The Coherence Principle: a new basis for general science

Francis M. Sanchez[1] & Valery A. Kotov[2]

8 March, 2014

[1]*Universite Paris 11 (formerly), 20 Av. d'Ivry, 75013 Paris*
[2]*Crimean Astrophysical Observatory, Nauchny, 98409 Crimea*

A *Coherence Principle* (CP) is proposed, a generalization and idealization of the virial theorem, stating that each well-defined phenomenon should be mono-frequency. When applied to the steady-state critical cosmology, characterized by the scale factor $\exp(t/T)$, this principle leads to three independent expressions for *T* compatible with the so-called Universe age $T_U \approx 13.80(4)$ Gyr, as estimated by the recent Planck mission for the spatially-flat six-parameters Λ-CDM model. The most precise formula is given by a *c*-free analysis of the "incredible" *non-Doppler* cosmic oscillation, implying tachyonic physics. This refutes (*a*) the primordial Big Bang model, (*b*) the cosmological *anthropic principle* and (*c*) the *Multiverse* theory, – in favor of the *reconstructing* Universe model with frequency about 10^{103} Hz and pseudo-period *T*. This corresponds to critical condition $\Omega = 1$, Hubble parameter $H_0 \approx 70.8$ km s^{-1} Mpc^{-1}, matter density $\Omega_m = 3/10$, and baryonic one $\Omega_b \approx \Omega_m^2/2 = 0.045$, with detailed predictions for astrophysics. The CP is connected with practical holography, which formalism is shown to be consistent with the basic quantum one, and holographic conservations are either demonstrated or observed, opening the way for further study. The CP is shown to apply also in *atomic and stellar physics, together with biology*, predicting the DNA chain to be a linear hologram.

Keywords: Coherence Principle, dark energy, anthropic principle, Multiverse, steady-state vibrating Universe, Eddington's theory, holographic conservation, tachyonic physics, antimatter, parity violation, DNA chain.

1. Introduction.

Modern cosmology is generally considered as an application of *general relativity*. But the spatially-flat six-parameters Λ-CDM mainstream model is unable to explain neither the dark energy density nor the baryon one. Moreover, in order to explain a Large Number Correlation, it is generally admitted, by an application of the so-called *cosmological anthropic principle (CAP)*[1], that we live at a particular epoch.

A Multiverse is claimed to be an inevitable outcome of the physical originating process that generated our own Universe (by a Primordial Big Bang). The combination of this idea with the above CAP induces the concept of the *anthropic Multiverse*, where each of the different universes has various values of the physical constants. Carr and Rees[1] recalled that «*Wheeler envisages an infinite ensemble of universes, all with different coupling constants and so on. Most are "still-born", in that the prevailing physical laws do not allow anything interseting to happen in them; only those which start off with the right constants can ever become "aware of themselves"*».

Edouard Brezin mentioned the Multiverse in his French Academy presidential talk (2005): "*Est-ce que les lois de la physique peuvent être unifiées? Les constantes de la nature qui le caractérisent, vitesse de la lumière (c), constantes de Newton (G), de Planck (h), etc. sont-elles le fait du hasard ou le résultat d'un principe qui nous échappe? Certains théoriciens voient aujourd'hui notre Univers comme plongé dans un paysage de multivers qui n'ont pas de raisons de*

ressembler au nôtre." This asks the right question: *"Does the natural constants result from hasard or from an unknown principle?"*.

This article aims to answer this question by proposing a new principle, giving directly several cosmological parameters, which are either called "free" by the standard cosmology or admitted from an ad-hoc reason: this is, in particular, the case for critical condition, which is said to result from an ad-hoc inflation step.

The simplicity of the argument implies that cosmology, contrary to what is generaly believed, is the simplest science of all. This means that the whole Science has suffered an excess of reductionism, leading to a separation between different branches of science. Indeed, the new principle is shown below to be applied in both *atomic physics* and *biology.*

2. Elementary analysis in cosmology

Current cosmology admits a great simplification: a cosmological Euclidean geometry, corresponding to the critical condition $\Omega = 1$, which is verified now in the % range range. Therefore, it is worth considering the simplest cosmology: a Galilean one based on the critical steady-state model[2], characterized by a scale factor $exp(t/T)$ with an unique parameter T, such that the galaxy recession law reads:

$$1/T = v/r = c/R \tag{1}$$

with an invariant, in time and space, mean critical energy density

$$\upsilon_c = 3c^2/8\pi GT^2, \tag{2}$$

where notations are usual.

