \sqrt{p n_t \beta} \quad (17 \text{ ppb}) \quad (68)$$

652 This traduces by the quasi-holic relation:

$$(n_t/p\beta^2) \left(\frac{2^{84} p^2}{H^3 n_t}\right)^3 \approx (PF)^2 \approx O_M \sqrt{6F}/8 \quad (69)$$

653 corresponding to the holographic relation involving the Monster group cardinal,
 654 an the π value corresponding to the Eddington's Proton-Electron ratio $p_E =$
 655 $1847.599459 = 6\pi_E^5$:

$$4\pi_E (O_M/2P^2)^2 \approx (4\pi/3)(2F)^3 \quad (6 \text{ ppm}) \quad (70)$$

656 The Monster cardinal appears also in $O_M \approx \hbar^3 \sqrt{2}/G m_0^5$ where m_0 is the geo-
 657 metric mean of the triplet electron-proton-neutron. In fact, eliminating O_M one
 658 observes, with $p_E \approx 1847.599459$ the Eddington Proton/Electron mass ratio :

$$\frac{137 n_t}{ap} \left(\frac{R}{4l_K p_E^{4/3}}\right)^2 \approx (4/3)F^3 \quad (0.1 \text{ ppm}) \quad (71)$$

659 So, the Eddington's approach is rehabilitated.

660 Moreover, the following relations confirms this value of G in the ppb preci-
 661 sion, not obtainable by computer calculation, but from logic and aesthetics. The
 662 optimal base e and the geometrical base π must play a central role, leading to the
 663 discovery of, where $p_G = m_P/\sqrt{N_L} m_e$ is defined from the Lucas Large Prime

664 Number $N_L = 2^{127} - 1$, the deviation of the last relation $R/2\lambda_e \approx N_L = 2^{127} - 1$
 665 shows:

$$p_G^2 = P^2/N_L \approx pH - 137^2 - \pi^2 - e^2 \quad (72)$$

666 The deviation seems to depend only on 137 and a , so we define:

$$pH - p_G^2 = a_G^2 = \left(\frac{a^7}{137^3}\right)^{1/2} \Rightarrow G \approx 6.675453706 \times 10^{-11} \text{ S. I.} \quad (73)$$

667 giving the selected G value ppb precision. Moreover, the canonical Diophantine
 668 $\sqrt{1836p}$ appears in :

$$P\sqrt{1836p} \approx \frac{a^{11}137^5 d_e^2}{(pH - p_G^2)^2} \quad (74)$$

669 So the ppb G value is confirmed by the Diophantine Number 1836, whose square
 670 appears as a monster in the series OEIS A072470.

671 Moreover:

$$\left(\frac{a^7}{137^3}\right)^{1/2} - 137^2 = a_G^2 - 137^2 \approx \frac{3570.3}{\mu} \approx a_s(1 + \pi/3) \quad (75)$$

$$\Rightarrow R/2\lambda_e = P^2/pH \approx N_L(1 - (137^2 + \pi^2 + e^2)/pH) \quad (6 \text{ ppb}) \quad (76)$$

$$a^2 = 137^2 + \pi_a^2 \Rightarrow \pi_a \approx 3 + 1/(6 + (\pi_q/3)^2) \quad ; \quad aq^2 = 4\pi_q \quad (77)$$

674 showing a symmetry between 137, e and π , implying the pure charge q . Such an
 675 efficiency of the Inductive Scientific Method, the direct study of data, suggests a
 676 connection between the Consciousness and the Cosmos, this is a first indication
 677 for the Solanthropic Principle.

678 Moreover, with τ the mass ratio tau/electron, n_t the mass ratio neutron-
 679 electron:

$$N_L^3 \approx P^4 a_w \tau^2 e^{e^e} (H\beta/n_t) \Rightarrow G \approx 6.675453644 \times 10^{-11} \text{ S. I.}, \quad (78)$$

680 This corresponds also to the following direct holographic relation involving
 681 a modified π value $\pi_P = 3 + 1/(7 + 1/\sqrt{a + 1})$:

$$\frac{4\pi_P}{3} P^{3/2} \approx a^{16} \Rightarrow G \approx 6.675453717 \times 10^{-11} \text{ S. I.}, \quad (79)$$

682 while the base π is manifest in :

$$P \approx \pi^{(a-2)/3} d_e \sqrt{\beta} \Rightarrow G \approx 6.675453749 \times 10^{-11} \text{ S. I.}, \quad (80)$$

683 Moreover, introducing the "economic" large number $N_4 = e^{e^{e^e}}$:

$$N_4^{1/2(a-1)^2} \approx P^2 n_t \sqrt{\beta}/H \Rightarrow G \approx 6.675452867 \times 10^{-11} \text{ S. I.}, \quad (81)$$

684 at 125 ppb from the above values.

685 The Fermi constant $G_F = \hbar^3/m_F^2 c$ implies the Fermi mass m_F checking
 686 $F = m_F/m_e = (2 \times 137\Gamma)^{3/2} \approx 573007.3652$, where $\Gamma = \gamma a/\pi$ is the Atiyah's
 687 (2018) constant. This F value exhibits the crystallographic ratio $\eta_c = 1 + 1/(3 \times$
 688 $139) \approx F^5/Pa^3$ (Sanchez et al. 2021)

$$P \approx \frac{F^5}{\eta_c a^3} \Rightarrow G \approx 6.675453718 \times 10^{-11} \text{ S. I.}, \quad (82)$$

689 Such a series of ppb correlations cannot be attributed to chance: so this
690 validates the above correlation with the Lucas Number. *It is strange enough that*
691 *the most famous Large Number of Number Theory was not compared before with*
692 *the most famous physical Large Number (Eddington 1936), of the same order*
693 10^{40} . This G value is compatible with the 10^{-5} precise BIPM measurement
694 (Quinn et al. 2014), but is about 2×10^{-4} larger than the official value, wrongly
695 adopted as the average of the incompatible results.

696 2.3 The Universe as a mono-atomic star

697 Paul Davies [8] considers a star as a ball of gas of radius R_s , which remains in
698 equilibrium if its self-gravity is supported by the combined effort of its internal
699 pressure and its electron degeneracy pressure. This will be the case if the grav-
700 itational energy per particle is comparable to the thermal energy $k_B T$ plus the
701 degeneracy energy. For hydrogen gas this implies:

$$k_B T + N_s^{2/3} \hbar^2 / m_e R_s^2 = G M m_p / R_s = G m_p^2 N_s / R_s \quad (83)$$

702 where N_s is the total number of protons in the star. At low density (large R_s)
703 the degeneracy term is negligible, so the temperature rises as $1/R_s$. As the
704 radius shrinks, the temperature reaches a maximum when

$$G m_p^2 N_s / R_s - N_s^{2/3} \quad \max \Rightarrow R_s = \frac{2 \hbar^2}{G m_p^2 m_e N_s^{1/3}} \quad (84)$$

$$\Rightarrow \text{For } N_s = 1 : R_{s \text{ mp}} / m_H = R$$

705 In this expression, the 2 factor comes from the thermal effect.

706 2.4 The pertinence of the Eddington's 136 and 137

707 According to Eddington, the electric parameter a is tied to the number 137,
708 itself tied to 136. The discriminant $\Delta_E = \text{sqr}t{136^2 - 40}$ of the Eddington's
709 equation $x^2 - 136x + 10 = 0$ shows:

$$\Delta_E (a/137)^4 \approx 136 \quad (-31 \text{ ppm}) \quad (85)$$

710 Looking for correlations involving the weak parameter $\sin \theta$, the computer shows:

$$\Delta_E (a/137)^3 \approx \frac{(8d_e)^2}{\sin \theta} \quad (0.6 \text{ ppm}) \quad (86)$$

711 meaning:

$$a \approx \frac{136 \times 137 \sin \theta}{(8d_e)^2} \quad (31 \text{ ppm}) \quad (87)$$

712

$$a^3 \approx 136 \times 137^2 \times d_e^7 \quad (1.4 \text{ ppm}) \quad (88)$$

713 proving the pertinence of theses numbers. Looking for precise (0.1 ppm) cor-
714 relations specifying the weak parameters W and Z , the computer shows, with
715 $\Gamma = \gamma a / \pi$:

$$W \approx \frac{137^2 \Gamma}{3d_e} \approx \pi \left(\frac{\Gamma a_s \sin \theta}{e} \right)^3 \quad (89)$$

716

$$Z \approx \frac{\pi^4 p^2 a}{137 d_e n_t} \approx \frac{136^3 d_e \sin^2 \theta}{\pi} \quad (90)$$

717 and with the gravitational huge number P :

$$\left(\frac{W^2}{Z}\right)^4 \approx \frac{127P}{128 \times 64} \quad (38 \text{ ppm}) \approx \frac{P d_e^2}{a \sin \theta} \quad (-12 \text{ ppm}) \quad (91)$$

718 Focusing on the Eddington's number, the computer shows:

$$W^6 \approx \frac{F^{13} 136^{18} 137^{10}}{P^3 137^5} \quad (-0.19 \text{ ppm}) \quad (92)$$

719

$$Z^6 \approx \frac{P^5 a^2 136^{14}}{F^{21} a^9} \quad (0.16 \text{ ppm}) \quad (93)$$

720 Taking account of the relations $P^{10} \approx F^{14} a^{67}$ and $a^{12} \approx Pp$, this makes appears
 721 the 60th triangular number $1830 = 60 \times 61/2$, and its successor 1831, which is
 722 the maximal number of parts by cutting a cake in 60 cuts (as 137 is the number
 723 for 16 cuts):

$$a^{1/3} \approx \frac{1830 \times 1831 \times W p_W}{\beta p Z F} \quad (0.2 \text{ ppm}) \quad (94)$$

724 the couple 1831, 1832 is the 30th 31th couple of the OEIS A118551, favoring,
 725 since $1830 = 60 \times 61/2$, the dimension 30 of the Topological axis. Note that
 726 this sequence contains also 1836 and 1837. Thus the Eddington's equation is
 727 completely rehabilitated.

728 2.5 Musical Relations implied by the Kotov Tachyon

729 The following relations are deduced from the study of the Kotov cosmic coherent
 730 period t_K [37],[5]. The first relation uses the basic Single-Electron Universe
 731 radius R_1 , which depends only on the electron Compton wavelength and the
 732 Haas-Bohr radius: [31], with $l_K = ct_K$:

$$\frac{R_1}{l_K} \approx a_w (4\pi p/p_W)^2 \quad ; \quad \pi p/p_W \approx (3 + 1/(7 + \mu/\tau))(n_t/\beta p) \quad (1 \text{ ppm}) \quad (95)$$

733 This defines $t_K \approx 9600.591768$ at slight deviation from Kotov's measurements (2
 734 ppm), but consistent with the following optimization in the 30 ppb range. The
 735 fractional development of $\pi p/p_W$ is very special, where the Electron magnetic
 736 moment $\mu_e = 2d_e$ appears:

$$\pi p/p_W \approx 3 + 1/(6 + \mu_e^{1/12}) = \pi_{\mu_e} \quad (5 \text{ ppb}) \quad (96)$$

737 proving that Nature uses deviation from the non-physical mathematical π , ap-
 738 pearing in the relation, induced by the fact that the deviation $2^{128} \lambda_e/R \approx$
 739 1.00560031 appears in a term close to the canonic $e^{256} \approx 3R_{hol} R_c / 2R \lambda_w$:

$$\pi \left(\frac{l_K R}{\lambda_w \lambda_e}\right)^2 = 4\pi \left(\frac{l_K}{\lambda_e}\right)^6 \approx (4\pi_{\mu_e}/3)(2e^2)^{128} \quad (0.8 \text{ ppm}) \approx \frac{2n_t^2 R_{hol} R_c}{H^2 R \lambda_w} \quad (41 \text{ ppm}) \quad (97)$$

740 whose holographic character is ascertained by introducing $(2e^2)^{1/3} \approx e^2/3$ with
 741 a deviation checking:

$$\frac{e^2/3}{(2e^2)^{1/3}} \approx (8/5)^{1/128} \quad (81 \text{ ppb}) \quad (98)$$

742 leading to the discovery of:

$$\frac{e}{(2 \times 3^3)^{1/4}} \approx \left(\frac{8}{5}\right)^{3/2^9} \approx \left(\frac{n_t}{p}\right)^2 \approx \left(\frac{n_t}{(137a)^{1/4}}\right)^{1/p} \quad (3 \text{ ppb}) \quad (99)$$

743 which specifies as:

$$\left(\frac{7 + n_t/p}{5}\right)^3 \approx (n_t/p)^{2^{10}} \quad (1.5 \text{ ppm}) \quad (100)$$

744 This proves that n_t/p is an important mathematical ratio, checking also:

$$(n_t/p)^{\sqrt{n_t p}} \approx 4\pi(p/p_w)^2 \quad (1.2 \text{ ppm}) \quad (101)$$

745 2.6 The Combinatorial Hierarchy

746 The huge difference between gravitation and electroweak couplings is called the
 747 Hierarchy Problem. A computer directly shows the following relation between
 748 the Electron Gravitational Parameter P , the weak coupling constant a_w and
 749 the square root of the electric constant \sqrt{a} :

$$10 \ln P \approx 7 \ln a_w + 134 \ln \sqrt{a} \quad (0.11 \text{ ppm}) \quad (102)$$

750 Note that the deviation corresponds to the ratio $311\pi/99$. Since $10 = 3 + 7$
 751 and $134 = 7 + 127$, one recognizes in the exponents the characteristic numbers
 752 of the Combinatorial Hierarchy [4]: 3,7,127, the three first Catalan-Mersenne
 753 numbers (OEIS A007013), whose following term (and final in the Combinatorial
 754 Hierarchy) is the famous Lucas Large Prime Number $2^{127} - 1$. With the Planck-
 755 Nambu mass $m'_P = m_P/\sqrt{a}$, one gets:

$$\sqrt{a}^{127} \approx P^3 \left(\frac{P'}{a_w}\right)^7 \approx (P n_t^7)^3 \approx \Gamma^{137/\sqrt{2}} \approx \pi^{136+137} \approx e^{\frac{F}{6\pi^5}} \approx \pi_a^5 e^4 \approx a_s^{1837 a_e^2 / 4\pi}$$

$$\approx g_1^{-1838/2\pi} \approx g_2^{-138^2/3^3} \approx g_3^{(2\pi)^4} \approx g_0^{-(16\pi e)^3/\tau} \approx s^{-2a \cos^2 \theta}$$

$$\Rightarrow e^{2\pi F} \approx g_1^{(1838/d_e)^2} \approx a_s^{(1837.5 d_e)^2/2} \quad \Rightarrow e^{4\pi F} \approx (\sqrt{a_s}/g_1)^{p_H \beta^2}$$

$$\sqrt{a}^{127} \approx (a/4)^4 (2^{127}/p n_t a_w \sqrt{a})^7 \quad ; \quad 2^{127/4} \approx (\pi/\pi_a)^5 \frac{a^7}{137\beta p} \rightarrow (\pi/\pi_a)^5 \approx d_e$$

$$\frac{a}{16\pi} \approx e \frac{d_e n_t^2 \beta^4}{H^2} \quad (6 \text{ ppb}) \approx \frac{1}{\sin \theta \cos^2 \theta \beta^2} \quad (1 \text{ ppm}) \quad (103)$$

756 showing a dramatic liaison with the Atiyah constants $\Gamma = \gamma a/\pi$ and $\pi_a =$
757 $\sqrt{a^2 - 137^2}$. The Planck-Nambu ratio $P' = P/\sqrt{a}$ will appear in the Diophan-
758 tine Physics (Section 3.1). Note that from the holographic approach $3P \approx p^7$,
759 one observes a different intervention of P^{10} :

$$P/4 \approx (\sqrt{p_G \sqrt{p_{n_t}}})^7 \Rightarrow P^{10} \approx (\sqrt{a}/4)^4 (2^{127}/p_{n_t})^7 \quad (104)$$

760 calling for more study.

761 2.7 The Physical Musical Frequency

762 The three main universal constants (c excluded), defines the time :

$$t_{\hbar, G, G_F} = t_N = \frac{G_F^{5/4}}{\hbar^2 G^{3/4}} = t_P \left(\frac{m_P}{m_F} \right)^{5/2} \approx 19.1369997 \text{ ms} \quad (105)$$

763 where m_P, m_F are the Plank and Fermi masses. This corresponds to the fre-
764 quency 52.254 Hz, close to the electric one in Europe. More precisely, it is 3
765 octaves down the frequency 418.04, half a tone from the frequency 442.9 Hz.
766 This means that this last frequency could be the best fit for the concert pianos,
767 and the preferred tune would be La bemol Major, or Fa mineur. This could
768 enlight the curious tuning problem of concert pianos, which seems to indicate
769 a sensibility to absolute musical scale of some chord musicians, who sometimes
770 critic the piano tuning.

