Analysis of 72 enigmas of the universe reveals their common origin in the form of the inertial paradox

Summary

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Abstract :

Beyond the standard model, the DUO5 theory analyzes 72 puzzles (§2) to find their common point. With the constraint of avoiding any determinism, relative to an act of "creation", the analysis leads to the cause of the existence of the universe via the inertial paradox. By iteration, the precise link between the measurement of "effects" and their common "cause" is shown. It is shown that, like John Wheeler's theory, there is a common particle for particles and space-time. The analysis reveals: 1) that the physical structure of space-time is woven of dipolar oscillators, at the subquantum, non-local scale; 2) the cause of the instability of the local "creation" of matter; 3) that the notion of antimatter is an artifact relating to the non-causal separation specific to locality; 4) the link between the stability of matter and the causal separation of primordial inflation; 5) the physical cause of inflation; 6) the original particle of the “preon” type, justified here, is named B.O.D.Y.S. (Subquantum Yin Yang Dipole Oscillator Boson). The iterative method between "cause" and "effects" allows to avoid the pitfall of self-reference and incompleteness of mathematical models, denounced by Gödel [3]. It is shown that the geometric aspect of the curvature of space-time, is only an "effect" of the "cause" relative to the physical coupling between the elements of matter and the B.O.D.Y.S structuring space-time. The study shows that the traces of the inertial paradox are present at all scales. This inertial paradox, constrains a state of permanent universe (without mass-space-time continuum), matrix of the state of expanding and provisional universe. The study shows, that at the quantum scale, the notion of inertia m is inseparable from its spatial amplitude ℓ, forming a non-scalar moment of inertia: $\chi = m.\ell$. It is shown that it is the cause of the Heisenberg uncertainty. This entity is materialized by each of the two poles of the stochastic dipolar oscillator B.O.D.Y.S, whose existence is a solution to the inertial paradox.

Summary :

1. Introduction

The first motivation of this new theory, beyond the standard model, is to find a common origin for all particles, like the supersymmetric preon [1]. This quest involves finding the common point between the 72 enigmas listed in chapter 2. This theory is inspired by the geometrodynamics of John Wheeler [2]. The ΛCDM model is an effective mathematical theory, and therefore based on local effects. But when it comes to tracing the causes of these effects, the model comes up against the self-reference and incompleteness of mathematics, problems denounced by Gödel [3]. Furthermore, Pareto's law [4] indicates that 80% of results (therefore effects) come from 20% of actions (therefore causes). To avoid these problems, the DUO5 theory, through the analysis of 72 puzzles, finds a common point in the form of the inertial paradox (§4). It is expressed in the state of permanent universe (Omnivers), matrix of the state of expanding universe. The study indicates that inertial paradox (§4) is incompatible with the absolute zero and infinity of mathematics [5]. This physical approach is a break with the notion of model that creates mathematical beings to replace physical beings. The vague notion of "empty" is replaced by the physical structure of space-time, woven from subquantum and superluminal preons [6]. In this study, the preon is specified by the acronym B.O.D.Y.S (Subquantum Yin Yang Dipole Oscillator Boson). It is the unique solution to the inertial paradox [7] which cannot bring inertia back to absolute zero. It is demonstrated here that the B.O.D.Y.S – in the absence of absolute zero – presents a perfect zero of symmetrical