A sphere of sufficiently large radius r, corresponding to a redshift speed v, contains the energy $E(r) = r^3c^2/2GT^2$ and an equivalent mass $m(r)$ such that

$$m(r)G/r = v^2/2, \tag{3}$$

so that the sum of the non-relativistic equivalent kinetic energy and the non-relativistic gravitational potential energy is zero. Now, the latter is given by the well-known formula $E_{gr}(r) = -3GE^2(r)/5rc^4$, which modulus is $(3/10)E(r)r^2/R^2$. For $r = R_U$ and $E(R) = E$, this leads to:

$$-E_{pot} = E_{kin} = \Omega_m E, \qquad \Omega_m = 3/10. \tag{4}$$

Thus one of the free parameters of the standard cosmological model seems to be trivial in the simplest model.

3. The Coherence Principle

Energy is related to frequency by the Planck relation $E = hf$, so the above expression $-E_{pot} = E_{kin}$ is interpreted as the manifestation of a *Coherence Principle* (CP): *each well-defined phenomenon is characterized by an unique frequency.* Thus, inversing the above argument, the admittance of CP, writing directly $-E_{pot} = E_{kin}$, implies (2), i.e. the critical condition $\Omega = 1$ or, equivalently, $R = 2GE/c^4$, without involving such an ad-hoc phenomenon as inflation.

Contrary to the so-called "anthropic principle", this is a real principle, *being a generalization and idealization of a large variety of phenomena.* For instance, it is implicitely used in the calculation of a N-atom star radius by Davies[3], who looked for the maximal value of $k\theta \sim Gm_p^2N/R$

$- N^{2/3}\hbar^2/m_e R^2$, involving the mean thermal energy and the difference between gravitational and degeneracy energies, leading to

$$R_N \sim 2\hbar^2/Gm_p^2 m_e N^{1/3}. \tag{5}$$

For pure mechanical phenomena, our CP is applied in the form $E_{kin} = -E_{tot}$, where $E_{tot} = E_{kin} + E_{pot}$, or: $2E_{kin} = -E_{pot}$, which is the classical virial theorem.

Therefore, the above relation $-E_{pot} = E_{kin}$ suppresses the factor *2* in the virial theorem, calling for a modification of the gravitation law, which will be studied apart. Note that a linear repulsive gravitation (for cosmic distances, say, superior to 10^6 lyr, the characteristic spacescale of a galaxy group), would explain directly the above one-parameter exponential recession *without any need for a primordial Big Bang, which is radically refuted by the present study,* as shown below. So, the "space streching" of general relativity would be replaced by a mere galaxy recession in an absolute referential, a Grandcosmos, which, contrary to the Multiverse, has an observational feature: the *cosmic microwave background* (CMB).

There is hence a fraction *7/10* of excess energy, which is compatible with the so-called "*present day* dark energy" density $\Omega_\Lambda = 0.73(3)$ of the official spatially flat Λ-CDM model[4]. The fit is even better with the most recent estimation after the Planck mission[5]: $\Omega_\Lambda = 0.692(10)$. Therefore, the dark energy would be simply tied to the above long-distance repulsive gravitation.

4. The coherence principle and the Eddington's statistical formula

Another application of the CP is equalizing the classical and quantum energies:

$$E_{cl} = E_{qu}, \tag{6}$$

with $E = Mc^2 = E_{cl} + E_{qu}$, leading to: $M_U c^2/2 = p_{cir}^2/2m_e'$, with the classical reduced electron mass $m_e' = m_e m_p/m_H$ and $p_{cir} = h/\lambda_{cir}$, the de Broglie impulsion with the wavelength λ_{cir}, given by the resonance condition $\lambda_{cir} = 2\pi R/N^{(eq)}$, where $N^{(eq)} = 2N_H^{(eq)} = 2M/m_H$ is the total *equivalent* number of protons plus electrons in the *R*-radius Universe, – in full conformity with the basic Eddington's symmetry between proton and electron[6]. Note that $N_H^{(eq)} = M/m_H$ denotes the "atomic number of the Universe"; it does not mean an actual number of hydrogen atoms: here m_H is used as a unit mass (like the usual "Dalton" of chemists). This leads to:

$$E_{cl} = E_{qu} = Mc^2/2 = 2(\hbar N_H^{(eq)})^2/m_e' R^2. \tag{7}$$

Taking into account (4) and replacing $N_H^{(eq)}$ by $\Omega_m N_H^{(eq)}$, one gets a relative density compatible with the relative baryon density[4] $\Omega_b \approx 0.045(3)$:

$$\Omega_b \approx \Omega_m^2/2 = 0.045. \tag{8}$$

This is a relation, unnoticed earlier, between material (essentially dark matter, to be defined) and baryon densities.

Due to the critical condition, Eq. (7) leads to:

$$R = 2\hbar^2/Gm_e m_H m_p = 13.816(2) \text{ Glyr}, \tag{9}$$

which presents also the limit of stellar radius, see (5), for *N* going to unity, apart a hydrogen/proton mass ratio. One must conclude, therefore, that the redshift radius, as a main spacescale, is present over decades in astrophysical textbooks.