771 *So, this time is characteristic of the Human nervous system : this is the first,*
772 *and strongest, indication towards the Solanthropic Principle : Humanity would*
773 *be alone in the Cosmos, as this paper confirms.*

774 The two others quantities derived from the 3 main constants are:

$$l_{\hbar, G, G_F} = l_P \left(\frac{m_P}{m_F} \right)^{3/2} \approx 1.376054631 \times 10^{-10} \text{ m} \quad (106)$$

$$m_{\hbar, G, G_F} = m_P \left(\frac{m_P}{m_F} \right)^{-1/2} = \sqrt{m_P m_F} \approx 1.065807123 \times 10^{-16} \text{ kg}$$

775 The first value is close to the Hass-Bohr radius (factor about 13/5). The second
776 one is intermediary between the Planck and Fermi masses. Note that the large
777 gap between these masses is the Particle Physics Hierarchy Problem.

778 2.8 The Decisive Egyptian number $\tau_0 = 3570$

779 The number of symmetries in a n-dimensional crystal show connections with
780 the entire values 137 and 1836 of the main physical parameters [32]. This leads
781 to the examination of the number $\tau_0 = 3570$, close to the Tau/Electron mass
782 ratio. Indeed, it shows the following dramatic property of the Golden Number
783 Φ , whose whole powers are tied to the terms of the Lucas recurrence series
784 (OEIS A000032), defined by $n_L(1) = 1, n_L(2) = 3$:

$$\tau_0 = 3570 = (2 + 3 + 5 + 7) \times 2 \times 3 \times 5 \times 7 = 17 \times 210 = n_L(17) - 1 \approx \Phi^{17} - 1 \quad (107)$$

785 The characteristic point in this number 3570 is that it uses in a symmetric
786 fashion the basic quartet of numbers, 2; 3; 5; 7, which, according to the Holic
787 Principle (section 2.1), are respectively tied to the natural concepts : Time,
788 Space, Mass, Field. *Since neither 137 nor this number $\tau_0 = 3570$ are not*
789 *signaled by mathematicians, this confirms a Number Theory Deficiency.* Rather
790 surprisingly, the numbers 137 and 3570 were known by the Egyptians [11]. One
791 observes, with $\tau_0 = 3570 = 60^2 - 30$:

$$60\sqrt{3570} = 3570 \eta_2 \approx R_{hol} l_P / 2\lambda_e (9 \text{ ppm})$$

$$\eta_2 = 60/\sqrt{\tau_0} \approx e^{1/239} \approx \pi^{1/2 \times 137} \approx \Phi^{1/115} \quad (108)$$

$$e/\pi\Phi \approx \tan \theta \sqrt{n_t/p} \quad (1 \text{ ppm})$$

792 showing a special $e - pi - \Phi$ harmony, calling for more study. Moreover:

$$\frac{495}{g_1 = g_2 \tan \theta} \approx \frac{2 \times 137^3 \sqrt{p}}{\tau_0 \sqrt{pW}} \quad (0.8 \text{ ppm}) \quad (109)$$

793 where $\tau_0 + 1 = 3571 \approx \Phi^{17}$ is the 17th term of the Lucas series. This confirms
794 that the meter unit l_1 is pertinent in the ppm domain, while the second t_1 is in
795 the 100 ppm domain.

796 The Hubble Universe radius ratio R/λ_e shows this dramatic correlation:

$$(4\pi)^2 R/\lambda_e \approx (\tau_0/\tau)^{\tau_0} \quad (12 \text{ ppm}). \quad (110)$$

797 This corresponds to 3 ppb on τ , the mass ratio Tau/Electron.

798 Since $\tau_0 = 3570 = 17 \times 210$, this is related to the relation, involving the
799 above central ratio u :

$$R/\lambda_e \approx (2/u)^{210} \quad (0.3\%). \quad (111)$$

800 This is a confirmation of the Holic Principle [28], which favors the exponent
801 210, as explained in the following section.

802 3 HOLOPHYSICS

803 3.1 The Holographic Principle

804 In the same manner that the Higgs mechanism was inspired by an analogy with
805 supraconductivity, the Holographic principle was the idealization of practical
806 holography.

807 The holography is the most practical way to deal with huge information. So,
808 it is natural to consider the DNA chain as a temporal hologram. Such a concept
809 of temporal linear holography was introduced in the Sanchez thesis (1975). The
810 idea that global holographic equations could replace the classical differential
811 ones was submitted by Sanchez, an holography specialist, to the de Broglie
812 Foundation in 1993, which rejected it after six months delay. Strangely enough,
813 at the same epoch, Gerard t'Hooft coined the term *hologram* in a theoretical
814 model which connects a 3-dimension space to its boundary, a 2 dimension one,
815 writing in *Dimensional-reduction in quantum gravity, gr-qc 9310026v1 (19 Oct.*

816 1993) : The situation can be compared with a hologram of a three dimensional
 817 image on a two-dimensional surface. So the two approaches may have been
 818 completely independent.

819 There are two kinds of holography. The most common is the monochromatic
 820 one, where a single wavelength is at work. But Dennis Gabor, in his original
 821 work, presented a *new microscopic principle*, a di-chromatic holography, one
 822 for the recording, the other for the lecture of the hologram magnified by the
 823 amplification factor, the ratio of the two wavelengths. This leads to a perfect
 824 3D imagery.

825 In the official studies [6] there is a single wavelength, the Planck length l_P ,
 826 the *so-called natural length* defined by the convention $\hbar = c = G$. The official
 827 approach starts from the black hole thermodynamics, but, strangely enough,
 828 no one recognized that the horizon radius of a black hole of horizon R and
 829 mass $M = Rc^2/2G$ is given by a Gabor-type 2D-1D using l_P and the Compton
 830 wavelength $d_M = \hbar/Mc$ of the black hole, considered as a particle, the natural
 831 consequence of the ‘no hair’ theorem :

$$\pi(R/l_P)^2 = 2\pi R/d_M \tag{112}$$

832 which identifies not only with the Bekeinstein-Hawking entropy of the Black
 833 hole, but also with the testimony of Archimedes where the same constant π is
 834 involved in the perimeter and the area of a circle, inducing a 2 factor between
 835 the perimeter and the area of a unit sphere. Nobody published this relation,
 836 because d_M is inferior to the Planck length, which is considered as a limit, the
 837 so-called Planck wall.

838 *If the official theorists had not taken this taboo such seriously, they would*
 839 *have deduced that the critical condition in cosmology, which identifies with the*
 840 *above relation, results directly from a 2D-1D Gabor-type holography, and so the*
 841 *recourse to the inflation would has not been necessary.*

842 3.2 The Holic Principle

843 In 1994, Sanchez presented the essential idea, which is replacing differential
 844 equations by global ones, at the ANPA in Cambridge, so also introducing the
 845 Holic Principle, which identifies the dimensions of spaces with physical cate-
 846 gories : 2 for Time, 3 for Space, 5 for Mass and 7 for Field.

847 So the third Kepler law is justified, whose Diophantine treatment, i.e. as-
 848 suming that Length and Time are quantified, results in a length proportional to
 849 the square of a whole number n , while the time is proportional to the cube of
 850 n . The other Kepler’s law is the constancy of the area speed along a trajectory,
 851 which, since $4 - 3 = 1$, is thus simply proportional to n , implying a quantum for
 852 this area speed, which identifies with the Planck’s constant divided by a mass.

853 It is strange that such an elementary argument was kept unnoticed during
 854 350 years. If Newton had not insisted in differential equations for describing the
 855 ellipse, he surely could have found it. Even more strangely, Poincaré does not
 856 recognized this evidence. But, since he declared that the cosmology cannot be
 857 founded on differential equations, it is sure he would have found this if he has not
 858 disappeared so young. But such a Two-Times Physics ask for an explanation,
 859 given in section 2.2.

860 Extending the resolution to the Mass and Field ratio, the canonical Holic
861 formula, since $2 \times 3 \times 5 \times 7 = 210$ writes :

$$T^2 = L^3 = M^5 = F^7 = n^{210} \quad (113)$$

862 which is verified for the Universe radius, with $u = R_{hol}/R = pH/a^3$ and $2/u \approx$
863 $1/(1 - \ln 2/2)$ through

$$R/\lambda_e \approx (2/u)^{210} d_e^{11/4} \quad (8 \text{ ppm}) \quad (114)$$

864

$$\left(\frac{1 - \ln 2/2}{u}\right)^{210} \approx \frac{\tau}{\sqrt{pp_G}} \quad (18 \text{ ppm}) \quad (115)$$

865 where τ is the Tau/Electron mass ratio, which was predicted by Eddington as
866 the "heavy mesotron" from Hypersymmetry with the Proton.

867 3.2.1 The Holic-Holographic mono-electron radius R_1

868 The hearth of the Holographic Principle is the relation $3x^2 = y^3$. This applies
869 to the parameters P (mass ratio Planck-electron) and p (mass ratio Proton-
870 electron) in the form:

$$3P = p_P^7 \quad p_P \approx 1840.978 \quad (116)$$

871 The mono-electron radius R_1 checks, with the Hass-Bohr radius r_{HB} :

$$\frac{R_1}{r_{HB}} \approx \left(\frac{a/\pi}{\mu^2}\right)^7 \quad (117)$$

872

$$\frac{R_1}{2r_{HB}} \approx \left(\frac{p_P^3}{\mu^2}\right)^7 \quad (118)$$

873 3.3 The Musical Cosmic Holography

874 The holographic principle favors the form $3x^2 = y^3$. With $x = p$ this shows
875 $y \approx 6^3$, a Pythagorean particularity since $3^3 + 4^3 + 5^3 = 6^3$. More precisely
876 $6^9 \approx 3p_G^2 = 3P^2/2^{127}$ leading to $P^2 \approx 2^{136}3^8$. The holographic Cosmos re-
877 duced radius exhibits the musical correlation $R_{hol}/\lambda_e = 2P^2/a^3 \approx 3^{3^4}(d_e H/n_t)$,
878 where:

$$(d_e H/n_t) \approx (\pi/3)^{1/a} \approx (4\pi/\sqrt{a})^{1/210} \approx (d_e^2 p n_t / a^3)^{1/(4 \times 210)} (12 \text{ ppb}). \quad (119)$$

879 where the holic central number 210 appears, tied to the economic numbers by :

$$3^4 + 2^7 + 1 = 2 \times 3 \times 4 \times 5 = 210 \quad (120)$$

880 Combining the two above musical relation thus leads to:

$$P^2 \approx 2^{136}3^8 \approx 3^{3^4} a^3 / 2 \quad \Rightarrow \quad 6^{137} \approx 3^{210} (r_B/\lambda_e)^3 (a/137)^{1/2} / \beta \quad (2.4 \text{ ppm}) \quad (121)$$

881 with r_B the Bohr hydrogen radius, defined by $r_{HB}/\lambda_e = a(1 + 1/p)$. The
882 importance of this result is that, while 137 is tied to 127 by the Lucas-Mersenne
883 series $3 + 7 + 127 = 137$, the huge number 6^{127} is of the order of R_c/λ_e , while
884 $R/2\lambda_e \approx N_L = 2^{127} - 1$, the Lucas Number, meaning *the musical decomposition*
885 $6 = 2 \times 3$ resumes the Cosmos-Universe relation.

886 3.4 The Higgs number and the Economic Formalism

887 The measured value of the mass ratio Higgs Boson/Electron is compatible with
 888 495^2 , where 495 is the first term of the perfect couple 495-496, where 496 is the
 889 dimension number of the string group SO3. By nalogy with the above economic
 890 form 3^{3^4} , we introduce the analog number, implying the crystallographic number
 891 $([32] 495/3 = 165 \approx (2a\sqrt{\beta}/137\pi)^{1/2}$ (50 ppb), and with $\pi_5 = n_t/2\pi$, the 3.5
 892 ppm approximation to the monstrous fifth term 292.6345874 in the fractional
 893 development of π . Recall that the fractional development of is an unsolved
 894 mathematical problem, but nobody remarked the liaison between π_5 and n_t :

$$495^{495^4} \approx (P/2)^{\pi_5^4} \approx e^{137p^4/a^2 \sin^2 \theta} \approx p^{(p+H+1/\ln P)^3} \approx a^{(2a^3)8n_t} \quad (122)$$

895 this means a geometrical relation between the central parameters a and p ,

$$(a^2)^{a^3} \approx p^{p^2} \approx e^{\pi_5^3} \approx (F^F)^{10/3} \approx ((2\pi)^{(2\pi)^{(2\pi)})}^{495^2/d_e^2 H} \quad (123)$$

896 tied also with the cardinals of the Monster group O_M and the Baby-Monster
 897 group O_B :

$$(a^2)^{a^3} \approx (O_M O_B)^{a\sqrt{ppG}/2} \approx O_M^{\tau^{2/3}} \approx O_B^{p_G^2/a^3} \quad (124)$$

898 The analog expression with $p_0 = p_W(p/H)^2$ implies the economic number $E_3 =$
 899 e^{e^e}

$$(p_0^2)^{p_0^3} \approx E_3^{E_3 a^{3/2}} \quad ; \quad E_4^{1/4} \approx P^{(a-1)^2} \quad (125)$$

900 while:

$$E_3/E_2 \approx a\sqrt{pH}(p/p_W)^2 (0.8 \text{ ppm}) \quad ; \quad E_3/E_2^3 \approx 8 \times 137 \approx e^7 \approx (F/Z)^6 \quad (126)$$

$$8E_2^2 \approx H \quad (33 \text{ ppm}) \quad ; \quad 8E_2^5 \approx n_t \tau \quad (6.7 \text{ ppm}) \quad (127)$$

$$P^2 \approx (3/\sqrt{2})^a H/n_t \quad (34 \text{ ppm}) \quad \approx (1/\sin\theta)^{\text{ade}} \sqrt{a/137} \quad (6 \text{ ppm}) \quad (128)$$

903 Introducing π -dependent canonic economic factors:

$$\Rightarrow (2\pi)^{(2\pi)^{(2\pi)}} \approx 495^{495^2/8} \approx \pi^{\pi^{\pi}} (\tau p H/a^2 \approx \pi e^2 \approx e^{a_s}) \quad (129)$$

904 So the above economic numbers plays a role in physics, but have not been
 905 remarked in mathematics.

906 The above relations implies that $P/2 \approx e^{16\pi}$, whose deviation is doubly
 907 remarkable

$$P/2e^{16\pi} \approx 1 + 137^2 a/\beta p_G^2 \quad (0.45 \text{ ppm}) \approx ((4\pi)^3 q^2 p_W/ap)^2 \quad (0.8 \text{ ppm}) \quad (130)$$

908 Note the direct relations:

$$\pi_5/\ln(\pi_5) \approx \ln P \beta p/p_w \quad (0.4 \text{ ppm}) \quad ; \quad F \approx (4\pi/3)(\ln P)^3 \quad (131)$$

909 This means also particular relations, which have been independently observed:

$$(R/\lambda_e)^{1/210} \approx 2a^3/pH \quad (15 \text{ ppm}) \approx \ln p/\ln a \approx \ln \tau/\ln \mu \approx 210/a \quad (132)$$

910 This implies also the liaison between $\sin\theta$ and the canonic number $a_0 = i^{-i} =$
 911 $e^{\pi^2/2}$

$$\pi^3 \approx a_0 \sin^2 \theta \quad (133)$$

912 which appears also in

$$\tau/\mu + 2 \approx a_0/e^2 \quad (134)$$

913 Moreover, this implies, with $8a \approx e^7$ and $lnp \approx e^e/2$:

$$p^{1/p} \approx e^{1/e^7 \sin \theta} \approx (3\pi)^{1/4a} \Rightarrow d_e^4 p/H \approx (H\beta^2)^{1/1837} \approx (e^{e\beta^2}/2)^{1/495} \quad (135)$$

914 Thus, the Higgs number is confirmed, as well as the connection with the π
 915 Diophantine approximation problem, and the sporadic groups, since a^a is tied
 916 to the product of the cardinals of the 20 groups of the happy family, and the
 917 Pell-Fermat and Lucas-Lehmer generators [31].

918 3.5 The Tachyo-Holography, Photon and Graviton Masses

919 The above Two-Times Physics is tied to the "photonde" concept : before a
 920 photon is detected, an overall mechanism involves the whole Universe through
 921 a feed-back tachyonic process. It is for this only reason that the energy of the
 922 photon is not dispersed away : *the Universe compute what is the best place for*
 923 *collecting the whole energy of the photon.*

924 This suggests the existence of a tachyonic pre-signal which determine which
 925 atom is devoted for the photon reception. Such a non-locality is specific of the
 926 quantum formalism, similar to the holographic one [31]. The Einstein model of
 927 the 'free propagating photon' is misleading, but is always central in the physics
 928 community : it is one cause for the present blockage of theoretical physics.

929 Gabor has associated the holographic resonance condition to a magnification
 930 of the hologram pattern. This was never achieved practically, but Nature could
 931 use another way: using a second speed c' for tachyonic signals.

932 The sign of this tachyo-holography is the Kotov oscillation which shows *no*
 933 *Doppler effect*. Taking account of the Kotov length $l_K = ct_K$ [22], we have
 934 shown the following holographic cosmic [32] relation with the weak wavelength
 935 $\lambda_w = \lambda_e/a_w$:

$$2\pi R/\lambda_w = 4\pi(l_K/\lambda_e)^2. \quad (136)$$

936 This relation use four lengths. A simplification towards only three lengths will
 937 occur by introducing a second Electron wavelength λ'_e , such that:

$$2\pi R/\lambda_w = 4\pi(l_K/\lambda_e)^2 = 4\pi(\lambda_w/\lambda'_e)^2. \quad (137)$$

938 This means that $\lambda'_e = \hbar/m_e c'$ is defined using a signal speed c' such that:

$$\frac{c'}{c} = \frac{\lambda_e}{\lambda'_e} = \frac{l_K}{l_w}, \quad (138)$$

939 leading to $c' \approx 7.3367 \times 10^{44}$ m/s.