nature, in its frame of reference. The presence of Yin Yang in the acronym B.O.D.Y.S implies that symmetry is consubstantial with the deep Nature of the universe. Several measurements such as the Tunnel effect, the reduction of the Schrödinger wave packet, the non-locality of entanglement measured by ASPECT [8], argue for a coupling {matter ↔ B.O.D.Y.S} or {quantum ↔ subquantum superluminal}. The duality of locality is the second key of the DUO5 theory. It allows to demonstrate that the local "creation" of unstable electron-positron pairs does not reflect the process of natural emergence of these pairs from the B.O.D.Y.S. The same is true for the local and unstable "creation" of a proton-antiproton pair. No one can deny that the protons which are the stable elements of matter are not the same as those "created" locally. It is shown here that the notion of antimatter is an epiphenomenon relative to the limits of local "creation". In agreement with John Wheeler, the DUO5 theory demonstrates that the elementary structure of space-time and the elementary structure of matter are both derived from dipolar B.O.D.Y.S. The basic element of matter is represented by a pole of B.O.D.Y.S, causally separated from its alter ego by inflation [9]. It is this causal separation (between opposite poles) that reveals the physical parameters of this isolated pole, which were previously cancelled. It is shown that the stability of the electron-positron pairs, resulting from the original causal separation, cannot be reproduced locally. Thus the boson-fermion dichotomy, inspired by the local experiment, must be revisited in the light of the original {delocalization → relocalization} operation. It is demonstrated with a numerical occurrence > 7σ, with the most precise measurements in physics (§8), the existence of the factor $\xi = 1.545819790014\times1011$, omnipresent at all scales (§8). It is shown that this factor ξ is linked to the fine structure constant, $\alpha = 137.035999$, the causes of which are revealed here. It is shown here that the Omniverse state is without mass-space-time continuum and populated by stochastic B.O.D.Y.S presenting a perfect zero. It is shown how its informational entropy which tends towards infinity, opens a non-zero probability to generate a synchronization flow of B.O.D.Y.S forming a BEC (Bose Einstein Condensate). It is shown in detail, how the saturation of this BEC, leads to an inflation and a mitosis-expansion. The hypothesis of the inertial paradox will be considered true, if it allows to solve the 72 enigmas listed.

Summary

2. The 72 enigmas listed in alphabetical order

enigmas	enigmas	enigmas
01.acceleration expansion	25.galaxy halo	49.particle causality (entangled)
02.alternative to creation	26.Higgs, W boson (origin)	50.PPK particle
03.anisotropy expansion	27.inflation (origin)	51.quark (origin)
04.anomaly moment magnetic	28.indeterminacy (quantum)	52.radius (classic electron)
05.anomaly age the first galaxies	29.inertia origin	53.star structure (origin)
06.anomaly deceleration Pioneer	30.locality (duality)	54.strong force (origin)
07.antimatter origin	31.muon mass (origin)	55.space-time and curvature
08.asymmetry matter	32.mitosis (origin)	56.subquantum scale
09.boson fermion dichotomy	33.neutrino (structure)	57.cluster (origin)
10.cold hole Eridan	34.neutron-proton (structure)	58.temperature halo
11.Coulomb force origin	35.origin 5th force	59.time origin.
12.cosmic rays origin	36.origin early black hole	60.temperature cluster
13.constant speed c	37.origin cosmos constants	61.taon desintegration
14.dark matter (origin)	38.origin gamma-ray burst	62.tunnel effect
15.decoherence quantum	39.origin universe	63.universe (5 large structures)
16.electron-positron origin	40.pion particle	64.universe (mass)
17.elementary electric charge	41.photon structure	65.universe, radius(t)
18.excess positrons cosmic rays	42.Planck mass (origin)	66.universe (lifespan)
19.expansion universe (origin)	43.Planck length	67.virtual particle
20.fine adjustment universe	44.Planck time	68.wave packet reduction
21.fine structure constant	45.Planck constant	69.weak force
22.fractal aspect universe	46.proton radius	70.X17 particle
23.gravitation (origin)	47.proton mass (origin)	71.Zitterbewegung
24.galaxy (origin)	48.preon particle	72. Omniverse

This inventory of 72 mysteries of the physics of the universe is unprecedented and non-exhaustive. Solving these 72 mysteries, following only the consequences of the inertial paradox, is the ultimate goal of the DUO5 theory. In conclusion, the quality of the resolution of each puzzle will be discussed. The quality criteria will be as follows:

1) assessment of the degree of correlation with the consequences of the inertial paradox;

2) assessment of the degree of correlation with observables and measurements;

3) assessment of the degree of numerical occurrence with the precision of the measurements;

4) assessment of the degree of physical explanation of the phenomena and mutual correlations.

The search for the causes of the existence of the universe is a very different approach from applied scientific research. The latter offers the possibility of feedback for continuous adjustment. In the search for the causes of the existence of the universe, the only feedback available is to find the common point among all these mysteries. This brings the constraint of auto-correlation between each chapter discussed.