In the caption of their Fig. 1 Carr and Rees[1] wrote: "*All these scales can be deduced directly from known physics except the mass and length scale of the Universe, which depends on the age of the Universe being α_G^{-1} times the electron timescale $\hbar/m_ec^2$.*" Since here $\alpha_G = Gm_p^2/\hbar c$, this is exactly Eq. (9), except the *2* factor and a hydrogen-proton mass ratio. Hence the CP answers a lacking argument, but without involving any "Universe age". Therefore, the famous "large number problem"[1] is not a problem at all, but a hint towards decisive formulae tying micro and macro physics, and there is no need to evoke neither a cosmological anthropic principle (which would mean we live in a very narrow *40* million years temporal window) nor any Multiverse.

Another consequence of the critical condition is the relation:

$$m_{Pl}{}^4 \equiv Mm_Hm_pm_e, \tag{10}$$

showing a spectacular appearance of the Plank mass $m_{Pl} \equiv (\hbar c/G)^{1/2} = 2.17651(13) \times 10^{-8}$ kg, which – contrary to the Planck's length $l_{Pl} \equiv (\hbar G/c^3)^{1/2}$ and the Planck's time $t_{Pl} \equiv l_{Pl}/c$ – has no *direct* meaning in standard cosmology.

Eq. (9), together with the critical condition, can be summed up by the double relation:

$$\hbar c/Gm_em_p = R/2\lambdabar_H = (E/m_e'c^2)^{1/2}, \tag{11}$$

where the classic reduced electron mass $m_e' = m_em_p/m_H$ appears. This is a highly symmetric expression of the double Large Number correlation, being in exact correspondence, including the *2* factor, with the Eddington[6] statistical formula in his own notations: $R_0/2\sigma = N^{1/2}$. Eddington, at that time, could not recognize the identification $\sigma = \lambdabar_H$, and also $N = E/m_e'c^2$, which is the equivalent number of corrected electrons, − due to an error of about *8* factor in the former galactic redshift length measurement. Note that the classical formula $E = Mc^2$ has been demonstrated for electromagnetic energy by Poincaré[7], as soon as 1900; so its generalization to any energy form may be considered as a "mass-energy" principle, without evoking the relativity theory.

5. The Coherent Cosmic Oscillation period

The above relation (9), by introducing the electron lengthscale $\lambdabar_e \equiv \hbar/m_ec$, writes:

$$R = 2a_G\lambdabar_e, \qquad a_G \equiv \hbar c/Gm_Hm_p. \tag{12}$$

Therefore, Eq. (9) can be seen as resulting from an elimination of c. Now, Carr and Rees[1], in their Eq. (61), defined a "weak fine structure constant", which inverse is

$$a_w = \hbar^3/G_Fm_e^2c, \tag{13}$$

where $G_F = 1.4358505(7) \times 10^{-62}$ J m^3 is the Fermi constant[4]. The suppression of the speed c between these two last relations, with $t_e \equiv \lambdabar_e/c$, defines the timescale

$$t_{Gw} = (a_Ga_w)^{1/2}t_e = 9602(1) \text{ s}, \tag{14}$$

which is very close to the *coherent cosmic oscillation* period $t_{cc} = 9600.606(12)$ s. Its non-Doppler character conforms with the above elimination of c, implying a hidden tachyonic physics[8]. With the electron Fermi time $t_{eF} \equiv \hbar\lambdabar_e^3/G_F$, the elimination of a_G leads to:

$$T \approx 2t_{cc}{}^2/t_{eF} \approx 13.812 \text{ Gyr}. \tag{15}$$

An identification of (15) with the value of Eq. (9), divided by *c*, would imply the following *G* value[8], which will be used in the following:

$$G \approx 6.67546 \times 10^{-11} \ \text{kg}^{-1} \text{m}^3 \text{s}^{-2} \tag{16}$$

at *+2σ* of the Particle Data Group value[4] *6.6738(8)* $\times 10^{-11}$ kg^{-1} m^3 s^{-2}.

6. A connection with particle physics

One of the most spectacular result of the study of Carr and Rees[1] is the relation (63) in their article, involving the charged weak boson, with the comment: "*it is unclear to what extent these coincidences can be interpreted anthropically*", – namely,

$$a_G^{-1} \sim \ (m_W/m_e)^8. \tag{17}$$

Now, introducing $\underline{m}$, the mean value of the weak boson masses (*W* and *Z*), one notices that, with the proton reduced wavelength $\lambdabar_p \equiv \ \hbar/m_p c$:

$$\lambdabar_p \, (\underline{m}/m_e)^8 \ \approx 13.805(12) \ \text{Glyr}, \tag{18}$$

a value which is too close to the value of (9) to be fortuite. This would mean that this liaison between gravitation and particle physics implies a Great Theory. This is a new argument against the ad-hoc Multiverse.