940 corresponding to two special masses associated with λ_w and λ_e , which are
 941 natural candidates for the photon and graviton masses:

$$m_{ph} = \frac{\hbar}{c'\lambda_w} \approx 1.22 \times 10^{-55} \text{kg} \quad (139)$$

$$m_{gr} = \frac{\hbar}{c'\lambda_e} \approx 3.72 \times 10^{-67} \text{kg} = m_{ph}/a_w$$

942 This photon mass was anticipated by Christian Marchal [24]. The confirmation
 943 of the pertinence of these masses is the following tachyonic symmetric relation:

$$\frac{R_C R_{hol}}{R} \approx \frac{\hbar^2}{G m_{bc} m_{ph} m_{gr}} \quad (140)$$

944 where m_{bc} is the DNA bi-codon mass (section 5.3)

945 3.6 The Wien constant and the Bernoulli Function

946 According to the preceding sections, the physical parameters must be con-
 947 nected to the parameters of the black body law. Indeed, Atiyah notes [2] :
 948 *Hirzebruck (Topological methods in algebraic geometry) following in the steps*
 949 *of Euler and Riemann, introduced a formal algebraic process of multiplicative*
 950 *sequences. In such processes he defined exponentials over Q . He showed that*
 951 *any such exponential has a generating function, and he focused on the Todd ex-*
 952 *ponential, whose generating function is the Bernoulli function $\frac{x}{1-e^{-x}}$. The fact*
 953 *that this function is analytic implies that the Hirzebruck process extends from*
 954 *Q to R .*

955 Strangely enough, Atiyah do not emphasize the fact that the above Bernoulli
 956 fuction is the kernel of the Planck's law.

957 A central black-body parameter is the Wien constant, the ratio between the
 958 nominal and the Wien wavelength: $w_5 = 5(1 - e^{-w_5}) \approx 4.965114232$, a constant
 959 largely used by physicists, but unknown by current mathematics, which shows
 960 a dramatic pertinence in the neutron-electron mass ratio n_t , the proton one p
 961 and the excess electron magnetic moment d_e :

$$\begin{aligned} n_t^{1/3} &\approx w_5 (\pi/2)^2 && (16 \text{ ppb}) \\ p &\approx a^{3/2} \ln(3 + 1/(7 + 1/\sqrt{a}(\ln \pi)^{1/3})) && (\text{ppb}) \\ d_e &\approx (1 + e^{-w_5})^{1/6} && (0.16 \text{ ppm}) \end{aligned} \quad (141)$$

962 One note the proximity $a \approx e^{w_5} - 2\pi$, suggesting a to be a trigonometric
 963 line. Indeed, $\cos a \approx 1/e$:

$$\begin{aligned} a &\approx e^{w_5} - 2\pi && (42 \text{ ppm}) \\ \cos a &\approx 1/e && (22 \text{ ppm}) \\ \Rightarrow a &\approx 44\pi - \arccos 1/e && (65 \text{ ppb}) \end{aligned} \quad (142)$$

964 This formula was extensively shown on the web, without indication of its
 965 provenance. The number 44 could be tied to the 22 dimensions of the X GUT
 966 boson (section 3.3).

$$\begin{aligned} \arccos 1/e &\approx -\ln q && (35 \text{ ppb}) \\ \Rightarrow a &\approx 44\pi + \ln q && (0.2 \text{ pm}) \end{aligned} \quad (143)$$

967 So the parameters are clearly tied to the black-body's ones.

968 **3.7 The Eddington's Hyper-Symmetry Proton-Tau**

969 The most characteristic symbolic liaison between a and p is the following rela-
970 tion:

$$p^{p^2} \approx (a^2)^{(a^3)} . \quad (144)$$

971 There is a similar relation tying the heavy leptons:

$$\tau^{\tau^2} \approx (\mu)^{((2\pi/3)\mu^3)} . \quad (145)$$

972 This confirms the Hyper-Symmetry Proton-Tau, predicted by Eddington who
973 called "heavy Mesotron" the new particle, which was discovered only 35 years
974 later, in a total surprise, since the Eddington's theory has been rejected and
975 forgotten. Here is the prophetic Eddington's sentence :

976 *"There seems to be no reason why there should not also exist heavy mesotrons*
977 *which decay into protons and negatrons. Their mass is obtained by substituting*
978 *m_e for m_p in (104-5). The result is $2.38 m_p$."*

979 The true value is 1.89, smaller by a factor near $\sqrt{\pi/2}$. The Eddington's value
980 for the mass ratio Muon/Electron is $\mu_E \approx 173.98$. One observes the following
981 relations:

$$\frac{\mu}{\mu_E} \approx 20 \frac{\mu}{\tau} \approx 2^{1/4} \quad (146)$$

982 A more direct confirmation of the Proton-Tau symmetry is provided by the
983 relations:

$$\frac{\sqrt{pH\mu\tau}}{F} \approx e_F = \frac{106}{39} \quad (-5.9 \text{ ppm}) \approx e\left(\frac{137}{a}\right)^{1/2} \quad (2.9 \text{ ppm}) \quad (147)$$

984

$$\Rightarrow \left(\frac{\sqrt{pH\mu\tau}}{F}\right)^3 \approx \frac{106 \times 137e^2}{39 a} \quad (6 \text{ ppb}) \quad (148)$$

985 Since the discovery of the Higgs boson, no observation favors the Supersym-
986 metry, the hope of theoreticians to deblock the Particle Physics, but no one recalls
987 the Eddington's prediction.

988 Moreover, the symmetry Tau-Nucleon is patent in:

$$\frac{F}{n_t} \approx \left(\frac{\tau^3}{pHn_t}\right)^3 \quad (5.4 \text{ ppm}) \approx \frac{H}{n_t} \left(\frac{\tau}{H}\right)^9 \quad (5.4 \text{ ppm}) \quad (149)$$

989 showing that this Eddington's Hypersymmetry is tied to a Proton-Hydrogen-
990 Neutron one and a cubic process, confirmed by:

$$\left(\frac{2a^3}{pp_G}\right)^2 \approx \left(\frac{n_t}{p}\right)^{1/2} \frac{F^2}{pp_G} \quad (2.4 \text{ ppm}) \quad (150)$$

991 tying gravitation and particle physics.

992 Concerning the main parameters of Particle physics, the computer shows

$$\tau^6 \approx \frac{n_t^3 F^4}{(\mu H/p)^5} \quad (1.8 \text{ ppm}) \quad (151)$$

993 Its pertinence is confirmed by the computer leading to (10 ppb precision):

$$P^4 \approx F^4 a^4 a_G^8 n_p n_t \mu^6 \tau^3 \Rightarrow \left(\frac{P}{F a^{9/2}}\right)^4 \approx p n_t (H \tau (\mu/137)^2)^3 . \quad (152)$$

994 Taking account of $F^2/pH = \mu^4/a^2$, this implies:

$$R/2\lambda_e \approx (pn_t)^{1/2}(\mu a)^7((H\tau)^{1/2}/137)^3 \quad (153)$$

995 with $R/(\lambda_p\lambda_H)^{1/2} = (WZ)^4$, this means the property:

$$2p(Hn_t)^{1/2}\left(\frac{\mu a(H\tau)^{1/2}}{137}\right)^3 \approx \left(\frac{WZ}{\mu a}\right)^4 \quad (154)$$

996 This shows the symmetries $a - \mu$ and $H - \tau$. The proton-Tau symmetry is
997 confirmed by the ppb relation:

$$\frac{\tau}{\sqrt{pp_G}} = (2a^3/p_G^2)^{3/2} \frac{1}{d_e(a/137)^4} \quad (155)$$

998 This confirms also G and the Koyde relation defining the τ value from the μ
999 one.

1000 *Thus it is time to come back to the Eddington's Fundamental Theory.*

1001 4 DIOPHANTINE PHYSICS

1002 4.1 The Systema Number and the Great Musical Scale

1003 In the same perspective of all-arithmetic physics, the "Arithmetic Relators"
1004 have been introduced by Thiébaud Moulin [26]. Indeed its "Systema Number":

$$N_S = 2^{65} 3^{41} 5^{28} \approx e^{137}/2\pi (0.02 \%) \approx (2\pi)^{2\pi\sqrt{137}} (0.07 \%) \approx 495^{a/2\pi d_e} (0.6 \%) \quad (156)$$

1005 is based on the second optimal musical scale with 41 notes [15]. From $2 \times 41 =$
1006 $3^4 + 1$ and $65 = 2^6 + 1$ this is tied with *the separation Cosmos-Universe, the*
1007 *proximity of the 4-step cubic operation of base 3 with the 4-step Combinatorial*
1008 *Hierarchy with base 2*, where R_{hol} is the reduced holographic radius of the huge
1009 Cosmos behind [31]:

$$\frac{R_{hol}}{\lambda_e} \approx 3^{3^4} (0.03 \%) \approx (4/3)(2^{2^7} \approx R/\lambda_e) (0.56 \%) \quad (157)$$

1010 In fact, the above musical scale with 41 notes is the sixth in the logi-
1011 cal order given by the fractional series of $\ln 3/\ln 2$ (OEIS n° A028507): 1,
1012 1,1,2,2,3,1,5,2,23... This last number is the entire part of e^π and $2\sqrt{a}$. Thus,
1013 the ninth scale is very special : $2^{1/665} \approx 3^{1/1054}$. One observes the dramatic
1014 relations:

$$3^{665} \approx \mu^a \approx (\sqrt{a})^\tau/\sqrt{a} \approx \tau^{(p/a)^2/2} \quad (158)$$

$$\sqrt{665 \ln 3} \approx 3^3 + 4/a \quad (63 \text{ ppb})$$

1015 This last number will be decisive in the couple Sun-Earth (section 4.3).

1016 **4.2 The Cosmic Axis and the Bosonic String Theory**

1017 The Cosmic Large Number correlations, when extended to small numbers ex-
 1018 hibits a series of 8 holic relations of the simplest form $y = x^2$ with successive
 1019 inversion in a symmetry macro-micro-physics. This leads to the Topological
 1020 Axis (or Cosmic Axis) [31], which appears to be the skeleton of main physical
 1021 parameters distribution. This is comforted by the following considerations

1022 From gauge symmetry considerations, Itzhak Bars [3] have shown that Time
 1023 with $d_T = 1$ dimension when associated with d_S spatial dimensions is equivalent
 1024 to two dimensions-Time associated to $d_S + 2$ spatial dimensions. This means
 1025 that, from the simplest Single-Electron cosmic sweeping model $d_T = 1, d_S = 1$
 1026 [31], with a total of 2 dimensions, this is equivalent to $d_T = 2, d_S = 3$. From
 1027 the Holic Principle [28] which states that in the basic Diophantine equations
 1028 the exponents are the dimensions, this implies the Kepler law :

$$T^2 = L^3 . \tag{159}$$

1029 Considering this Kepler Law as a Diophantine Equation, i.e. assuming the quan-
 1030 tification of both Time and Length, we have shown how the symmetry between
 1031 the Newton and Planck constants involves quantum physics and coherent cos-
 1032 mology [30]. This symmetry is patent when one separates the mass from the
 1033 kinematic terms, and there is a logical place for a speed, identified as the light
 1034 speed:

$$GM = L^3/T^2 ; \quad \hbar/M = L^2/T = GM/c \Rightarrow \hbar c/G = m_P^2 \tag{160}$$

1035 Note that in a Space with more than 3 dimensions, the atoms would be
 1036 unstable [39] [13]. The intuitive Space - Time involves 4 dimensions instead
 1037 of the 5 of Kaluza-Klein model [16]. We suppose that this dimension 4 is the
 1038 periodicity starting from $d = 2$. So one gets the series of twice the odd numbers.
 1039 When limited to 8 numbers, this is the Bott octonion sequence of the Cosmic
 1040 Axis :

$$2, 6, 10, 14, 18, 22, 26, 30. \tag{161}$$

1041 The 4 first numbers, corresponding to quaternion algebra, are the spectroscopic
 1042 numbers of the Periodic Table, respectively for orbital numbers $k = 0;1;2;3$.
 1043 [32]. *So the string concept, identifies with the spin one, both with 2 dimensions.*
 1044 Moreover, the gauge bosons seem are clearly associated to the odd values of k :

$$\begin{aligned} k = 1, d = 6, & \quad \text{Gluon (massive)} \\ k = 3, d = 14, & \quad \text{Weak boson} \\ k = 5, d = 22, & \quad \text{GUT boson} \\ k = 7, d = 30, & \quad \text{Universal boson} \end{aligned} \tag{162}$$

1045 The liaison between the associated Topological function $f(d) = e^{2^{d/4}}$ and the
 1046 particle physics is the following dramatic relation, involving the string-spin gen-
 1047 erator term:

$$f(2) = e^{\sqrt{2}} \approx \frac{\sqrt{2}}{g_1} \approx \frac{\sqrt{7}}{g_2} \approx \frac{\sqrt{\Gamma}}{g_3} \tag{163}$$

1048 where $\Gamma = \gamma a/\pi$ is the Atiyah's constant, and g_1, g_2, g_3 are the gauge coupling
1049 constants, where the following symmetry is admitted : $g_1 g_3 \approx g_2/(1 + g_1^2 + g_2^2)$.
1050 One recognizes the numbers 2, 7 and 25.5 appearing in the Nambu rule [27] for
1051 the Pion, Kaon, Tau.

1052 Let us recall the optimal relations between the gauge coupling constants:

$$1/g_0 = 2a^3/pp_G \approx 1 + g_1^2 + g_2^2 \quad (0.13 \text{ ppm}) \quad ; \quad \frac{g_0}{g_2} \approx \frac{a^{3/2}}{137\beta e^2} \quad (0.20 \text{ ppm}) \quad (164)$$

1053 We proposed the following symmetric value of g_3 , which shows the property :

$$g_1 g_3 = g_0 g_2 \approx (e/\pi_{\tau/\mu})^6 \quad (3 \text{ ppm}) \quad ; \quad \pi_{\tau/\mu} = 3 + 1/(7 + \mu/\tau) \quad (165)$$

1054 confirming that the parameters are tied to the fractional development of π .
1055 Here, it is a symbolic one where the final term $17 = \tau_0/\mu_0$ of the above Ptolemae
1056 approximation is replaced by τ/μ .

1057 In the Topological Axis, the Cosmos seems to corresponds to the symbolic
1058 orbital number $k = e^2$. This induces a liaison between the optimal base e and
1059 the simplest base 2:

$$2^{e^2+1/2} \approx e^{2e} + e^2 + 1/8\sqrt{137} \quad (2 \text{ ppb}) \quad (166)$$

1060 The Topological Axis takes then the name of Cosmic Axis [31]. The following
1061 sections will extend its denomination to "Cosmo-Anthropic" or "Solanthropic"
1062 Axis.

1063 4.3 The red-shift periodicity

1064 William Tifft has revealed a periodicity $\Delta v \approx 72 \text{ km/s}$ in the galaxy red-shifts.
1065 This corresponds to $c/\Delta \approx 4170$, which is close to mass ratio Fermi/Nambu
1066 ≈ 4181.5 , which is itself close to the 19th Fibonacci number 4181. Comparing
1067 this number with the above holic number $\tau_0 = 3570$, this leads to :

$$\frac{4181}{3570} \approx \frac{\sqrt{137d_e}}{10} \quad (3 \text{ ppb}) \quad (167)$$

1068 Moreover $3570/10 = 357$ is close to the $(P/F^3)^{1/2}$, leading to:

$$\frac{F^5}{Pa^3} \approx 1 + \frac{2}{3 \times 139} \quad (1 \text{ ppb}) \quad (168)$$

1069 where 139 is the above Atiyah's Algebra number (section 3.7). This correction
1070 factor appears in the holographic relation tying the cosmic holographic radius
1071 with the Neuron (section 3.1).

1072 4.4 The rehabilitation of Wyler's Formulas

1073 Armand Wyler [44] proposed the following formulas, from holographic consid-
1074 erations in spaces of dimensions 5 and 7:

$$p \approx p_W = 6\pi^5 \quad (18.8 \text{ ppm}) \quad (169)$$

$$a \approx (16/9)(120\pi^{11})^{1/4} \quad (0.61 \text{ ppm})$$

1075 This approach supported many critics, but nobody looked for the special
 1076 π -value this implies. In the formula for a , the corresponding π -value is very
 1077 special:

$$\begin{aligned} \pi_W &= 3 + 1/(7 + 1/(16 - 2/163)) = \frac{67 \times 863}{45 \times 409} \\ \Rightarrow a_W &\approx 137.359990936148 \end{aligned} \quad (170)$$

1078 which is compatible with the measured value 137.035999084(21). The power 11
 1079 could be tied to the 11 D supergravity [42].

1080 This confirms the Wyler's approach, whose value for a has been discarded,
 1081 because of the single use of the mathematical value of π , which cannot be realized
 1082 in the Total Quantum Physics.