Summary

3. Duality of locality and antimatter

Problem statement: Quantum mechanics is an effective theory that seeks to make all observables consistent, including those that have no physical explanation. Thus, the Schrödinger wave function Ψ(r,t) is interpreted as a probability density, without giving a physical explanation. Other enigmas related to locality remain, such as Heisenberg uncertainty, the phantom link of entangled particles, the tunnel effect, and wave-corpuscle duality. The DUO5 theory, based on the inertial paradox (§4) and locality duality, proposes to resolve the 72 enigmas. Preons in the form B.O.D.Y.S, structure subquantum and superluminal spacetime (§5). According to this concept, spacetime is physically woven by subquantum and superluminal B.O.D.Y.S dipole oscillators (§15). As John Wheeler suggests, space-time and matter have the same origin. The structuring element of space-time is the B.O.D.Y.S (§5) composed of these two opposing poles that cancel each other out. The subquantum spatial amplitude of the B.O.D.Y.S "string" preserves the causality of the link between its two poles on a cosmological or non-local scale. The matter element is a separated and relocated pole of B.O.D.Y.S. The causal separation revealed its previously canceled physical parameters with its alter ego. This original causal separation (§17) is detailed as a vectorial process, relating to a phase of cosmic inflation. This process amounts to a radial delocalization (inflation) and a tangential relocalization between poles from different B.O.D.Y.S. Their stable fusion between neighbors is possible (§18), because their origins are delocalized, unlike local experimentation. This explains the instability of a proton-antiproton pair created locally, while those forming matter are stable. The wave-particle duality is explained by the coupling {matter ↔ B.O.D.Y.S}. The spin of the particles, intimately linked to the poles of B.O.D.Y.S, remains causally linked at a non-local distance (§15). By definition, the origin of the physical CAUSES of the universe is non-local. Figure 1 below shows that the local creation of an electron-positron pair is not transposable to the original non-local creation, characterized by an inflatory-type causal separation. Some aspects of the cosmological principle cause confusion, particularly regarding the duality of locality. If we can consider that all localities are almost identical, we must be aware that the appearance of stable matter occurred in a framework of non-locality, characterized by a causal separation, followed by a relocalization. This is not reproduced by the local experiment that is the basis of the standard model. Thus, it wrongly rejected the idea that the proton could be composed of electron-positron pairs. Chapter (6) shows convincing occurrences that indicate that quarks are only effects related to internal inductions.