7. The Coherence Principle and the Eddington energy

Extending the energy equality (4) to the Eddington's one[6]:

$$-E_{pot} = E_{kin} = E_{Ed}, \tag{19}$$

with $E_{Ed} = \ M_{Ed}c^2$ (corresponding to the mass $M_{Ed} = N_{Ed}m_H$, with the Eddington's Large Number of hydrogen atoms $N_{Ed} = \ 136 \times 2^{256}$) and the transit time of the Schwarzschild radius of a hydrogen atom $t_H = 2Gm_H/c^3$, this leads to:

$$T_{Ed} \ = (10/3)N_{Ed} \, t_H \ \approx 13.794 \ \text{Gyr}. \tag{20}$$

The deviation from (9), divided by *c*, is very close to the proton-neutron mass ratio m_p/m_n, so that

$$R_{Ed} \approx 2\hbar^2/Gm_e m_H m_n, \tag{21}$$

meaning the Eddington's theory should be fairly well applied to our Universe, – resulting in a well correspondence with a "gravitational deuterium atom". Hence the forgotten Eddington's theory, discarded by an accusation in "numerology", must be revisited.

Note that Eq. (21), apart the *2* factor and a hydrogen-proton mass ratio, has been proposed in 1998 by one of the authors (F.S.) to the French Academy (which rejected it, arguing that the Primordial Big Bang is a fact!). This formula was found after 3 minutes of raippraisal of cosmology on the basis of an elementary *c*-free dimensional analysis. So, the "pli cacheté" n° 17367, deposited on 4 March, 1998, contains the prediction of the so-called Universe age, as determined 15 years later[5] (March, 2013) to 0.3%. The retained physical constants were *G, ℏ,* and the products of the three main particles of atomic physics: electron, proton and neutron. The rejection of *c* being

motivated by the fact that this speed is far too weak to connect the elements of the so vast Universe. This is known as the "horizon problem" in standard cosmology, and resolved once more by the ad-hoc inflation. We propose[8] rather that tachyonic physics is involved, as evident in the above *non-Doppler* coherent cosmic oscillation phenomenon. Note that the physics community, while affirming to look for any experimental hint leading to a reappraisal of theory, shows the tendency to reject a phenomenon which is *too* extraordinary. The present study confirms that the above *non-Doppler* oscillation is a key for future physics.

8. The Coherence Principle and Hydrogen atom

A version of CP has been used already by Arthur Haas[9], three years before Bohr, through equalizing, in the Thomson model of an atom, three different expressions for energy. Using the above classical virial form of the CP, one gets:

$$m_e' \, v^2 = e^2/r = hf \tag{22}$$

with $e^2 \equiv \alpha \hbar c$ and frequency of electron revolution $f = v/2\pi r$. This defines a scale $\hbar^2/m_e' e^2$, i.e. the Bohr radius. Using the resonant energy nhf, with n integer, this gives the classical spectrum. Hence, the virial form of the CP is directly tied to the quantification $\hbar$ of angular momentum.

9. The simplest model: a "black atom"

In the above formula, replacing the electric potential $\alpha \hbar c/r$ by its gravitational equivalent $\alpha_G \hbar c/r = Gm_H^2/r$ in a hydrogen molecule, one comes back to (9), apart the *2* factor and an hydrogen/proton mass ratio. One notes, moreover, the following symmetry beetween cosmic and atomic relations involving the Bohr hydrogen radius:

$$R = 2a_G \lambdabar_e, \qquad a_G = \hbar c/Gm_H m_p, \tag{23}$$

$$r_B = (m_H/m_p)a\lambdabar_e, \qquad a = \hbar c/e^2 \equiv \alpha^{-1}. \tag{24}$$

Therefore, the scale $\lambdabar_e$ appears as a unifying length, inducing the following *black atom* model[8] which considers a hydrogen atom immersed inside a black hole of radius R_{ba}, limiting electron trajectories. Equating the Bohr radius r_B with the mean radius of spheres of radii $n\lambdabar_e$, – each with a probability proportional to n^2, with n whole number superior to *1*, but limited by $R_{ba}/\lambdabar_e$, – one gets $r_B/\lambdabar_e = (\Sigma \digamma 1/n)/(\Sigma \digamma 1/n^2)$. Therefore, with the Euler constant γ, one gets the radius

$$R_{ba} = \lambdabar_e \, exp[(\pi^2/6 - 1)r_B/\lambdabar_e + 1 - \gamma] \approx 15.8 \text{ Glyr.} \tag{25}$$

Such a good approach to R, starting only from the lengths r_B and $\lambdabar_e$, is remarkable. This "black atom relation" can be approximated by $a/ln(2a_G) \approx (\pi^2/6 - 1)^{-1}$. This makes precise the rough relation

$$a \sim ln(a_G) \tag{26}$$

considered as that of central importance by Carr and Rees[1] who justified it by basic theoretical considerations. Note that the extrapolation

$$\pi^2/6 - 1 \approx ln(l/\lambdabar_e)/ln(R/\lambdabar_e) \tag{27}$$

defines a length l such that $l/c \approx 9100$ s, sufficiently close to the above non-Doppler period to confirm its central character.