1083 4.5 The Symbolic Holographic Principle

1084 As seen above the Holographic Principle is manifest in Cosmology. But since
 1085 the real Total Quantum Holographic Principle cannot use the mathematical
 1086 π , because it is not rational, a more general version, the Symbolic one, uses
 1087 different values of π which are rational, even in a symbolic manner. So we
 1088 introduces the quasi-holographic relation tying the two Heavy Leptons :

$$\pi_\tau \tau^2 = (4\pi_\mu/3)\mu^3. \quad (171)$$

1089 With the choice

$$\tau/2 = 6\pi_\tau^5 \quad ; \quad \mu = 2\pi_\mu^4 \quad (172)$$

1090 the above quasi-holographic relation is correct to 158 ppm.

1091 Another case is the holographic relation tying the gravitational, electrical
 1092 and Fermi coupling constants:

$$4\pi(P/a)^2 \approx (4\pi/3)(aa_w)^3 \quad (0.1 \%). \quad (173)$$

1093 The rather large imprecision is drastically reduced by using the following π
 1094 values:

$$4\pi_{\tau/\mu}(P/a)^2 \approx (4\pi_q/3)(aa_w)^3 \quad (0.6 \text{ ppm}). \quad (174)$$

1095 The first value is the Ptolemae approximation $3 + 1/(7 + 1/17)$, where 17 is
 1096 replaced by τ/μ . The second one is the canonic value $\pi_q = aq^2/4 \approx 2 + \ln\pi$.
 1097 Also, there is:

$$4\pi p_G^2 \approx 2\pi_{30}\sqrt{aa_w} \quad ; \quad \pi_{30} = 3 + 7 + 1/30 = 3\frac{221}{211} \quad (0.6 \text{ ppm}). \quad (175)$$

1098 Moreover, the corresponding length $ct_N \approx 9R_T/10$, enters a λ_e monochro-
 1099 matic holographic relation with R_{hol} , with $\eta = F^5/Pa^3 = 1 + 2/(3 \times 139)$ with
 1100 also a relation with the Egyptian length $D_{Eg} = 3570 l_1 = \sqrt{2R_T l_1}$ defining the
 1101 meter l_1 from the Earth radius R_T (section 5.4):

$$\eta\left(\frac{ct_N}{\lambda_e}\right)^2 = \frac{R_{hol}}{2\lambda_e} \approx \frac{D_{Eg}}{l_P} \quad (0.06 \%) \quad (176)$$

1102 Eliminating D_{Eg} implies the following connection involving $p_W = 6\pi^5 = \frac{(2\pi^2)^3}{4\pi/3}$,
 1103 and leads to the following symmetric holographic relation:

$$\begin{aligned} \frac{4 a^6}{3 \times 137^3} &\approx (p_W d_e^8)^2 \quad (0.5 \text{ ppm}) \\ (R_C R_T l_1)^{1/3} &\approx \frac{137\pi^{1/3} 2\pi^2 (\lambda_e d_e)^3}{(4\pi/3)^{2/3} (a l_P \beta)^2} \quad (60 \text{ ppb}) \approx \frac{R_W a^{3/2}}{\sqrt{p n_t}} \quad (3 \text{ ppm}) \end{aligned} \quad (177)$$

1104 defining the meter to 180 ppb. Interestingly enough the additive term $137\pi^{1/3} \approx$
 1105 200.65 is close to the Human Measure (section 5.5). Through the above ppb
 1106 connection with the musical Human nervous system, *this confirms the unicity*
 1107 *of the tetrade Cosmos-Universe-Earth-Human, the Solanthropic Principle.*

1108 4.6 The Electric π_q value

1109 According to the standard theory, the electrical parameter a is related to the
 1110 electric charge $q = W \sin \theta$ where $\cos \theta = W/Z$ by the relation $aq^2 = 4\pi$. Now
 1111 these parameters are sufficiently well defined to observe that this relation is
 1112 out by 0.01 %. As seen in the previous section it is what one must face in a
 1113 Diophantine world : *the mathematical π must not be the final word.* So the
 1114 above relation must be understood as defining a specific value π_q :

$$\begin{aligned} \pi_q &\approx 2 + \ln \pi \quad (15 \text{ ppb}) \quad ; \quad \pi_q \approx 3 + 1/(7 - 1/(11 + 1/25)) \approx 3 \frac{1999}{1907} \quad (3 \text{ ppb}) \\ \frac{\ln a}{\ln \Phi} &\approx \frac{a^2}{1836 + 1/\Phi} \quad (0.4 \text{ ppm}) \quad ; \quad \frac{\ln \Phi}{\ln(\pi_q/3)} \approx \frac{a^2 p}{p_W n_t} \quad (0.3 \text{ ppm}) \\ \frac{(4\pi n_t/p)^2}{\pi_q} &d_e \sqrt{p/p_W} \quad (0.4 \text{ ppm}) \quad ; \quad \pi_q \approx \frac{p}{n_t} \left(\frac{e^e}{\pi e}\right)^2 \quad (1.6 \text{ ppm}) \\ \ln P/\pi &\approx \frac{\pi e^e}{\sqrt{a_s}} (1 + 1/\sqrt{pH}) \approx \frac{\pi_q a_s}{\Phi} (1 + 1/n_t) \quad (40 \text{ ppb}), (11 \text{ ppb}) \end{aligned} \quad (178)$$

1115 This comforts the Diophantine Physics, in particular throught the Golden Num-
 1116 ber Φ .

1117 This corresponds to the following $\pi - e$ large number correlation:

$$e^{2^{11}+135} \approx \pi^{1907 \approx p_G \ln D / \sqrt{a}} \approx a^{\sqrt{D}} \approx D^{p p_G / a^2} \quad (179)$$

1118 where $D = 1966883$ is the Monster group dimension.

1119 4.7 The Lucas and Euler Large Mersenne Numbers

1120 The Lucas Large Mersenne number $N_L = 2^{127} - 1$, where 127 is itself a Mersenne
 1121 number. it results from the abobe holographis analys the identification defining
 1122 the CMB wavelength $\lambda_{CMB} = hc/k_B T_{CMB}$:

$$N_L = \frac{2\pi \lambda_{CMB}}{\lambda_e} \frac{\pi \lambda_{CMB}^2}{\lambda_H^2} \quad (180)$$

1123 Now λ_{CMB}/λ_e is close to the Euler Mersenne number $N_E = 2^{31} - 1$, where
 1124 31 is also a Mersenne number. The correlations show :

$$\begin{aligned}
N_E^2 &= N_L/8N_E^2 \approx \frac{\pi^4 a^{3/2} p^2 H n_t}{a_w W Z} \quad (70 \text{ ppb}) \\
\frac{\lambda_{CMB}}{N_E \lambda_e} &\approx \frac{\pi^3 a_w Z}{(p n_t)^2 W} \quad (0.5 \text{ ppm}) \\
\Lambda &= \frac{4N_L}{\pi(\lambda_{CMB}/\lambda_e)^2} = \frac{8\pi\lambda_{CMB}/\lambda_e}{\lambda_H^2} \approx \frac{N_E^2 P n_t}{a_w W^2 p \sqrt{a}} \quad (0.6 \text{ ppm}) \\
\frac{P}{p W^2 \sqrt{a}} &\approx \frac{4H a^2}{\pi^2 Z} \approx \frac{a_w \Lambda}{N_E^2 n_t} \quad (0.4 \text{ ppm})
\end{aligned} \tag{181}$$

1125 The Lucas number is also close to $R/2\lambda_e$. The correlation analysis shows
1126 that two corrections occurs, which are connected with the ratio $a/137$:

$$\begin{aligned}
N_L &\approx \frac{R}{2\lambda_e} \frac{H(4\pi)^2 \sqrt{a}}{n_t^2} \frac{W Z \sqrt{a}}{a_w} \quad (0.16 \text{ ppm}) \\
\frac{H(4\pi)^2 \sqrt{a}}{n_t^2} &\approx \left(\frac{a}{137}\right)^{17+1/4} \quad (24 \text{ ppb}) \\
\frac{a_w}{W Z \sqrt{a}} &\approx \left(\frac{a}{137}\right)^4 \quad (1.8 \text{ ppm})
\end{aligned} \tag{182}$$

1127 4.8 The Electrical Moonshine

1128 A dramatic connection was made between a priori very distinct domains, imply-
1129 ing the dimension $D = 196883$ of the Monster group. Edgar Witten suggested
1130 that its logarithm could be pertinent [43]. Indeed, one observes, with $d_0 = 26$,
1131 the main dimension of the bosonic string theory:

$$\begin{aligned}
6d_0 \ln D &\approx (137/\pi_{16})^2 \quad (24 \text{ ppb}) \quad \approx (a/\pi)^2 - 1 \quad (49 \text{ ppb}) \\
2d_e D \sqrt{a} (\cos \theta)^2 &\approx E_3^{1/2} p \sqrt{(n_t/H)} \quad (0.6 \text{ ppm}) \\
4\sqrt{D} E_3^{1/2} &\approx (16e)^2 p H / n_t d_e \quad (5 \text{ ppm})
\end{aligned} \tag{183}$$

1132 where $\pi_{16} = 3 + 1/(7 + 1/16) = 355/113$, and $E_3 = e^{e^e}$.

1133 4.9 The Monster Group

1134 The Monster group cardinal us tightly tied to the Rydbergh reduced wavelength
1135 $\lambda_{Ryd} = 2(aH/p)^2 \lambda_e$:

$$O_M \approx (p/n_t)(d_e a \lambda_{Ryd}/l_P)^2 \quad (3, 4 \text{ ppm}) \tag{184}$$

1136 confirming that the Total Quantum Physics is tied to the Monster group, which
1137 shows also

$$O_M/48 \approx (1836 \times 1837 \times 1838.5)^5 p (n_t/1838.5) \quad (45 \text{ ppb}) \tag{185}$$

1138 The logarithms of O_M shows also the following relations, :

$$3 \ln O_M/e \approx 137 \quad (68 \text{ ppm}) \quad (186)$$

$$\ln O_M/\ln \ln \ln \ln O_M \approx 2 \times 137 \quad (8 \text{ ppm})$$

1139 The orders of the monster groups O_M and O_B checks:

$$O_M O_B \approx \Phi^{420}/\sqrt{\pi} \quad (0.6 \%) \quad (187)$$

$$O_M O_B \approx n_{ph}/\ln \pi \quad (0.7 \%)$$

1140 4.10 The Atiyah's Algebra Formula

1141 The Atiyah's formulation for 137 is $2^7 + 2^3 + 2^0$, associated to three algebra[2].

1142 Including the lacking complex algebra term 2^1 , this defines $137 = 139 - 2$. Now

1143 $139 \approx e^{\pi^2/2} = i^{-i\pi} = a_0$. The latter's checks :

$$\sqrt{a_0} = i^{-lni} = e^{(\pi/2)^2} \approx \sqrt{a} + \frac{d_e}{\sqrt{a}} \quad (14 \text{ ppb}) \quad (188)$$

$$K_0/7 \approx \sqrt{a a_0} \quad (39 \text{ ppm})$$

1144 comforting the pertinence of the Nambu rule [27], where the relations $\tau\tau_0 =$

1145 $\frac{2H_0\sqrt{a_0}}{WZaK_0}$ and $\sqrt{\frac{\pi_0}{\tau}} = \frac{aW}{2K_{\pm}H_0^{3/4}}$ specify the strange mesons masses: $K_0 \approx 973.811$

1146 and $K_{\pm} \approx 966.122$.

1147 4.11 The Ramanujan-Hardy Partition Formula

1148 Main physical parameters are clearly tied to the Ramanujan-Hardy asymptotic

1149 formula for the number of partitions of a whole number. Indeed with:

$$Part(n) = \frac{e^{\pi\sqrt{2n/3}}}{4n\sqrt{3}}$$

$$Part(137) \approx \frac{a\sqrt{P}}{H} \quad (8 \text{ ppm}) \approx f(18) (\ln \pi)^4 \quad (48 \text{ ppm}) \quad (189)$$

$$Part(1836) \approx \frac{P^2 a \sqrt{H/n_t}}{p} \quad (2 \text{ ppm}) \approx 2\sqrt{O_M O_B}/ed_e \approx \Phi^{\mu+2}$$

1150 where $f(18)$ is the topological function $f(d) = e^{2^{d/4}}$ for $d = 18$. Since μ is close

1151 to the canonical Holic number [28] $210 = 2 \times 3 \times 5 \times 7$ this establishes a link

1152 between the Golden Number and the orders of the monster groups O_M and O_B .

1153 4.12 The Economic Numbers

1154 Introducing the 4th order economic number $E_4 = \exp(\exp(\exp 1))$, one ob-

1155 serves the dramatic:

$$E_4^{1/4} \approx P^{(a-1)^2} \quad (190)$$

1156 The corresponding E_3 and E_2 checks:

$$\begin{aligned}
 E_3/(2E_2)^3 &\approx 137 && (5.7 \text{ ppm}) \\
 E_2^{1/2} &\approx 6a_s/13 && (18 \text{ ppb}) \\
 E_3/E_2^3 &\approx (F/Z)^6 && (65 \text{ ppm}) \\
 (2a)^3/E_3 &\approx 137^2/\tau && (0.6 \text{ ppm})
 \end{aligned}
 \tag{191}$$

1157 This opens a new research domain.

1158 4.13 The Lucas-Lehmer series and the Pell-Fermat generator

1159

1160 The number a^a is related to the Cosmos volume, with unit length the Hass-Bohr
 1161 radius [31],

$$a^a \approx \frac{4\pi^2}{3} \left(\frac{p}{n_t}\right)^2 \left(\frac{R_C}{r_{HB}}\right)^3 \quad (10 \text{ ppm}) \tag{192}$$

1162 and to the product of the cardinals of the 20 sporadic groups of the Happy
 1163 Family of the Monster. Moreover it is close to the ninth term of the Lucas-
 1164 Lehmer series, which is used to decide if a number of the form $2^n - 1$ is prime .
 1165 Its starts from 4 and proceeds by the law $a_{n+1} = a^2 - 2$ (OEIS A003010). :

$$\begin{aligned}
 a \ln a &\approx \Sigma_1^{20} \ln O_i && (400 \text{ ppm}) \\
 a \ln a &\approx 2^9 \ln(2 + \sqrt{3}) && (47 \text{ ppm}) \\
 a \ln a &\approx 3(2^8 - 1) \ln(1 + \sqrt{2}) && (0.4 \text{ ppm})
 \end{aligned}
 \tag{193}$$

1166 *This connects the generator $(2 + \sqrt{3})$ of the Lucas-Lehmer series with $(1 + \sqrt{2})$,*
 1167 *that of the Pell-Fermat series.*

1168 4.14 The Monster Number π_5 in the π fractional series

1169 Recall that the fractional development of π is an unsolved problem in math-
 1170 ematics. The Ptolemae's approximation $377/120$ involves the Egyptian series
 1171 $1 + 1/2 + 1/3 + 1/4 + 1/5 = 137/60$.The OEIS A001203 gives the numbers in
 1172 the fractional series of π :

$$3, 7, 15, 1, 292, 1, 1, 1, 2, 1, 3, 1, 14, 2, 1, 1, 2, 4, 2, 6, 6, 99, \dots \tag{194}$$

1173 So, the Monster Number $\pi_5 = 292.6345904$ could be related to the param-
 1174 eters. Indeed:

$$\pi_5 \approx n_t/2\pi \quad (3.4 \text{ ppm}). \tag{195}$$

1175 It is surprising that such an evident correlation has escaped general attention.

1176 **4.15 The Golden Number and its powers**

1177 The ratio $8/5$ is a canonic approximation for Φ . One notes

$$\begin{aligned}
 p &\approx (8/5)^{16}/d_e^4 && (5 \text{ ppm}) \\
 \Rightarrow \sqrt{a} &\approx 2(\Phi_a^4 - 1) \quad ; \quad \Phi_a = 1 + 1/(1 + (1 + (1 + (1 + p_P^{1/16})))) && (196)
 \end{aligned}$$

1178 The term $\Phi^2/2$ is very close to the number $\Omega_2 = e^{e^{-\Omega_2}}$, the unknown exten-
 1179 sion of the number $\Omega_1 = e^{-\Omega_1}$ (OEIS A201942). One observes:

$$\begin{aligned}
 p/\Omega_2 &\approx a^3/p_P && (7 \text{ ppm}) \\
 p\Omega_2 &\approx (1836/a)^3 && (0.9 \text{ ppm}) \\
 \Rightarrow p_0p^2 &\approx (1836)^3 && (8 \text{ ppm})
 \end{aligned}
 \tag{197}$$

1180 **5 DIOPHANTINE ASTRONOMY**

1181 The Modern Science really began when Kepler tried to find an harmony in the
 1182 sky. This is the prolongation of his study.