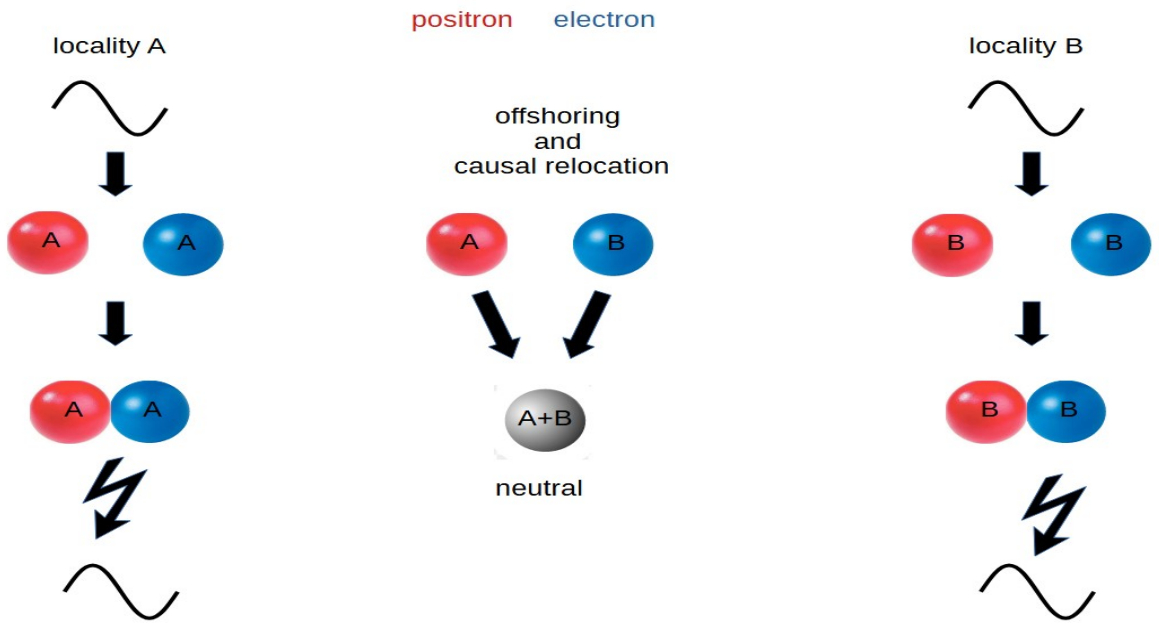

Fig. 1: Consider an electron-positron pair, emergent (not created but removed from the subquantum scale) in locality A and another, emergent in locality B, causally separated from locality A. The local experiment consists of confronting positron A with electron A, which annihilate each other since they are the same locality of emergence. These fermions cannot condense like bosons. But if electron A is confronted with positron B, then they merge like bosons, since their locality of emergence has been causally separated. This shows that the local "boson-fermion" dichotomy is not valid at the scale of the universe! This is why there is a profusion of stable protons, but no anti-protons. The local experiment is therefore not necessarily transposable to the non-local scale.

The standard model wrongly calls the local emergence of an electron-positron pair "creation". It admits as proof that the appearance of the inertia of the elements of this pair comes from the equivalence: $\hbar \nu = m_e c^2$. Of course the dimensional analysis of this equivalence is correct, but it does not explain the appearance of the inertial aspect. Indeed the $\hbar \nu$ form of a photon is known to be massless! There is a blatant contradiction here. With the DUO5 theory, the notion of inertia does not appear magically, because it pre-exists in the (closed) frame of reference of a subquantum B.O.D.Y.S pole. This pre-existence is justified by the consequences of the inertial paradox (§4). The local injection of a calibrated energy $\hbar \nu$ causes the extraction and relocation at the quantum level of two poles of a B.O.D.Y.S. Thus, the relocation is responsible for the annihilation of the pairs. Since the inertial aspect of these poles already existed, it is not a “creation” of inertia but just a state transfer. The subquantum state of the B.O.D.Y.S is determined by the symmetrical and non-local oscillation of its two opposite poles. The local creation experiment is a false friend, because it does not reproduce the physical reality of stable matter. It put the standard model on a false track, which is the main cause of the 72 enigmas listed in chapter 2.

Summary

4. Non-determinism, inertial paradox and B.O.D.Y.S

Problem statement: Regarding the origin of the universe, the standard model modestly evokes a "singularity" so as not to name an enigma tinged with "creation" with its mystical aspect. The common confusion between the terms "origin" and "creation" is often made. The term "creation" implies a mystical determinism, which does not correspond to the scientific approach. The non-determinism relating to the uncreated existence of the notion of inertia m, imposes the paradox: $\{\nexists\ m > Ø; \nexists\ m \equiv Ø\}$. The existence of a notion of inertia is as unjustifiable as its state fixed at strict absolute zero, here noted Ø. The only solution to this paradox is zero in the dipolar and symmetrical form. The constraint of non-determinism, implies stochastic B.O.D.Y.S whose dipolar aspect forms a zero inertial frame of reference. The same constraint imposes an absence of quanta and fixed value. So there comes a continuous function whose variability is purely random. With such a function, any value of inertia, however small one wishes, is always separated from absolute zero by an infinity of infinitely small intervals. Thus the absolute zero of mathematics is an impossible hope for inertia. More prosaically, if absolute zero Ø for inertia were possible, we would not be here to talk about it. In the frame of reference of each dipolar B.O.D.Y.S, the moment of inertia of each pole $\chi = m.\ell$, is algebraically canceled by its alter ego. But in the inertial frame of an oscillating pole of B.O.D.Y.S, the variability of inertia ($dm/d\ell$) opens at each cycle, the hope of finding an absolute zero at the "zero" point. This hope justifies the permanence of the Omniverse state. Relation (1) shows that the inertial paradox (first term) implies the dipolar nature, to obtain a zero of algebraic and symmetric nature. The third term indicates: 1) that at the zero point, any m implies a spatial amplitude potential ℓ, which is inversely proportional to it; 2) that the displacement of a pole Δm is covariant with $\Delta\ell$; 3) the presence of a force F to ensure the inseparability of the poles to guarantee the zero of algebraic type; 4) that the time of a cycle is a function of $m.\ell$; 5) that the electron positron pair is inherited from the poles, under the conditions described below and in chapter (5).