10. High frequency reconstructing Universe

In the *six-parameters spatially-flat Λ-CDM* model, the recession timescale H_0^{-1} (called also a "present day inverse Hubble constant") and the so-called "Universe age" are close to each other, but distinct and variable. The above results, in the frame of the *one-paramete*r critical steady-state cosmology, predict that they are *identical and invariant*, with, from (9),

$$H_0 \approx 70.8 \ \text{km s}^{-1} \ \text{Mpc}^{-1}. \tag{28}$$

Note that the Planck mission result for H_0 is in high tension with the supernovae type *1a* one[5], − to be a sign of disintegration of the mainstream model, which is unable to realize neither that H_0 is invariant nor to derive the above *trivial* values for Ω_m and Ω_b.

The CP implies also that the observable Universe is vibrating[8] with a period of $t_U = h/E_U \approx 0.838 \times 10^{-103}$ s, while mainstream physics considers the Planck time $t_P \equiv (hG/c^5)^{1/2}$ as the most basic timescale. Since the critical condition reads $2t_P^2 = t_U T_U$, we get with (15):

$$T_U/2 = t_P^2/t_U = t_{cc}^2/t_{eF}, \tag{29}$$

which simplest interpretation, by further application of CP, is that T_U is itself a non-linear beatnote *period*. Under the hypothesis of an overall unified Science, so that Intelligent Life will be a branch of physics, − as precised in the conclusion, − the suppression of this periodic character, e.g. a consideration of an infinite past, would lead to advanced civilizations filling up the Universe. Under such hypothesis, the periodic character of T would be a logical necessity.

Therefore, the mainstream Λ-CDM model must be reinterpreted by adopting the Universe is vibrating, reconstructing itself with a frequency of about 10^{103} Hz, which is the natural physical idea behind the ad-hoc inflation, and being much more physical than the continuity concept. Note that the absence of any *particular time origin* is in the original spirit of relativity, showing thus a common feature of quantum physics and relativity, which are said to be irreconcilable by standard treatment, while Eqs. (23) and (24) show a clear atom-Universe symmetry. Note that the standard view is to tie such an unification to physics at the Planck scale, corresponding to a unmeasurable Primordial Big Bang event.

The *periodic* character of T is confirmed by the two following simple combinations of T and t_{cc} giving two intriguing timescales. Firstly:

$$(t_{cc}^2 T)^{1/3} \approx 10.8 \ \text{yr}, \tag{30}$$

close to the classic (but yet unexplained) Wolf period of the Sun, and, secondly, a timescale of

$$(t_{cc} T^2)^{1/3} \approx 400000 \ \text{yr}, \tag{31}$$

which is an unexplained climatic cycle. One must conclude that these two cyclic phenomena might have a cosmic origin. Note that the last timescale is of the order of a galaxy cluster *c*-transit, which seems to correspond also to the above lengthscale for gravitation to transform from an attractive interaction to a repulsive one.

11. The connection with Holography

A complementary point of view is that of Poincaré[10], who has noted that, starting with a Universe uniqueness, cosmology could not be derived from local equations. Note that our *Coherence Principle* involves integral equations instead of the differential ones of *general relativity*. Now, integral holographic conservations have already been presented[8], some being recalled below. *In fact, it is well known that practical holography, which is an optimal information treatment, needs the coherence of involved waves.*

Note that the classical Holographic Principle[11] focuses on dimensional reduction and the Planck scale, not using neither the primordial coherence concept nor the universe scale *R*. Moreover, it is not emphasized that the holographic formalism is the same as the basic quantum one. Indeed, it needs a coherent wave *U*: it is diverging, spherical and mono-frequency, and characterized, like a quantum unitary operator, by:

$$UU^* = 1 \qquad (32)$$

where *U** is the converging (or conjugate) wave, the temporal inverse of *U*. By interfering with an informed wave *A*, coherent with *U* (meaning there is only one frequency involved), this creates, in a suitable medium that could be identified with quantum vacuum, a hologram:

$$(U + A)\,(U + A)^* = 1 + UA^* + AU^* + AA^*. \qquad (33)$$

When excited back by the time inverted wave *U**, it generates the reverse wave *A**. This mechanism is compatible with the above Universe oscillation. The other terms vanish because of no phase matching in a 3D medium, and also due to inequality

$$AA^* << 1. \qquad (34)$$

This (*a*) may be interpreted as a statement that the Universe is a perturbation of a very energetic coherent background, and (*b*) could be tied to the fact that quantum energy of vacuum has an energy density 10^{120} times the Universe one.