1183 **5.1 The Kotov, Schwabe, Milankovitch and Cosmic cycles**

1184 The Hubble period $T = R/c$ and the Kotov period $t_K \approx 9600.59$ second are
 1185 clearly tied to the Schwabe Period 11.02 years, the Milankovitch 100 000 years
 1186 and an unexplained 400 000 years, called "Cosmic". With $l_K = ct_K$ and the
 1187 Bohr's radius $r_B = a(1 + 1/p)\lambda_e$, we propose the holographic definitions:

$$\begin{aligned}
 \frac{R}{r_B} &= \left(\frac{R}{l_{Sch}}\right)^4 = \left(\frac{R}{l_{Milank}}\right)^7 \approx W^7 \\
 \left(\frac{R}{l_K}\right)^2 &= \left(\frac{\pi_K}{3}\right) \left(\frac{R}{l_{Sch}}\right)^3 = \left(\frac{R}{l_{Cosmic}}\right)^6 \quad \pi_K = \pi \frac{\beta e^e}{\sqrt{n_t/8}} \approx \frac{22}{7} && (29 \text{ ppm})
 \end{aligned}
 \tag{198}$$

1188 producing $t_{Sch} \approx 11.019708$ years, $t_{Milank} \approx 87\,367.5$ years and $t_{Cosmic} \approx$
 1189 $387\,170.2$ years. The synthetic way to connect these relations involves the cube
 1190 of the length ratios, and the Holic Principle involves the power 28:

$$\left(\frac{R}{r_B}\right)^3 = \left(\left(\frac{R}{\mathbf{Sch}}\right)^3\right)^3 = \frac{3}{\pi_K} \left(\frac{R}{l_K}\right)^2 = \left(\frac{R}{l_{Cosmic}}\right)^3)^4 = \left(\left(\frac{R}{l_{Milank}}\right)^3\right)^7 \approx M_{11}^{28}
 \tag{199}$$

1191 where $M_{11} = 8 \times 9 \times 10 \times 11 = 16 \times 495$ is the order of the first Mathieu group.
 1192 Mathematicians have not emphasized the fact the the definition of a perfect
 1193 number implies its antecedent. For instance the couple (5;6) is perfect since the
 1194 sum of the true divisors of 6 est 6-1 = 5. In this definition the use of the unity
 1195 as a divisor is escaped. *We have suggested that this co-perfect number 495 is*
 1196 *the square root of the mass ratio Higgs/Electron.*

1197 5.2 The Music of the Sun

1198 We have studied the $t_K \approx 9600.59$ s period of both the Sun and several quasars.
 1199 As recalled above, since the latter are *without any Doppler effect, apart some*
 1200 *de-phrasings*, it was viewed as the sign of non-local physics. So we proposed the
 1201 following holographic relations with the Universe radius R and Cosmos radius
 1202 R_C , with $l_K = ct_K$:

$$l_K^3 \approx R^2 r_e / 2 \approx R^3 l_P^2 / 3r_e^2 \approx R_c l_p r_e / \sqrt{3} \Rightarrow l_K^3 \approx R_C^2 r_e^4 / R^3 \quad (200)$$

1203 In fact, instead of the classical radius of the electron r_e , the wavelength of the
 1204 Pions appears to specify these relations:

$$l_K^3 \approx (3/\pi_a) R^2 / \lambda_{\Pi_0} ; \pi_a = \sqrt{(a^2 - 137^2)} \Rightarrow \Pi_0 \approx 264.14539$$

$$l_K^3 \approx R_C^2 (2d_e \lambda_{\Pi_{\pm}} n_t / p_W)^4 / R^3 ; p_W = 6\pi^5 \Rightarrow \Pi_{\pm} \approx 273.13265 \quad (201)$$

1205 This mass ratio charged pion/electron Π_{\pm} is within the 1.3 ppm official preci-
 1206 sion. For the neutral one Π_0 , this value is 2σ larger than the standard value.
 1207 It is significant to obtain such precise results by a succession of elementary
 1208 approaches.

1209 The current solar cycle 25 prolonged the list of the Wolf number extrema
 1210 observed from Galileo's time: 75 epochs, from 1610 to 2022, — and those ex-
 1211 tremata fixed the Schwabe's period as 11.07(4) years. The Hale's magnetic cycle
 1212 of the Sun, therefore, is equal to 22.14(8) years.

1213 This Schwabe sun period T_{Sch} seems associated with the neutral Pion wave-
 1214 length, through :

$$\frac{r_{HB}}{\lambda_{\Pi_0}} \approx \frac{T_{Sch}}{t_K} \Rightarrow T_{Sch} \approx 11.018 \text{ years} \quad (202)$$

1215 where $r_{HB} = (aH/p)\lambda_e$ is the Haas-Bohr's atomic radius. The length $l_{Sch} =$
 1216 cT_{Sch} enters an holographic relation:

$$\left(\frac{R}{l_K}\right)^2 \approx \frac{\pi_a p}{3\beta H} \left(\frac{R}{l_{Sch}}\right)^3 \quad (0.6 \text{ ppm}) \quad (203)$$

1217 So, the cosmic origin of the Schwabe period cannot be denied. According
 1218 to 54-year observations of the Sun-as-a-star, through Zeeman measurements
 1219 performed in 1968–2021 by the Crimean Astrophysical Observatory (CrAO),
 1220 Wilcox Solar Observatory (Stanford) and five other observatories of the world,
 1221 the variation of the solar mean magnetic field reveals a saw-tooth shape, sup-
 1222 porting thus this cosmological status of the Hale cycle; this sharp rise of the
 1223 magnetic temporal profile means *cosmic periodic quantum transitions* [21].

1224 Another periodicity, about 5 minutes, has been detected in the sun [38],
 1225 which corresponds to the same musical note (Lab) that the one deduced from
 1226 the Neuron $t_N = G_F^{5/4} / \hbar^2 G^{3/4} \approx 19.137$ ms appearing in the Permanent Cos-
 1227 mology [31](section):

$$t_s \approx 2^{14} t_N \approx 313,541 \text{ s} \Rightarrow 1/t_s \approx 3.19 \text{ mHz} \quad (204)$$

1228 *So, this sun oscillation period confirms the musical octave-reduction principle*
 1229 *which favors the diapason 442.9 Hz.*

1230 **5.3 The Sun-Earth couple and the Great Musical Scale**

1231 Kotov [20] has revealed the following relation tying the spin period of the Sun
 1232 $t_S = 27.027(6) t_E$ where t_E is the mean terrestrial day, the Earth spin period,
 1233 while $T_E = 365.26 t_E$ is the Earth orbital period:

$$\left(\frac{t_S}{t_E}\right)^2 \approx \frac{2T_E}{t_E} \quad (0.04 \%) \quad (205)$$

1234 With $2 = 2\pi/\pi$, this is a basic holographic relation. Moreover, this number
 1235 has been signaled above (Eq. 20), as characterizing the Large Musical scale
 1236 $665 \ln 3 \approx 1054 \ln 2$ (60 ppb) :

$$665 \ln 3 \approx \left(\frac{t_S}{t_E}\right)^2 \quad (0.04 \%) \approx a \ln \mu \quad (60 \text{ ppb}) \quad (206)$$

1237 Such a correlation specifies the system Sun-Earth. Moreover, with $p_P = a^{12}/P$:

$$\begin{aligned} \frac{p_{Ed}\Delta_{Ed}}{a} &\approx p_G \quad (64 \text{ ppm}) \approx \frac{p_P}{d_e^2} \quad (120 \text{ ppm}) \\ \Rightarrow \frac{p_{Ed}\Delta_{Ed}}{a} &\approx p_G \quad (64 \text{ ppm}) \approx \frac{p_P}{d_e^2} \quad (120 \text{ ppm}) \quad (207) \\ \Rightarrow \frac{p_{Ed}\Delta_{Ed}}{a} &\approx \frac{p_G^2 d_e^2}{p_P} \quad (8 \text{ ppm}) \end{aligned}$$

1238 This confirms the implication of the Eddington's mass ratio, $p_{Ed} \approx 1847.599459$,
 1239 the ratio of the two roots of his equation $10x^2 - 136x + 1 = 0$ with discriminant
 1240 $\Delta_{Ed} = (136^2 - 40)^{1/2}$. Thus, the system Sun-Earth rehabilitates the Eddington's
 1241 equation. From the approximate holographic relation $4a^3/3 \approx p^2$, one observes:

$$\begin{aligned} \frac{T_E}{t_S} &\approx \frac{((4/3)(\sqrt{137a})^3)^{1/2}}{a} \approx \frac{1836}{\Delta_{Ed}} \quad (0.02 \%) \\ \Rightarrow \pi_0 \left(\frac{1836a}{\Delta_{Ed}}\right)^2 &\approx (4\pi/3)(\sqrt{137a})^3 \quad ; \quad \pi_0 = 3 + 1/(7 + 2/(\pi_0)^3) \quad (0 \text{ ppb}) \\ \Rightarrow (4\pi_0/3)(\sqrt{137a})^3 &\approx 137^2 W/2a \quad (70 \text{ ppb}) \end{aligned} \quad (208)$$

1242 The presence of $\pi_0 \approx 3.1415527254$ confirms thus is an holographic relation.
 1243 The elimination of π_0 leads to a 70 ppb relation mixing the usual topologic
 1244 terms , 2 3 and π with 137, a , Δ_{Ed} , 1836 and $W = 137^2\Gamma/3d_e$ ([31], where Γ
 1245 is the Atiyah constant. With our value $Z = \pi^4 a p^2 / 137 d_e n_t$, another 70 ppb
 1246 relation appears, leading to the following ppb relations:

$$\begin{aligned} 1836^2 &\approx \frac{\pi^5 \Delta_{Ed}^4 Z}{2^8 137 W} \approx \frac{3\pi^2 Z^2 W^3}{2^6 137^4 a^5} \quad (10 \text{ ppb}) \\ \Rightarrow \left(\frac{137a\Delta_{Ed}}{W}\right)^4 &\approx \frac{12 \times 137 Z}{\pi^3 a} \end{aligned} \quad (209)$$

1247 This proves that the number 1836² must have arithmetic singularity. Indeed,
 1248 1836 figures as a special term in the OEIS A018930, acting by its square.

1249 Moreover, $x_1 = 13.59264308$, the larger root of the Eddington's equation,
1250 checks:

$$s \times x_1 \approx 3 + 1/(7 + \mu/\tau) \quad (0.25 \text{ ppm}) \quad (210)$$

1251 Such a direct liaison with the Weak-Mixing angle s confirms that *the above*
1252 *Eddington's equation is of central importance, calling for more study.* This is a
1253 strong indication towards the "Solanthropic" Principle : the system Sun-Earth-
1254 Human would be unique in the Universe.

1255 5.4 The Earth-Moon couple and the quark symbolic masses

1256 In the couple Earth-Moon, the ratio of the diameters is close to $11/3$, which is
1257 not a musical ratio. But $q \times (11/3) \approx 10/9$, which is a classical musical interval.
1258 This means that the electric charge number obeys:

$$\begin{aligned} 10/q &\approx 33 = 495/15 && (1.9 \%) \\ \Rightarrow 495 q &\approx 150 \approx (p(a/137)^2)^{2/3} && (0.16 \text{ ppm}) \\ (O_M/48)^{1/24} &\approx 150 && (1 \text{ ppm}) \end{aligned} \quad (211)$$

1259 The number 150 represents the combination uud , with the symbolic masses of
1260 the quarks, forming the first perfect couple : $u = 5; d = 6$.

1261 It was reackognized that 496, the dimension of the SO32 group, is the third
1262 perfect number. But it is not generally explained that *the perfect quality con-*
1263 *cerns in fact a couple of numbers.* For instance, in the perfect couple 5;6, the
1264 former is the sum of the *true* divisors of the second, where the unity is not
1265 considered as a true divisor, in conformity with the Pythagoras spirit where the
1266 Unity (called "Monade") is only additive, but not multiplicative. The perfect
1267 couple 495-496 shows up in:

$$\begin{aligned} 496 q &\approx (\pi/3)^2 a / \sqrt{\beta} && (0.2 \text{ ppm}) \\ 495 q &\approx (\pi/3)^2 (a_w/WZ)^2 (p/p_W)^4 && (1.6 \text{ ppm}) \end{aligned} \quad (212)$$

1268 confirming the value and central role of the pure electrical charge number q . It
1269 is enlighting that this was obtained without using the computer: this is a new
1270 manifestation of the connection Cosmos-Consciousness. Moreover, since it was
1271 induced by the couple Earth-Moon, this means the singularity of this couple.

1272 Moreover, 496 appears in the following:

$$\frac{\sqrt{a_w}}{aa_s} \approx \frac{496}{\sqrt{\pi_q/\pi}} \quad (2.5 \text{ ppm}) \approx 2(2\pi_a)^3 \quad (-6.5 \text{ ppm}) \quad (213)$$

1273 where $\pi_a = \sqrt{a^2 - 137^2}$. So 496 is at the heart of the parameters.

1274 **5.5 The Solar System and the gauge couplings**

1275 Kepler was looking for a celestial harmony in the planets, which culminates in
 1276 his third law, characterized by the two main numbers 2 and 3 of Pythagoras
 1277 music, which, to his great surprise and delight, appear as exponents connecting
 1278 Space and Time. *This was the prefiguration of the Holic Principle [28] which*
 1279 *leads to the Total Quantum Physics [30].*

1280 Valey Kotov has also connected the Time and Space by showing that his
 1281 cosmic coherent period t_K and the associate length ct_K are statistically cen-
 1282 tral elements in the solar system [19]. In particular, one day is very close to
 1283 $9t_K$, while for Jupiter the spin period is $6\Phi t_K$, Saturn: $4t_K$, Uranus: $4\Phi t_K$,
 1284 Neptune: $6t_K$, where 4Φ is the golden number appears

1285 Roughly speaking, the orbital periods of the 4 first elements of the solar
 1286 system follows a singularity: Sun (spin 30 days), Mercure (88 days), Venus (225
 1287 days) and the Earth (365 days). Jean-Marie Souriau [35] considered the multiple
 1288 5 of the additive series beginning by the *perfect couple* 5;6, a series used for
 1289 long by the cathedral workers. This defines the numbers 30,55,84,140,225,365,
 1290 showing a tight correspondence. According to this author, the appearance of the
 1291 golden number is normal, since this number and its square are the most irrational
 1292 numbers, *this explains why the series stop at the Earth, again particularizing*
 1293 *our planet in the Solar System.*

1294 Moreover, the above sun Schwabe's period agrees surprisingly well with the
 1295 value, inferred by Scafetta [33] from the analysis of configurations of Venus,
 1296 Earth and Jupiter and, consequently, of their gravitational tides on the Sun.
 1297 The combined alignment repeats every:

$$T_{VEJ} = \left(\frac{3}{T_V} - \frac{5}{T_E} + \frac{2}{T_J} \right)^{-1} \approx 22.14 \text{ years} \quad . \quad (214)$$

1298 where $T_V = 224.701$ days, $T_E = 365.256$ days and $T_J = 4332.589$ days are
 1299 sidereal orbital periods of the respective planets (Table 2).

1300 Due to its rather large eccentricity, Mars has played a central role in the
 1301 fundamental discovery by Kepler of the area speed law. The orbital period
 1302 ratio of Mars and Earth : $687/365 = 3\pi_0/5$, implies a rational value π_0 such
 1303 that (to 47 ppm, 28 ppm and 30 ppm):

$$T_{Mars}/T_{Earth} = 3\pi_0/5 \approx (4\pi_0)^{1/4} \approx \tau/p_{Ed} \approx (2a^3/pn_t)^{3/2} \quad (215)$$

1304 the last expression involves directly the third Kepler law.

1305 Concerning now the spatial elements, note that the Bode-Titius regular-
 1306 ity is always not explained by current physics. But Kotov [18] has shown a
 1307 very interesting series for the semi-axes of 10 planets, 4 internal and 6 external
 1308 (including Pluto and Eris), by respect to the Asteroid Ring (Table 3). The
 1309 main parameter in his study is the ratio between the Kotov length and the
 1310 Earth semi-axes $f_K \approx 19.2394778$, which shows the following correlation, with
 1311 $\epsilon = E_{ph}/k_B T = \pi^4/30\xi(3) \approx 2.701178018$ where E_{ph} is the mean energy by
 1312 photon in the thermal radiation:

$$f_K^2 \approx \epsilon a \quad (3 \text{ ppm}) \quad (216)$$

1313 Such a relation with *a main parameter of the black-body radiation* is comforting
 1314 the approach. Its pertinence is confirmed in the Table 4 which shows that these

1315 distances connect dramatically with the gauge coupling constants. In particular,
 1316 the Venus case implies:

$$\begin{aligned}
 \left(\frac{a}{137}\right)^4 &\approx \frac{4g_1^2}{\sin^2\theta} \quad (0.9 \text{ ppm}) \approx \frac{WZ\sqrt{a}}{a_w} \quad (-1.7 \text{ ppm}) \\
 \Rightarrow 4 \tan\theta &\approx \frac{\sqrt{a} 495^4}{a_w} \quad (2.6 \text{ ppm}) \approx \frac{137}{64} \quad (55 \text{ ppm})
 \end{aligned}
 \tag{217}$$

1317 confirming the Higgs number 495.

1318 Resuming the astrophysics considerations: there is an overall harmony im-
 1319 plying the most basic concepts of theoretical physics. *It is the very achievement*
 1320 *of the Kepler's task.*

1321 6 COSMOBIOLOGY

1322 This natural scientific domain was the most neglected of all.

1323 6.1 The CMB as the genetic code of the Universe

1324 The root of any cosmology is to consider the Universe as a whole. In standard
 1325 cosmology it is a relativistic whole. But in our Coherent Cosmology, it is a
 1326 quantum whole. This means the Universe must be considered as a particle in
 1327 an external Cosmos [31]. It is indeed the very message of the Cosmic Axis.