The critical condition $R = 2GE/c^4$ has a spectacular property: it obeys a holographic conservation. Indeed, introducing $\lambdabar_M \equiv \hbar/Mc$, with $M \equiv Rc^2/2G$, the critical equivalent mass inside the sphere of radius *R*, and $\lambdabar_m \equiv \hbar/mc$ (a particle of mass *m* is associated with a whole large number $N_m \equiv M/m$), the so-called "Bekenstein-Hawking entropy"[12] of the Universe writes:

$$\pi(R/l_{Pl})^2 \equiv 2\pi R /\lambdabar_M \equiv 2\pi N_m R /\lambdabar_m. \qquad (35)$$

The third term is an extension to any particle of mass *m* introducing a multi-linear holographic term, generating a whole spherical surface by rotation of circles[8]. For sufficiently large N_m, this is an approach of continuity: *a need for quasi-continuity could be the basic reason for a so large Universe, by opposition to the claimed anthropic argument*[1]. Thus, the second 1D holography in (35) is associated with a scanning reconstruction process. A particle of mass *m* has a frequency F/N_m, where $F \equiv E/h \approx 1.193 \times 10^{103}$ Hz is the Universe vibrating frequency. According to a *resonance principle*[8], naturally associated with the CP, N_m would be a large whole number. With the full Planck time $t_P \equiv (Gh/c^5)^{1/2}$, the vibrating period is

$$t \equiv 1/F \equiv 2t_P^2/T \approx 0.838 \times 10^{-103} \text{ s.} \tag{36}$$

We proposed[8] that it corresponds to a matter-antimatter oscillation, *resolving once for all the dilemma of the apparent absence of antimatter.* The above scanning process, being oriented, would explain the parity violation in *particle physics* and *biology.*

12. The Coherence Principle and special holographic conservations

The CP is also confirmed by the following holographic conservations[8] on the redshift sphere of invariant radius R. Indeed, Eq. (9) may be written as the holographic conservation 1D-2D-4D: $2\pi R/\lambdabar_e \equiv 4\pi \lambdabar_p \lambdabar_H /l_{Pl}^2 \equiv 4\pi[(\lambdabar_F l_{cc})^{1/2}/\lambdabar_e]^4$, where the 4D term results from the above identification $t_{Gw} = t_{cc}$, with $l_{cc} \equiv ct_{cc}$, where $\lambdabar_F \equiv \hbar/m_F c$ is the Fermi wavelength, corresponding to the Fermi mass $m_F \equiv a_w^{1/2} m_e$. A search for a 3D term, with the holographic wavelength being the hydrogen molecule wavelength $\lambdabar_{H2}$, – since the gravitational parameter a_G was defined by a pair of hydrogen atoms, – shows up the CMB reduced wavelength $\lambdabar_{CMB} \equiv \hbar c/k\theta_{CMB}$:

$$2\pi R/\lambdabar_e \equiv 4\pi \lambdabar_p \lambdabar_H /l_{Pl}^2 \approx (4\pi/3)(\lambdabar_{CMB}/\lambdabar_{H2})^3. \tag{37}$$

This defines a Universe temperature *2.731* K, sufficiently close to the recorded value[4] *2.7255(6)* K to be significative. Note that, eliminating $\lambdabar_e$ from (9), this means that, apart a factor $(8/3)^{1/5}$, the hydrogen atomic wavelength is given by the expression $\lambdabar_H \sim (G\hbar^4/E_{CMB})^{1/5}$, i.e. a *c*-free dimensional analysis based on G, $\hbar$ and the characteristic energy $E_{CMB} = k\theta_{CMB}$. This suggests once more the *tachyonic* character of the coherent waves involved by this holographic conservation, opening further studies. Looking for another holographic relation involving the same wavelengths, one finds:

$$4\pi(\lambdabar_e/\pi l_{Pl})^2 \approx (4\pi/3)(2R/\lambdabar_{CMB})^{3/2}, \tag{38}$$

corresponding to *2.7255 K, compatible with the above recorded value.*

Moreover, by detailed analysis, introducing the mean value of the CMB and neutrino's temperatures, – the later being[4] $(11/4)^{1/3}$ weaker than the CMB temperature, – one finds that the corresponding mean Wien wavelength λ_{mean} obeys the following holographic relation:

$$(4\pi/3)(\lambdabar_e/R)^3 \approx 4\pi(\lambda_{mean}/R)^4, \tag{39}$$

corresponding to $\theta_{CMB} \approx 2.726$ K, again compatible with the recorded value. Such a precision cannot be fortuite: this strongly confirms the pertinence of holographic conservation, together with the invariance of both R and θ_{CMB}. Moreover, this indicates that the standard statistical analysis is correct: *the neutrino background should exist, without any Primordial Big Bang.*