1328 Mathematics integrates Physics but not Biology. Indeed the current Mathe-
 1329 matics and Physics are both reductionist, while Biology is evidently holistic, in
 1330 harmony with our Coherent Cosmology. For this reason, it is logical to interpret
 1331 the Cosmic Micro-wave Background (CMB) as the genetic code of the Universe.
 1332 This defines the new domain of Cosmobiology.

1333 This is supported by the following perfect holographic relation involving the
 1334 Wien CMB wavelength λ_{Wi} :

$$\begin{aligned}
 e^a &\approx 4\pi\left(\frac{R_{hol}}{\lambda_{Wi}}\right)^2 \quad (0.1 \%) \\
 e^{137^2/a} &\approx 4\pi\left(\frac{137R}{a\lambda_{cmb}}\right)^2 \quad (9 \text{ ppm}) \\
 e^a &\approx q^{-p/16} \quad (0.04 \%)
 \end{aligned}
 \tag{218}$$

1335 So the CMB would be the Unitary Information Field, whose fluctuations
 1336 statistics involves directly mathematical functions [1]. *While the spectral distri-*
 1337 *bution of the CMB is almost exactly a thermal one, it bears information.*

1338 6.2 The Cosmo-Thermal Relations

1339 Introducing the scale factor $j = 8\pi^2/\ln 2$ [36], which checks:

$$e^\pi \approx a - j \quad (67 \text{ ppm}) \approx j/\ln a \quad (-47 \text{ ppm}) \tag{219}$$

1340 this scale factor j correlates directly with p, s and 495:

$$\begin{aligned}
p/16 &\approx j + 1 && (0.1 \%) \\
j + 1/2 &\approx 495 \text{ s} && (16 \text{ ppm})
\end{aligned} \tag{220}$$

1341 As shown by Schrödinger [34], the temperature is a central parameter in
1342 Biology. For instance, in spite of very different conditions, the mammal tem-
1343 perature $T_{mam} \approx 37.5$ Celcius = 310.65 Kelvin is the same for the polar bear
1344 and the african antilop. One observes:

$$T_{mam}/T_{cmb} \approx j \quad (0.04 \%) \tag{221}$$

1345 So there is a concordance of biological and physical parameters, comforting
1346 the Cosmobiology.

1347 Moreover, with $P = \lambda_e/l_P$: $R_{hol}/\lambda_e = 2P^2/a^3$, $R/\lambda_e = 2P^2/pH$ and
1348 $\lambda_{Wi}/\lambda_e \approx P/a^3 pH$, meaning there is a symmetry between the Hubble radius
1349 R , the Cosmic holographic radius R_{hol} and the Wien CMB wavelength:

$$\begin{aligned}
P^3 &\approx RR_{hol}/4\lambda_e\lambda_{Wi} && (0.03 \%) \\
P^3 &\approx (2\pi R/\lambda_e)(2\pi ct_K/r_e) && (0.07 \%)
\end{aligned} \tag{222}$$

1350 These relations confirms that the CMB background radiation is directly the
1351 emanation of the Cosmos, external to the Universe, not the 'fossil' trace of a
1352 Big Bang. Moreover, this symmetry integrates the Kotov length ct_K , which
1353 plays a central role above in the Solar System.

1354 There is a double holographic relation tying R, l_P with the CMB Field:

$$2\pi R/\lambda_e = 4\pi(\lambda_p\lambda_H)/l_P^2 \approx (4\pi/3)(\lambda_{cmb}/\lambda_{H_2})^3 \quad (0.6 \%) \tag{223}$$

1355 giving 2.73 Kelvin. A slight modification implying p_W leads to another holo-
1356 graphic relation giving the temperature 2.72582 Kelvin, compatible with mea-
1357 surement [31].

1358 The mean length between l_P and the Universe radius R corresponds to the
1359 lethal mammal temperature, while with the holographic radius, it is the Water
1360 Triple Point :

$$\begin{aligned}
hc/k\sqrt{Rl_P} &\approx 313.1 \text{ Kelvin} = 39.9 \text{ Celcius} \\
hc/k\sqrt{R_{hol}l_P} &\approx 313.1 \text{ Kelvin} = 0.3 \text{ Celcius}
\end{aligned} \tag{224}$$

1361 This is the Water triple point temperature T_{H^2O} defining the Celcius unit,
1362 which is tightly connected with the triple points of Hydrogen (13.4 Kelvin) and
1363 Oxygen (54.4 Kelvin) through the relation:

$$T_{H_2}T_{O_2} \approx T_{H^2O}T_{CMB} \quad (1 \%) \tag{225}$$

1364 These relations are only specific of mammal and molecular properties, so
1365 they not in direct numerical relation with Human. But they are so simple and
1366 so direct that, *from the idealist aspect, they are really "anthropic"*.

1367 **6.3 The DNA, the Cosmic Oscillation and the quarks sym-**
 1368 **bolic masses**

1369 The atomic masses of the DNA nucleotides are clearly related to Particle Physics
 1370 parameters (Table 5), where the number $\sqrt{5}$ is central. One observes, with n_t
 1371 the mass ratio neutron/electron:

$$A + T + 1/2 \approx C + G - 1/2 \approx n_t/3 \approx 2\sqrt{5} \quad (226)$$

1372 Firstly, this means that the mean mass of the bi-codon (three nucleotide
 1373 pairs), $m_{bc} = 3m_H(A + T + C + G)/2 = 1839.3m_H$, is about $n_t m_H$. Note that,
 1374 with the pure isotopic atoms, the mean bi-codon mass is special:

$$6(C + T + A + G)/4 \approx 1838.418 \approx H\sqrt{n_t/p} \quad (0.1 \text{ ppm}) \quad (227)$$

1375 This mean bicodon mass is tied to the above cosmic period:

$$\frac{\hbar^2}{Gm_{bc}^3} \approx 2ct_K \quad (0.7 \%) \quad (228)$$

1376 This means a tight connection between the DNA and the above Cosmic tachy-
 1377 onic oscillation. Moreover :

$$e^a \approx \frac{R}{l_P \sqrt{(A + T)}} \quad (0.01 \%); \quad a \ln a / \ln 3 \approx C + G \quad (0.01 \%) \quad (229)$$

1378 reveals a liaison with CMB and the Cosmos volume tied to a^a , confirming the
 1379 CMB is the Cosmogenic code and that *the optimal whole base identifies with*
 1380 *the number of doublets in the bi-codon*. Moreover, the bi-codon mass enters the
 1381 center of the Cosmic Axis, whose maximal dimension is 30:

$$m_{bc}/m_e \approx (\Pi_{\pm}/\Pi_0)e^{15} \quad (0.06 \%) \quad (230)$$

$$m_{bc}/m_e \approx f(16)/\Phi^2 \quad (0.5 \%)$$

1382 Secondly this implies:

$$n_t/a \approx 5 \times 6^2 \quad (231)$$

1383 where $u = 5$ and $u = 6$ are the symbolic quark masses describing the neutron
 1384 $udd = 180$, while the proton combination $uud = 150$ was encountered above
 1385 (section 13).

1386 This implies the following arithmetic property of 137, clearly tied to the
 1387 Wyler formula $p_W = 5\pi^5$:

$$6 \times 5^5 = 137^2 - 19 = 136 \times 137 + 118 \quad (232)$$

1388 where $137 = 118 + 19$, where 118 is the atomic number of the terminal atom
 1389 (Orgamesson) in the periodic table, a relation itself connected to high-dimension
 1390 crystallography [32].

1391 The DNA chain molecule must be a temporal hologram: an electric current
 1392 running along emit a field governing the organism. With its radius 2 nm, the
 1393 angular momentum of a signal with speed c is $0.6 \text{ m}^2/\text{s}$, which favors the human
 1394 units, the meter and the second, as precised below (section 18).

1395 The number of cells in a Human adult is rather well defined, between 30
1396 and 45 thousand billion cells [25]. Now the number of classical electron radius
1397 $r_e = \lambda_e/a$ in a length of 0.1 m, which is 35.5×10^{12} , shows a dramatic correlation
1398 with the above Egyptian number $\tau_0 = 3570$:

$$N_{cell} = \frac{0.1 l_1}{r_e} \approx \frac{n_t W Z \tau_0}{2p\sqrt{2}} \approx H_0 1837^{5/2} \quad (233)$$

1399 **6.4 The Egyptian Meter as natural unit**

1400 The length unit meter was known by the Egyptian, by reference with the Earth
1401 radius: it is the height corresponding to an horizon distance of $D_{Eg} = 3570$
1402 meter[11]. This Egyptian Earth radius checks, where $n_H = M/m_H$ the atomic
1403 mass of the Cosmos :

$$R_{Eg} = D_{Eg}^2/2 = 6\,372\,450 \text{ meter} \quad (0.1 \%) \approx R_c/e n_H \quad (0.3 \%) \quad (234)$$

$$R_{Eg}/l_1 = \tau_0^2/2 \approx \tau_{pG}(a/137)\sqrt{H/p} \quad (0.16 \text{ ppm})$$

1404 Thus, the introduction of the meter l_1 , the length unit, confirms the Cosmos
1405 radius. How the Egyptian took care of this number 3570 is a mystery of Science
1406 History. What is evident is that they knew the "Egyptian series" defining
1407 $137 = 60 (1+1/2+1/3+1/4+1/5)$, as attested by the Ptolemae approximation
1408 $\pi_{Pt} = 377/120 = 2 + (1 + 1/2 + 1/3 + 1/4 + 1/5)/2$. Even more surprising,
1409 they knew the Third Combinational Hierarchy term $3 + 7 + 127 = 137$, as is
1410 attested by the Karnak Hypostyle Room, located between the second and third
1411 pillar of the Karnak Amon Temple exhibiting $134 = 7 + 127$ columns. They
1412 knew also the Mersenne number definition $7 = 8 - 1$, as attested by the first
1413 column half row composed of 7 column plus one giant central one.

1414 Moreover:

$$\frac{495}{g_1 = g_2 \tan \theta} \approx \frac{2 \times 137^3 \sqrt{p}}{\tau_0 \sqrt{pW}} \quad (0.8 \text{ ppm})$$

$$\frac{1}{\beta} \left(\frac{495^2}{Z} = \frac{\sin \theta}{g_1} \right)^{1/3} \approx \frac{10}{9} \approx \frac{\lambda_e l_K}{l_1^2} \quad (0.4 \text{ ppm}) \approx \frac{(\tau_0 + 1)^2}{20 d_e F} \quad (3 \text{ ppm}) \quad (235)$$

$$\frac{495^2}{Z} = \frac{\sin \theta}{g_1} \approx \frac{\tau_0}{1838.5\sqrt{2}} \quad (10 \text{ ppb}) ; \quad 10 d_e F t_1 \approx ct_N \quad (71 \text{ ppm})$$

1415 where $\tau_0 + 1 = 3571 \approx \Phi^{17}$ is the 17th term of the Lucas series. This confirms
1416 that the meter unit l_1 is pertinent in the ppm domain, while the second t_1 is in
1417 the 100 ppm domain.

1418 **6.5 The Human Measure and the Absolute Speed**

1419 The pertinence of the unit meter l_1 implies that of the unit mass $\text{kg} = m_1$, as
1420 is attested by the following dramatic relations, with $p_P = a^{12}/P$. The Human

1421 Measure Number is about the power 11 of the Golden Number, this number 11
1422 being its fifth power. This specifies the dimension 11 of supergravity [42]:

$$\begin{aligned}
\hbar^2/Gm_e^2l_1m_1 &\approx 200.7675604 \approx \mu - 6 \quad (4 \text{ ppm}) \approx \frac{(11/4)^4}{(\pi^2/15)^3} \quad (20\text{ppm}) \\
\mu &\approx \tau_0^{12} \frac{m_e r_H}{m_1 l_1} \quad (0.09 \%) \approx \Phi^{\Phi^5} - 1 \quad (0.03 \%) \approx (\pi - 1)^7 \quad (0.08 \%) \\
\mu - 6 &\approx d_e(\sqrt{a}/2)^3 (68 \text{ ppm}) \approx a\pi^{1/3} \quad (330 \text{ ppm}) \approx Y = (8\pi a^{3/2})^{1/2} \quad (120 \text{ ppm}) \\
Y &\approx \frac{g_1 p_P}{\pi} \quad (30 \text{ ppm}) \approx \frac{138}{2g_1} \quad (-40 \text{ ppm}) \Rightarrow (4\pi)^2 a^{3/2} \approx 138 \text{ pP} \quad (10 \text{ ppm})
\end{aligned} \tag{236}$$

1423 where $11/4$ and $\pi^2/15$ are two main parameters (section 21) of the thermal
1424 radiation. Moreover this ties to 10 ppm the SU_1 constant g_1 with the gravi-
1425 tational huge term $P = m_P/m_e$. Note that $p_P = a^{12}/P$ is very close to the
1426 proton/electron mass ratio, the deviation being $a/137$ at 5.3 ppm.

1427 Moreover, the Earth liberation speed $v_T = \sqrt{2GM_T/R_T} \approx 11185$ m/s shows
1428 a correlation with the atomic speed c/a , where $l_1 = 1$ m, $m_1 = 1$ kg :

$$2^{2/53} \frac{c/a}{v_T} \approx \frac{m'_P r_{HB}}{l_1 m_1} \quad (40 \text{ ppm}) \tag{237}$$

1429 which exhibits the Indian music interval $2^{1/53} \approx 3^{1/84} \approx 6^{1/137}$.

1430 Introducing the speed V_0 of the Local Group, measured, by respect of the
1431 CMB, around 620 km/s. With the above Human Measure this gives a singular
1432 kinetic momentum:

$$\begin{aligned}
\hbar^2/Gm_e^2 \times V_0/\hbar &\approx R/\lambda_\tau \\
\Rightarrow c/V_0 &\approx \frac{m_p m_H}{m_e m_\tau} \approx 485 \quad \Rightarrow \quad V_0 \approx 618 \text{ km/s}
\end{aligned} \tag{238}$$

1433 This is the definite prove that Relativity do not apply at the cosmologic level

1434 6.6 The three human units, meter, kilogram and second

1435 The three human units, meter, kilogram and second, are separately tied to phys-
1436 ical parameters, the Earth radius and mass, the Sun mass, the gauge couplings
1437 and t_N , the Neuron (section 1.6):

$$\begin{aligned}
l_1 = 1 \text{ meter} &= 2R_T/\tau_0^2 \approx \frac{\lambda_e^2}{a^2 l_P 60 \sqrt{\tau_0}} \quad (8 \text{ ppm}) \\
m_1 = 1 \text{ kg} &\approx (m_e H^2 \approx m_{bc}) \times \frac{2\pi R}{\sqrt{R_T l_1}} \quad (30\text{ppm}) \\
m_1 = 1 \text{ kg} &\approx \frac{g_2^2 m'_P{}^2}{M_T} \quad (0.6 \%) \approx \frac{g_0 \sqrt{M_S m_e}}{\cos \theta} \quad (0.2 \%) \\
t_1 = 1 \text{ second} &\approx \frac{t_N \tau_0}{8\pi e} \quad (18 \text{ ppm}) \\
D &\approx \frac{R_1^2 d_e^2 l_1 m_e}{N_L l_K \hbar t_1} \quad (18 \text{ ppm}) \approx \frac{(4\pi)^2 \beta 1848}{\pi \sin \theta} \quad (0.15) \text{ ppm}
\end{aligned} \tag{239}$$

1438 The last relation characterizes the speed unit m/s, through the Monster group
 1439 dimension $D = 196883$ (section 3.8), where appears the ratio $R_1/(4\pi)^2 l_K =$
 1440 $a_w(p/p_W)^2$ (section 1.3).

1441 Moreover, $m_{Hu} = 100$ kg checks :

$$\begin{aligned} \frac{d_e^4 m_{Hu}}{m_P} &\approx \frac{a_w a}{137 a_s^2} (-23.5 \text{ ppm}) \approx \frac{D \tau_0 60^2}{4a} (48 \text{ ppm}) \\ \Rightarrow \frac{d_e^4 m_{Hu}}{m_P} &\approx \left(\frac{D \tau_0 60^2 a a_w^2}{4 \times 137^2 a_s^4} \right)^{1/3} (0.5 \text{ ppm}) \end{aligned} \quad (240)$$

1442 So, the optimal Human mass is tightly related to the Planck mass, itself related
 1443 to the oocyte mass $m_{oo} \approx m_P/\sqrt{a}$.

1444 6.7 The Devolution Number

1445 Considering the above relation:

$$r_{HB} m_A = \hbar^2 / G m_e^2 \approx 200.7675604 \text{ kg} \times \text{m}. \quad (241)$$

1446 With l_1 the length unit meter, corresponding in the Earth gravitational field to
 1447 the pendulum period of 2 second, this defines the Human Measure, where the
 1448 associated Human mass is thus $m_h \approx 100$ kg, exhibiting the following number:

$$N_A = \frac{2l_1}{r_{HB}} \approx \frac{m_A}{m_{Hu}} \approx 37.7 \text{ billion} \quad (242)$$

1449 It is remarquable that the number of atomic radius in the Human height
 1450 of 2 meters is so close to the number of Human weight of 100 kg in the mass
 1451 appearing so naturally in the Diophantine resolution of the Kepler laws. It is
 1452 why it is called Armageddon mass. Indeed, the Devolution theory predicts
 1453 that the total number of Human is limited by the process of mutations, which,
 1454 contrary to the Darwin theory, cannot statistically be positive. So, one possible
 1455 interpretation of this number would be the total number of Humans. *This would*
 1456 *mean that a small number of future generations is left.*

1457 The pertinence of this Devolution Number is its proximity of its square (80
 1458 ppm) with the following correlation involving the Higgs perfect couple 495-496,
 1459 with $\lambda_w = \lambda_e/a_w$:

$$\frac{\lambda_{cmb}}{\lambda_w} \approx \left(\frac{a^2}{2\pi} \right)^6 d_e \frac{\pi q}{\pi} (8 \text{ ppm}) \approx \frac{4P(p-1)\sqrt{\beta}}{495 \times 496} (0.3 \text{ ppm}) \quad (243)$$

1460 meaning the following holographic relation involving the CMB wavelength:

$$\pi N_A^2 \approx \pi \left(\frac{2l_1}{r_{HB}} \right)^2 \approx 2\pi \frac{\lambda_{cmb}}{\lambda_w} \quad (244)$$

1461 confirming the cosmogenic role of the CMB background.

1462 7 Conclusion: The Pythagorean Solanthropy

1463 The connection of physical parameters with biological ones is out of any doubt,
 1464 especially from the Cosmo-thermal relations (section 5.2) and the DNA ones

1465 (section 5.3, and Table 7). One could deduce that Life is Universal. But the
1466 Neuron time, so coherent with the Human nervous system, is central in the
1467 specific correlations involving the Human surroundings. Firstly, the ppb rela-
1468 tion 74 relies the Neuron length ct_N with R_{hol} the reduced holographic radius,
1469 and checks an holographic relation involving the Egyptian Length 3570 meter,
1470 defined from the Earth radius, producing another correlation to 100 ppb. Sec-
1471 ondly, the relations 19-20-21 shows the liaison of the Neuron with the Higgs
1472 number 495 and the gauge coupling constants, in an overall improbability in
1473 the ppb domain. Thirdly, these gauge couplings are specific of the Solar System
1474 centered on the Asteroid ring and the Earth, the incredible Table 6 showing
1475 that each of the 10 planets (not eight) shows ppm connection with the gauge
1476 couplings with also an an overall improbability in the 100 ppb domain. Finally,
1477 the devolution number, through the relations 124 and 125, is associated to a
1478 100 ppb correlation with the CMB main wavelength.

1479 So the conclusion is clear: the huge number of potential star systems in
1480 the Universe (10^{24}) is nothing by respect to the cumuled improbability of the
1481 connections, around 10^{39} . This proves the unicity of the system Solar System-
1482 Earth-Human in the Cosmos.

1483 However, this does not prove that the Life would be limited to our planet.
1484 But as the pig oocyte as the same dimension that the Human one, it seems
1485 probable rather that the Life itself is unique in our planet. The main difference,
1486 of course ,is that the pig does not play the violon-cello, as these strange musicians
1487 possessing an absolute musical sensibility which corrects the concert piano pitch.

1488 The excess of formalism induced a separation of Science into multiple do-
1489 mains. The return to the direct inductive scientific method reunifies all these
1490 domains. In particular the return to the intuitive mass concept is determinant.
1491 Indeed, in the 3 first minutes of a reappraisal of cosmology (Sept. 1997), Fran-
1492 cis Sanchez, taking account of the existence of three main particles in Atomic
1493 Physics has deduced the tachyonic formula (without c) which gives half the
1494 Hubble radius, so directly the mass of the critical observable Universe, which so
1495 appears as a particle in an external Cosmos, identified as the final gauge boson
1496 by the Cosmic Axis. The geometrical mean of these four masses identifies with
1497 the Planck mass, which is $\sqrt{137}$ times the Human oocyte mass, which is the
1498 geometric mean between the electron and the Armageddon mass, the strange
1499 mass of a mountain, which results from the Diophantine analysis of the Kepler
1500 laws.

1501 This analysis is based on *the symmetry between the Newton and Planck*
1502 *constants, by respect to the mass concept* : while astrophysics uses the product
1503 Gm , nobody remarks that, in quantum physics, it is $/m$ which has a kinematic
1504 meaning. And the ratio between the two kinematics term is a speed, so using c ,
1505 this deduces at once the Planck mass from the three universal constants. This
1506 simple reasoning would have not escaped Newton if he had not been polarized
1507 in the differential equations, and has reasoned as a real pythagorician, by using
1508 Diophantine ones.

1509 So, why nobody acclaimed this evidence, which was deposited in a sealed draft
1510 in the Paris Academy in March 2018 (and in the Dimensional Analysis section
1511 in the French wikipedia), and was published with difficulty in 2006 by Pecker
1512 (against the rejection of the co-editor Narlikar), in a short letter where the
1513 modern Hubble constant value 13.8 was replacing the current 13.7 for the first
1514 time [29]. In fact, the officials believe that this gives the Universe age, while

1515 in fact it is the time of renewal of new-born galaxies in an Universe without
1516 expansion. Of course, the first observations of the telescope Webb shows that
1517 there is no "dark age" at all, so the Primordial Bang model is out.

1518 One reason for this blockage is that the Particle Physics standard model
1519 considers that the mass concept has only a secondary importance. The pure
1520 equations do not use the mass concept, and it is only an additive Higgs-Englert-
1521 Brout mechanism which give mass to particles. The standard model use exten-
1522 sively the convention $c = 1$, so identifying the concepts of Time and Length.
1523 This paper demonstrates that it is a dreadful misconception, so it is not really
1524 surprising that the real importance of the mass concept escapes the analysis.
1525 The holophysical analysis of the photo-wave shows clearly that the mass is a
1526 memory, a number of informations. It is why the DNA bi-codon mass is so
1527 related to the parameters.

1528 Moreover, as the Human consciousness of whole numbers is central in our
1529 synthesis, this means also a Philosophy-Science reunification, a return to the
1530 Pythagoras "Natural philosophy". Note that this consciousness connection has
1531 nothing to do with the cumbersome Von Neumann-Wigner's one associated with
1532 the wave-packet reduction [41].

1533 Jean-Claude Pecker has been finally convinced by our arguments, and wrote
1534 this historical comment (2 Agustos 2019) in a mail group of discussion, which
1535 contradict a whole life of anti-Pythagorism:

1536 *Il est clair pour moi qu'une bonne description de l'univers doit en effet im-*
1537 *pliquer des relations arithmétiques ; on sait qu'à l'échelon du végétal, les suites*
1538 *de Fibonacci se retrouvent dans la nature; les lois de Kepler sont aussi de na-*
1539 *ture arithmétique. Je pense que la nature même de la matière implique des*
1540 *mathématiques du discontinu, autrement dit arithmétiques. L'apparence du con-*
1541 *tinu n'est vraisemblablement due qu'à l'énormité des nombres impliqués dans la*
1542 *description des phénomènes*

1543 A salient point is that there is no need to be an advanced mathematician to
1544 test the numerical relations: everybody can check the relations, and appreciate
1545 their improbability. These relations indicate the way towards the missing parts
1546 of Number Theory. One of these is clearly to find an equivalent of the Mersenne
1547 Numbers on base 3. Indeed, the salient point is that the fourth cube of 3
1548 is close to the seventh square of 2 which is two times the fourth step of the
1549 Combinatorial Hierarchy : $3^{3^4} \approx (4/3)2^{2^7}$. (section 3.2). This gives at once the
1550 separation between the Cosmos holographic reduced radius and the Universe
1551 radius.

1552 *The relations are so elegant and improbable that this excludes the Multiverse*
1553 *idea, based on the supposition that the parameters are really "free".*

1554 The very fact that the 3 minutes formula was missed during a century,
1555 and the Newton-Planck symmetry for 350 years, is a new prove of the general
1556 devolution.

1557 *As predicted [31], the James Webb telescope is correcting the formalists which*
1558 *have betrayed the genuine scientific spirit, that of Pythagoras.*

1559 7.1 The two rival cosmologies

1560 There was an intensive debate between the two main models for cosmology.
1561 However the confrontation was rather unequal, because the steady-state model
1562 has been victim of his essential scientific quality, to be easily refutable : it

1563 suffices that one of the global statistical cosmic property shows deviation along
1564 the distance of observation. It is why opponents have believed they have succeed
1565 to prove its refutation.

1566 But the steady-state model has correctly predict both the critical character
1567 and the galaxy recession acceleration. Jean-Claude Pecker, alas recently
1568 deceased, took seriously the Eddington quest on the Galaxy temperature, and
1569 was the leader of the opposition to a too dogmatic scientific system which cen-
1570 sored any refutation of the mainstream theory.

1571 Indeed, the first observations of the JWST seem to confirm a one more
1572 prediction of the steady-state cosmology: a far field with no difference in galaxy
1573 population. In our reappraisal of steady-state cosmology, our Hubble radius
1574 corresponds to 70.79 (km/s)/Mpc, which is intermediary between the two official
1575 values in dramatic tension (5%), that of the Planck mission and that of the direct
1576 novae measurement.

1577 So, the JWST is prompted to check the validity of theses so-called refuta-
1578 tions. In particular, to concentrate towards the most precise cosmic measure-
1579 ment : the Universe temperature. This study predicts its invariability with
1580 observation distance.

1581 7.2 The merging of the two rival cosmologies

Finally, as the official so-called Universe age is 13.8 Giga years, while the Hub-
ble radius is 13.8 Giga lightyears, this means something is correct in the official
approach, only a spatial quantity was unduly replaced by a temporal one. This
implies that the Big Bang idea finally applies, but not its Primordial aspect. So,
this introduces the PERMANENT BANG, meaning the Universe is destroyed
and reconstructed in a very rapid sequence ($10^{104}hrtz$), *anoscillationbetweenmatterandantimatter*

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Table 1: Physical Constants

Gravitation Constant [31]	$G \approx 6.675\ 452\ 72 \times 10^{-11} \text{ kg}^{-1}.\text{m}^3.\text{s}^{-2}$
Planck constant ("exact") $h = 2\pi \hbar$	$h = 6.626\ 070\ 15 \times 10^{-34} \text{ kg.m}^2.\text{s}^{-1}$
Fermi Constant	$G_F \approx 1.435\ 850\ 991 \times 10^{-62} \text{ kg.m}^5.\text{s}^{-2}$
NEURON $t_N = G_F^{5/4}/\hbar^2 G^{3/4} = t_e P^{3/2}/F^{5/2} \quad (t_e = \lambda_e/c)$	$t_N = 19.136\ 9997 \text{ ms}$ Speed of light in vacuum
Planck mass $m_P = (\hbar c/G)^{1/2}$	$m_P \approx 2.176\ 246\ 257 \times 10^{-8} \text{ kg}$
Planck length $l_P = \hbar/cm_P$	$l_P \approx 1.616\ 394\ 471 \times 10^{-35} \text{ m}$
Electron mass	$m_e \approx 9.109\ 383\ 7015 \times 10^{-31} \text{ kg}$
Electron Compton reduced wavelength $\lambda_e = \hbar/m_e c$	$\lambda_e \approx 3.861\ 592\ 6755 \times 10^{-13} \text{ m}$
Hass-Bohr Atomic Radius	$r_{HB} \approx 5.294\ 654\ 093 \times 10^{-11} \text{ m}$
Single-Electron Universe radius	$R_1 \approx 1.492\ 365\ 473 \times 10^{26} \text{ m}$
Observable Universe radius	$R \approx 1.306\ 713\ 899 \times 10^{26} \text{ m}$
Critical density $\rho_{cr} = 3c^2/8\pi GR^2$	$\rho_{cr} \approx 9.411\ 979\ 89 \times 10^{-27} \text{ kg m}^{-3}$
Holographic cosmic radius $R_{hol} = u R \quad ; \quad u = pH/a^3$	$R_{hol} \approx 1.712\ 894\ 163 \times 10^{26} \text{ m}$
Cosmic radius ($R_C/R = C/c \approx 6.94549387 \times 10^{60}$)	$R_C \approx 9.075\ 773\ 376 \times 10^{86} \text{ m}$
Topon (Space Quantum)	$d \approx 3.050\ 663\ 51 \times 10^{-96} \text{ m}$
Kotov Cosmic Coherent Period $t_K = l_K/c$	$t_K \approx 9600.591457 \text{ s}$ [23]
First Tachyonic speed	$c' \approx 7.336\ 574\ 671 \times 10^{44} \text{ m/s}$
Photon mass $m_{ph} = \hbar/cl_K$	$m_{ph} \approx 1.222\ 184\ 483 \times 10^{-55} \text{ kg}$
Graviton mass $m_{gr} = m_{ph}/a_w$	$m_{gr} \approx 3.722\ 342\ 724 \times 10^{-67} \text{ kg}$
CMB Temperature	$T_{CMB} \approx 2.725\ 820\ 138 \text{ K}$
CMB Wien wavelength	$\lambda_{Wi} \approx 1.063\ 082\ 472 \times 10^{-3} \text{ m}$
Boltzmann Constant ("exact" conversion factor)	$k_B = 1.38064910^{-23} \text{ J K}^{-1}$
Planck-Nambu mass $m'_P = m_P/\sqrt{a} \approx \text{Human oocyte mass}$	$m'_P \approx 1.859\ 048\ 422 \times 10^9 \text{ kg}$
Armageddon mass $m_A = m_P^2/m_N$	$m_A \approx 3.793\ 957\ 035 \times 10^{12} \text{ kg}$
CMB Temperature $T_{CMB} \equiv T_{CNB}(11/4)^{1/3}$	$T_{CMB} \approx 2.725\ 820 \text{ K}$
CMB reduced wavelength $\lambda_{cmb} = \frac{56}{\hbar c/k} T_{CMB}$	$\lambda_{cmb} \approx 8.400\ 716\ 617 \times 10^{-4} \text{ m}$
Universe photon number	$n_{ph} \approx 3.840\ 045\ 899 \times 10^{87}$
Earth Half Orbital Axis $A_T = ct_K/f_K \quad f_K \approx 19.2539478$	$A_T = 149\ 597\ 870\ 700 \text{ m}$ "exact" (u.a.)

Table 2: Physical Parameters

Planck/Electron mass ratio $P = m_P/m_e$	$P \approx 2.389\,015\,08 \times 10^{22}$
Electrical Constant	$a \approx 137.035\,999\,084(21)$
Electron Excess Magnetic moment	$d_e \approx 1.001\,159\,652\,180\,96$
Atiyah-Sanchez constant $a_0 = i^{-i\pi} = e^{\pi^2/2}$	$a_0 = 139.0456367$
Gravitational Coupling constant $a_G = m_P^2/m_p m_H$	$a_G \approx 1.691\,936\,468 \times 10^{38}$
Weak Coupling constant $a_w = F^2 = \hbar^3/cG_F m_e^2$ [32]	$a_w \approx 3.283\,374\,406 \times 10^{11}$
Strong Coupling constant [32]	$a_s \approx 8.434502914$
Proton/Electron mass ratio $p = m_p/m_e$	$p \approx 1836.152\,673\,43$
Wylter Proton/Electron mass ratio $p_W = 6\pi^5$ [44]	$p_W \approx 1836.118\,019$ exact
Neutron/Electron mass ratio $n_t = m_n/m_e$	$n_t \approx 1838.683\,661\,7$
Hydrogen/Electron mass ratio $H = m_H/m_e$	$H \approx 1837.152\,660\,14$
Lucas gravitational ratio $p_G = P/\sqrt{N_L}$	$p_G \approx 1831.531\,181$
Electro-gravitational ratio $p_P = a^{12}/P$	$p_P \approx 1835.680\,119$
Koide-Sanchez constant $p_K = (1 + \mu + \tau)/2 = (1 + \sqrt{\mu} + \sqrt{\tau})/3$	$p_K \approx 1842.604\,994$
Hydrogen correction factor $\beta = 1/(H - p) = (1 - 1/2a^2)^{-1}$	$\beta \approx 1.000026626$
Muon/Electron mass ratio $\mu = m_\mu/m_e$ [31]	$\mu \approx 206.768\,286\,9$
Tau/Electron mass ratio $\tau = m_\tau/m_e$ [31]	$\tau \approx 3477.441\,701$
Higgs Boson mass ratio $H^{(0)} = m_{Hgs}/m_e$ [32]	$H_0 \approx 495^2$
W-boson mass ratio $W = m_W/m_e$	$W \approx 157340.1093$
Z-boson mass ratio $Z = m_Z/m_e$	$Z \approx 178451.7529$
A-dimensional Electric Charge $q = W \sin \theta/H_0 = \sqrt{4\pi_q/a} = G_F$	$q \approx 0.302\,973\,2214$
Electric π value $\pi_q = aq^2/4$	$\pi_q \approx 3.144\,729\,933$
Weak-mixing angle $s = qR/R_{hol}$	$s \approx 0.231\,128\,9347$
SU1 gauge constant $g_1 = q/\sin \theta$, $\cos \theta = W/Z$	$g_1 \approx 0.343\,625\,7561$
SU2 gauge constant $g_2 = W/H_0$	$g_2 \approx 0.642\,139\,0034$
SU3 gauge constant $g_3 = g_0 g_2/g_1$, $g_0 = \frac{57}{pp_G/2a^3}$	$g_3 \approx 1.221\,047\,167$
Charged Pion mass ratio $\Pi_+ = m_{P_{i+}}/m_e$	$\Pi_+ \approx 273.132\,8472$
Neutral Pion mass ratio $\Pi_0 = m_{P_{i_0}}/m_e$	$\Pi_0 \approx 264.145\,3915$