One notes also the following connection involving the cosmic neutrino background (CNB) wavelength $\lambdabar_{CNB} \equiv \hbar c/k\theta_{CNB}$, and the above non-Doppler oscillation scale $l_{cc} \equiv ct_{cc}$:

$$\lambdabar_{CNB} \approx (\lambdabar_{CMB} l_{cc} \lambdabar_F)^{1/3} \equiv (\lambdabar_{CMB} \lambdabar_e (R\lambdabar_e /2)^{1/2})^{1/3}, \tag{40}$$

corresponding to $\theta_{CMB} \approx 2.727$ K. This relies the three main cosmical phenomena: the galactic recession, represented by R, the *cosmic microwave background*, represented by $\lambda_{CMB} \equiv hc/k\theta_{CMB}$ and the non-Doppler oscillation, represented by $l_{cc.}$ Another relation is noted, involving the electron classical radius $r_e \equiv \lambdabar_e/a$:

$$R/2l_{cc} \approx (\lambda_{CMB}/r_e)^2(l_{Pl}/\lambdabar_e)^{1/2}, \qquad (41)$$

corresponding again to $\theta_{CMB} \approx 2.726$ K,

These last relations (38)–(41) cannot be fortuite, and calls for explanation, opening further study.

13. The Coherence Principle and biology

Considering, in a non-reductionism way, that cosmology is the base for all Science, the *Coherence Principle* might be successfully applied to *biology*, providing in particular an answer to the Schrödinger's question[13]: *"how can the events in space and time which take place within the spatial boundary of a living organism be accounted for by physics and chemistry?"*. The CP would complete the famous but partial answer of Schrödinger: the concept of a complex molecule containing the genetic code for living organisms. The CP implies that an organism could be driven by an unique frequency. In particular, this would explain why each organism has an optimal mass. As explained above, holography needs the coherence condition, so the DNA chain would be a 1D linear hologram[12]. *Without this assumption, biology is physically incomprehensible*. Schrödinger could not invoke holography, which was discovered later[14]. In particular, the junk DNA, this large part of the chain seemingly useless, would receive a holographic background role, see (34). For example, over 98% of human genome is noncoding DNA[15]. Moreover, the study of DNA vibrations appears now to be an important research domain[16], but not considered yet from the coherent, or holographic, point of view. Note that in Section 54 of his book, Schrödinger explained that his unique goal in writing it was *to predict the existence of new "physical laws"*.

14. Astrophysical predictions

As well-known, a scientific theory must be falsifiable. It is indeed the case for this study, because it predicts a number of observable features: *(a)* by selecting *the true cosmic redshifts*, the recession time must be identified with the period T (which is no longer any age), corresponding to the recession constant 70.8 km s^{-1} Mpc^{-1}, *(b)* the far-field galaxies, in average, could present the same features as near field ones, with identical physical characteristics (notice it is already supported by "abnormal" old galaxies of the deep field views), *(c)* the existence of young galaxies in the near field (in this respect the observations of Arp[17] must be revisited in the frame of this *coherent new cosmology*), *(d)* the identical CMB temperature everywhere, *(e)* the Wolf solar cycle $(Tt_{cc}^2)^{1/3} \approx 11$ yr and the large climatic period, $(T^2t_{cc})^{1/3} \approx 400000$ yr, might be present in other celestial objects[18] (e.g., a cycle of *11.4* yr has been already detected[19] in the monstrous blazar OJ 287).

15. Conclusions

The formula $E = Mc^2$, demonstrated first for electromagnetic energy, was succesfully generalized to all forms of energy. In the same way, the Coherence Principle propose a generalization of the formula $E = hf$ to all systems. For a mass larger than the Planck mass, this involves a period smaller than the Planck time, which is considered generally as a temporal limit. Dropping this "Planck wall", this implies that at least one of the three constants defining the Planck units must be removed. As we have seen, it is clearly the so-called "space-time constant" c which is not adapted (far too small) to a Coherent Cosmology. This is manifested in the *non-Doppler* cosmic oscillation, which implies that a large tachyonic superspeed is at work, but being not infinite, as is manifested by the phase difference, constant over decades, from one quasar to another (this fact eliminates any local bias). Recall that special relativity authorizes the two domains: one with speeds always weaker than c,

and the other with speeds always larger than *c*. This opens further studies, tied probably to the non-locality of quantum physics, the vacuum energy and the existence of an external Grandcosmos, defining an absolute reference system, directly observable through the CMB[12]...