Table 3: Tachyonic Generalization of the 3 MINUTES FORMULA

m_G	m_{\hbar}	$\frac{(\hbar/m_{\hbar})^2}{Gm_G}$	Remark
m_e	m_P	λ_e	Elimination of $c = \frac{Gm_P}{\hbar/m_P} = \frac{\hbar}{m_e\lambda_e}$
$\sqrt{m_p m_H}$	m_P	$\sqrt{\lambda_p \lambda_H}$	Eddington's symmetry Electron-Proton
m_e	$\sqrt{m_p m_H}$	Universe $\frac{R}{2}$	gravitational di-hydrogene model (3 MINUTES FORMULA)
$m_P d^3$	$\sqrt{m_p m_H}$	λ_{Wi}	pr. 3.2×10^{-4} ; CMB WIEN COSMOGENIC WAVELENGTH
m_N	m_N	$R_{hol}/2$	$m_N = am_e$: Nambu mass ; holographic definition of R_{hol}
m_A	m_A	d	Topon = Space Quantum ; $m_A = m_P^2/m_N$
m_e	m'_P	H atom $r_{HB}^{(0)}$	$m'_P = m_P/\sqrt{a} \approx m_{oo}$: HUMAN OOCYTE MASS
m_A	m_e	H atom $r_{HB}^{(0)}$	$m_A = m_{oo}^2/m_e$: Armageddon mass
$m_{bc}^{(0)}$	$m_{bc}^{(0)}$	$2l_K$	pr. 6.3×10^{-4} ; $m_{bc}^{(0)}$ isotopic DNA BI-CODON MASS
m_{Hu}	m_e	$2l_1 = 2m$	$\frac{2l_1}{r_{HB}^{(0)}} = \frac{m_A}{m_{Hu}} \approx 100 \text{ kg}} = N_A$: Nombre d'Armageddon $\approx 38 \times 10^9$
$um_{bc}^{(0)}$	$\sqrt{m_{ph} m_{gr}}$	Cosmos R_C	pr. 4.7×10^{-4} ; $m_{photon} = \frac{\hbar}{c l_K} = a_w m_{graviton}$; $u = \frac{R_{hol}}{R}$

Table 4: Some cosmic timescales (periods) observed in the solar system.

Object	Period	Symbol	Value
The Sun	Hale's cycle	T_H	22.14(8) years
—	Schwabe's cycle	T_{Sch}	11.07(4) years
—	7-year cycle		7.09(16) years
—	spinning (sidereal)	t_S	27.027(6) days
—	spinning (synodic)	t'_S	25.165(6) days
—	pulsation	t_K	9600.606(120) s
Venus	orbital (sidereal)	T_V	224.701 days
—	orbital(synodic)	T'_V	583.924 days
—	spinning (sidereal)	t_V	243.025 days
—	spinning (synodic)	t'_V	145.930 days
Earth	orbital	T_E	365.256 days
—	spinning	t_E	1 day
Moon	orbital (sidereal)	T_M	27.322 days
Jupiter	orbital	T_J	4332.589 days
Earth–Venus	conjunction		243 years

Table 5: Numerical regularity for 10 planets [18].

Planet	A (u.a)	$l_K/2\pi A$	$2A/l_K$
Mercure	0.327	$7.912 \approx 8$	
Venus	0.723	$4.235 \approx 4$	
Earth	1	$3.062 \approx 3$	
Mars	1.524	$2.009 \approx 2$	
Asteroid	2.9	$1.056 \approx 1$	
Jupiter	5.203		$0.541 \approx 1/2$
Saturn	9.539		$0.992 \approx 1$
Uranus	18.182		$1.994 \approx 2$
Neptune	30.058		$3.125 \approx 3$
Pluton	39.44		$4.100 \approx 4$
Eris	67.5		$7.017 \approx 7$

Table 6: Solar System and gauge couplings. Semi-axes of 10 planets and Asteroid Ring, in astronomical units, in function of physical parameters. The implication of $\delta = a - 137$, $r_a = a/137$, $\pi_a = (a^2 - 137^2)^{1/2}$ and the Golden Number Φ confirms the Arithmetical Physics. The implication of $\Delta_{Ed} = (136^2 - 40)^{1/2}$ confirms the Eddington's Fundamental Theory. A decisive implication (0.3 ppm) results from the Kotov's ratio 4 between Asteroids and the Venus semi-axes. Decisive implications results from the Pluton and Eris axes, implying *they are true planets*. Since the semi-ax is taken as unit (the u.a.), this confirms definitely the central role of the Earth in this very special solar system.

Planet	A (u.a)	Formula	Implication	ppm
Mercure	0.387	$\frac{\sin \theta}{g_3} \approx 0.386 \approx \frac{1}{e^2 g_1}$	$e^2 g_1 \sin \theta \approx \frac{6}{5d_e a r_a}$	0.6
Venus	0.723	$\frac{g_1}{\sin \theta} \approx 0.728 \approx \frac{1}{4g_1}$	$2g_1/r_a^2 \approx \sqrt{\sin \theta}$	0.4
Earth	$A_T = 1$			
Mars	1.524	$\frac{1}{g_0} = \frac{g_2}{g_1 g_3} \approx 1.530$	$\frac{g_0}{g_1} = \frac{g_3}{g_2} \approx \frac{6r_a}{\pi d_e^4}$	3
Asteroids	2.9	$1/g_1 \approx 2.910$		
Jupiter	5.203	$e^e g_1 \approx 5.207 \approx \frac{1}{qg_2}$	$\frac{1}{qg_1 g_2} \approx 15 (p_w/n_t)^2$	6
Saturn	9.539	$\frac{g_1}{\delta} \approx 9.545 \approx \frac{4\sqrt{a_s}}{g_3}$	$g_1 g_3 \approx \delta(p/p_w)\Delta_{Ed}^{1/2}$	6
Uranus	19.182	$\frac{2a_s}{\cos \theta} \approx \frac{f_K^2 g_1 \tau}{4\pi p} \approx 19.180$	$a_s^3 \approx \frac{f_K^2 \beta^2 \sqrt{2}}{a^{3/2}}$	3
Neptune	30.058	$16a_s \sin^2 \theta \approx 30.04 \approx \frac{aW^2}{g_1 a_w}$	$\frac{8a_s r_a \sin^2 \theta}{15} \approx (n_t/H)^2$	2
Pluton	39.44	$\frac{16g_1}{p} \approx \pi \left(\frac{q a_w}{WZ}\right)^2 \approx (2\pi)^2$	$\frac{\beta a}{(a_w/WZ)^2} \approx \frac{\pi_a}{2 + Z/W}$	0.014
Eris	67.5	$8a_s \approx 67.476 \approx \frac{e^\pi}{g_1}$	$g_1 \approx \frac{e^\pi \pi_q^2 p_w}{8a_s \pi^2}$	0.07

Table 7: DNA nucleotides. Standard masses : H = 1.00784, C = 12.0096, N = 14.00643, O = 15.9990, P = 30.974. They connect both with Pythagorean formulas involving the square root of 5 and main parameters of Particle Physics.

<i>anh.mnph.desoxy</i>	Formula	Sb	Mass/ m_H
-cytidine (dCMP)	$C_9H_{12}N_3O_6P$	C	$286.93 \approx \sqrt{5} 128 \approx \frac{\mu H Z a_s}{\tau F}$ (10 ppm)
thymidine (dTMP)	$C_{10}H_{13}N_2O_7P$	T	$301.83 \approx \sqrt{5} 135 \approx \frac{\mu \tau \Pi_0}{a_s \Pi_+ \Pi_-}$ (40 ppm)
adenosine (dAMP)	$C_{10}H_{12}N_5O_5P$	A	$310.77 \approx \sqrt{5} 139 \approx \frac{2Z \times 137}{W}$ (20 ppm)
guanosine (dGMP)	$C_{10}H_{12}N_5O_6P$	G	$326.65 \approx \frac{\sqrt{5} 1836}{4\pi} \approx \frac{Z}{2\Pi_+}$ (80 ppm)

Table 8: The Golden Number and the main parameters

Number	Approximation	Implication	Remark
Φ	$\approx \frac{1}{u \sin \theta}$ (720 ppm)	$\approx \frac{e}{\pi \tan \theta}$ (690 ppm)	$\cos \theta = \frac{W}{Z} \approx \frac{\pi}{ue}$ (30 ppm)
Φ	$\approx \frac{a^3}{1836^2 \sin \theta}$ (10 ppm)	$\Phi \approx (\frac{2}{\sin \theta})^{1/3}$ (224 ppm)	$\sin \theta$ confirmed
Φ	$\approx (\frac{a}{137})^{p_{GP}/p_W}$ (0.25 ppm)	$\approx 7 s$ (80 ppm)	$\frac{a}{137}$ Eddington couple
Φ	$\approx a^{(1836+1/\Phi)/a^2}$ (0.20 ppm)	1836 confirmed	a base confirmed

Table 9: The Golden Number and 16 D world

Number	Approximation	Implication	Remark
$\Phi^2/2$	$\approx \Omega_2 p/H\beta^2$ (38 ppb)	$\Omega_2 = e^{e^{-\Omega_2}}$	$\Omega_2 \approx \frac{1836^2 - (\tau/\mu)^2}{a^3}$
$\Phi^3/3$	$\approx \sqrt{2}$	$\sin \theta \approx \sqrt{2}/3$	$\sin \theta$ principal value
$\Phi^4/4$	$\approx \sqrt{3}$	$\Phi^8 \approx 48 - 1$	
$\Phi^5/5$	$\approx \pi/\sqrt{2}$		
$\Phi^6/6$	$\approx \sqrt{3}$	$1/g_1^2 \sin \theta$	gluon dim 6
$\Phi^7/7$	$f(2) = e^{\sqrt{2}}$	$(\Phi^7/7)^{256} \approx (17/2)e^{2^{17/2}}$	Cosmic Axe connec.
$\Phi^8/8$	$\approx \sqrt{138}/2$		
$\Phi^9/9$	$\approx a_s n_t/p\beta$ (0.2 ppm)		
$\Phi^{10}/10$	$\approx (9\mu)^{1/3}$ (75 ppm)		superstring 10d
Φ^{ϕ^5}	$\approx (\mu + 1)$ (300 ppm)	$\approx W/\sqrt{F}$ (117 ppm)	$\Phi^5 \approx 11$
Φ^{11}	$\approx (\mu - 8)d_e$ (31 ppm)	$\approx (\pi e^{3\pi i})^{1/2}$	$e^\pi \approx 2\sqrt{a}$
Hum. Mes. Nb. (HMN)	$(8\pi a^{3/2})^{1/2}$	$\approx (\mu - 6)$ (120 ppm)	supergravity 11d
$\Phi^{12}/12$	$\approx 2n_t/a$ (73 ppm)	$\approx 12\sqrt{5}$	quarks 5 and 6
$\Phi^{13}/13$	≈ 40	$\approx (an_t/H)^{3/4}$ (3 pm)	
$\Phi^{14}/14$	$\approx \sqrt{n_t \Pi_{\pm}/p} F/W$ (24 ppm)	$f(14) \approx F/7 \approx H_0/3$	weak bosonic dim 14
$\Phi^{15}/15$	$\approx (\mu + 1)$ (300 ppm)		
$\Phi^{16}/16$	$\approx (a_0 - 1)8e^{2e}/n_t$ (16 ppm)		
$(\Phi^{17} - 1)/17$	≈ 210 (80 ppb)	Liaison Mu-Tau	3570 Egyptian Number

Table 10: The Golden Number and 32 D world

Number	Approximation	Implication	Remark
$\Phi^{18}/18$	$\approx \pi\sqrt{5}a/3$	$\approx \sqrt{5} e^{w_5}$	CMB dim 18
$\Phi^{19}/19$	$\approx p/(2 + \sqrt{3})$ (118 ppm)		
$\Phi^{20}/20$	$\approx \sqrt{F} H/n_t$ (10 ppm)	$\approx a_s 200.5/\sqrt{5}$	HMN $\approx \frac{\sqrt{5F}}{a_s}$
$\Phi^{21}/21$	$\approx 138 a_s$	$\approx a_s \sqrt{a_0 a} (a/137)^4$ (5 ppm)	$\Phi^{21} \approx p_G^2/a$
$\Phi^{22}/22$	$\approx 60^2/2$	$f(22) \approx P/2p\sqrt{3}\beta^2$	strong X boson dim 22
$\Phi^{24}/24$	$\approx 24 (n_t/a)^2$	$\approx 2^9 a_s$	24 transverses dim.
$\Phi^{26}/26$	$\approx 3e^{3e}$ (47 ppm)	$e^{3e} \approx \tau n/8e^{2e}$ (7 ppm)	26 D bosonic string
$\Phi^{30}/30$	$\approx a^2/137q$ (17 ppm)	$\approx (30\sqrt{2} \approx \Phi^{10})^{a/\sqrt{\tau_0}}$	Universal boson 30 D
$\Phi^{32}/32$	$\approx Wd_e(a/137)^2/(a - 136)$ (34 ppm)	$\approx 2ee^e p_{Ed}$ (34 ppm)	Edd. eq. confirmed

Table 11: Main Confirming Relations

Number	Approximation	Implication	Remark
$i^{-lni} = e^{(\pi/2)^2}$	$\approx \sqrt{a} + d_e/\sqrt{a}$ (14 ppb)	$137 = 139 - 2$	Atiyah Algebras
$2 + ln\pi = \pi_q$	$\approx a(q/2)^2$ (15 ppb)	q pure electric charge	symbolic π value
2^{128}	$\approx R/\lambda_e$	double Lucas Number	Universe : base 2
6^{128}	$\approx R_C/\lambda_e$	$6 = 2 \times 3$	Cosmos : base 3
a^a	$\approx \sqrt{a_s} \sqrt{pH}/\sqrt{a_s}$	a_s value confirmed	$\sqrt{a_s}$ optimal base
a^a	$\approx \frac{4\pi^2}{3} (R_C/r_{HB})^3$	Cosmos rad. R_C confirmed	a special base
$3^{665} \approx 2^{1054}$	$\approx \mu^a \approx \sqrt{a}^{\tau/\sqrt{a}}$	Heavy Leptons useful	\sqrt{a} optimal base
665	$\approx 3\Phi \times 137$	$\sqrt{665 \times 666} \approx \frac{F}{2\pi a}$	$3^{3\Phi} \approx \mu d_e$
$665 \ln 3/2$	≈ 365.288	\approx year/day	Earth year special
$\sqrt{665 \ln 3}$	≈ 27.03	\approx solar spin/day	Sun spin special
$\sqrt{665 \ln 3/2}$	$\approx 1836/\sqrt{\Delta_{Ed}}$	$\Delta_{Ed} = 136^2 - 40$	Edd. eq. confirmed
$\frac{10(N_{Ed}=136 \ 2^{256})}{3}$	$\approx n_n = M/m_n$	$\approx R_C/eR_T$	Liaison Cosmos-Earth
3570	$\approx \sqrt{2R_T/l_1}$	$\approx \tau$: Tau (terminal Lepton)	l_1 (metre) natural unit
3570	$\approx at_1/2t_N$	$t_N = G_F^{3/4}/\hbar^2 G^{3/2}$: Neuron	t_1 (second) natural unit
Neuron/ms	≈ 19.14	La flat (418.0 Hz) - 3 octaves	Hum. La = 442.9 Hz
153	$\approx \beta P^2/pf(26)$	$153 = 1^3 + 3^3 + 5^3 = 1836/12$	26D bosonic string
$f(30) = e^{2^{30/4}}$	$\approx \lambda_e/153^2 d_R$	$d_R = 2l_P^2/R$ (Universe Topon)	30D confirmed
$e^{e^{-g_2}}$	$\approx 2e$	$\approx \ln R_C/\lambda_e$	Cosmic Axis confirmed
495^{495}	$\approx p_P^{p_P \sin^2\theta}$	$p_P \approx a^{12}/P$	Higgs number conf.
$1/g_1$	$\approx e^{e^{-e}}$ (12 ppm)	$\frac{1}{g_1} - g_1 \approx f(-g_1) \approx (a^2/10)^{1/8}$	Topol. funct. conf.
$\frac{a}{a-1}$	$\approx 3^{1/150}$ (27 ppb)	unknown musical scale	optimal base 3
$\frac{a}{137}$	$\approx 3^{a/F}$ (3 ppb)	$F/a \approx 4181$	19th Fibonnaci nb.
$612 = 1836/3$	$2 \times 17 \times 18$	Nucleotide atomic mass	2 + 15th Fibonnaci nb.