The Coherence Principle unifies domains of science which are believed to be separated. A manifestation of this splitting is the abnormal number of different units (not to speak of the seven fundamental quantities of the International System). For instance, a length is expressed in Megaparsecs by astrophysicist while it is tied to the *GeV* by a particle physicist. Indeed theorists, using the Planck unit system (writing *h = c = 1*), fail to reckognize the above crucial *c*-free formulae, which confirm the existence of tachyonic physics. In this condition, the crash of the Mars Climate Orbiter is not so surprising. But here, the big crash concerns a whole scientific system which did not take seriously the "Large Number Hypothesis" of Dirac and the Eddington's Great Theory, which are both confirmed by the present study. While Eddington rejected any Universe beginning, Dirac was oriented in the wrong direction by a belief in the Primordial Big Bang, and predicted erroneously a temporal variation of *G*. The Primordial Big Bang is the "taboo" that blocked science over nearly one century, generating the non-scientific anthropic principle and the Multiverse. Such a drastic hypothesis about genesis of the whole Universe is tied to occidental culture, but is not conform with basic philosophical views. For instance, Rowan-Robinson ends his book[20] by the sentence: *"the origin of the Big Bang itself will still be a mystery by the end of the twenty-first century, and perhaps even in the year 3000"*.

However, the anthropic fine tuning is real, and calls for an explanation. In the non-reductionist ("holistic") approach, this would mean that an "Inverse Anthropic Principle" is at work, meaning a Coherent Cosmos needs intelligent Life, not the inverse[12]. This enters the Laughlin's program[21] *"Reinventing Physics from the Bottom Down"*.

---

1. Carr, B. J. & Rees, M. J. The anthropic principle and the structure of the physical world. *Nature* **278,** 605–612 (1979).

2. Bondi, H. & Gold ,T. The steady-state theory of the expanding universe. *Mon. Not. Roy. Astron. Soc.* **108,** 252‒270 (1948); Hoyle, F. A new model for the expanding univers. *Mon. Not. Roy. Astron. Soc*. **108,** 372‒382 (1948).

3. Davies, P. *The Accidental Universe* (Cambridge Univ. Press, Cambridge, 1982), p. 50.

4. Beringer, J. *et al.* (Particle Data Group). *Phys. Rev.* **D86,** 010001 (2012).

5. *Planck 2013 results XVI. Cosmological Parameters, arXiv:1303.5076v1 [astro-ph.CO]* (2013).

6. Eddington, A.S. *The Fundamental Theory* (Cambridge Univ. Press, Cambridge, 1946).

7. Poincaré, H. La théorie de Lorentz et le principe de réaction. Archives néerlandaises des sciences exactes et naturelles **5**: 252–278 (1900).

8. Sanchez, F.M., Kotov, V.A. & Bizouard, C. Towards a synthesis of two cosmologies: the steady-state flickering Universe. *J. Cosmology* 17, 7225–7237 (2011); Sanchez, F.M., Kotov, V.A. & Bizouard, C. The Sun, Cosmos and gravity constant. *Izv. Krym. Astrofiz. Obs.* **109**(3), 181–185 (2013).

9. Hermann, A. *The Genesis of Quantum Theory* (MIT Press, Cambridge, Mass., 1971), p. 92.

10. Poincaré, H. *Dernières Pensées*. "Conférence à l'Université de Londres", pp. 102-103 (Flammarion, 1913).

11. Bousso, R. The Holographic Principle. *Rev. Modern Phys*. **74**, 834 (2002).

12. Sanchez, F.M, Kotov, V.A. & Bizouard, C. Towards coherent cosmology. *Galilean Electrodynamics* **24**(4), 63‒80 (2013).

13. Schrödinger, E. *What is Life?* (Cambridge Univ. Press, 1944).

14. Gabor, D. A new microscopic principle. *Nature* **161**, 777–778 (1948).

15. Elgar, G. & Vavouri, T. Tuning into the signals: noncoding sequence conservation in veritabrate genomes. *Trends Genet.* **24** (7), 344–352 (2008).

16. Chou, K.C. Low-frequency vibrations of DNA molecules. *Biochem. J.* **221**(1), 27–31 (1984).

17. Arp, H. Anomalous redshifts, in *Current Iissues in Cosmology*, ed. Pecker J.-C. & Narlikar J, Cambridge Univ. Press, pp. 183–194 (2006).

18. Sanchez, F.M., Towards the grand unified Holic Theory. In: *Current Issues in Cosmology*, eds. J.-C. Pecker & J. Narlikar, Cambridge Univ. Press, pp. 257–260 (2006).

19. Valtonen, M.J., Mikkola, S., Merritt, D., *et al. Astrophys. J.* **709**, 725 (2010).

20. Rowan-Robinson, M. *The Nine Numbers of the Cosmos* (Oxford Univ. Press, 1999).

21. Laughlin, R.B.A. *Different Universe. Reinventing Physics from the Bottom Down* (Basic Books, New York, 2005).

Correspondence and requests for materials should be addressed to F.S. (hol137@yahoo.fr)