$$\nexists\ (m > Ø)\ ;\ \nexists\ (m \equiv Ø)\ \Rightarrow\ \exists\ (\Delta m.\Delta\ell + \Delta m.\Delta\ell' = 0_{\oplus}) \Rightarrow \begin{cases} \Delta m.\Delta\ell = \text{Cte} \\ \Delta m/\Delta\ell = \text{Cte} \\ F = f(m.\ell \times m.\ell') \\ t^2 = f(m.\ell) \\ \Delta\lambda\!\!\!^{-}_{e} = f(\Delta\ell) = f(\Delta m^{-1}) \end{cases} \quad (1)$$

The following relations (3, 4) confirm that the internal force of the electron is inherited from that which binds the poles of the B.O.D.Y.S. It is very important to realize that this force is the guarantee of inseparability of the poles to ensure the perfect symmetrical zero, required by the inertial paradox. Chapters (5, 30) confirm that the origin of all the physical parameters of the

electron come from the components of the moment of inertia of the poles of B.O.D.Y.S: $\chi = \Delta m.\Delta \ell$. Symmetry and duality are consubstantial to Nature, including in the living [10], [11]. In the frame of reference of a pole, the constant entity $\chi = \Delta m.\Delta \ell$, appears to violate the inertial paradox. But since this frame of reference is not autonomous, it has no existence of its own. At this scale, the notion of inertia of dimension [M] is replaced by the inseparable entity: $\chi = \Delta m.\Delta \ell$. By definition, stochastic oscillation naturally possesses the determinism of perpetrating the random and permanent search for the impossible absolute zero at the zero point of the B.O.D.Y.S. This is the key to the permanent existence of the Omniverse. We find this concretely in Heisenberg's concept of uncertainty. Figure 2 (below) shows that the curve of the trajectory of each pole follows the law $\Delta m/\Delta \ell = Cte$. It is measurable at the quantum scale via the Heisenberg uncertainty applied to an electron, according to:

$$\Delta x \Delta p \geq \frac{\hbar}{2} \geq m_e \lambda\!\!\!^{-}_e \frac{c}{2} \Rightarrow \Delta m \Delta \ell = Cte \qquad (2)$$

Basically, the mass reduction of a pole at zero point generates a large spatial potential according to $\Delta m.\Delta \ell = Cte$. During the pole travel, the mass m increases as the amplitude $\Delta \ell$ according to $\Delta m/\Delta \ell = Cte$. In the stochastic framework of the Omniverse, the B.O.D.Y.S are not connected, and therefore do not form a mass-space-time continuum. But statistically, the probability of synchronizing a limited number of B.O.D.Y.S is not zero. To satisfy the constraint of canceling the opposite moments of inertia, the poles are linked by a force $F = f(m.\ell) = f(q^2)$, which ensures their inseparability. The following relations show that this is verified with the electron. This original link between the elementary electric charge e^2 and the inertial moment $\Delta m.\Delta \ell = Cte$, of relation (1), is confirmed by:

$$e^2 = \frac{m_e \lambda\!\!\!^{-}_e}{10^{-7}\alpha}, \qquad (3)$$

which comes from the old relationship in the cgs system with r_0, the classical radius:

$$q^+ q^- = \frac{\sqrt{(m_e r_o)^+}\sqrt{(m_e r_o)^-}}{Cte}, \qquad (4)$$

Thus the internal force of the electron, given by $F = f(q^2) = f(m.\ell)$, is inherited from the inseparability of the poles of B.O.D.Y.S. This force $F = f(e^2)$ is constant for any spatial amplitude such that:

$$\frac{\Delta m}{\Delta \ell} = \frac{\Delta F}{\Delta \ell} = Cte, \qquad (5)$$

This is the origin of the Coulomb force, born in the reference frame of the poles of B.O.D.Y.S. We recall that 10^{-7} is the appropriate dimensional adjustment, to commute the cgs system, in MKSA system, to make autonomous the dimension [Q] of the electric charge of the

electron. Epistemologically, the search for this autonomy of the electric charge, was motivated to be able to assign it freely and indifferently to other particles like the proton. Because of the erroneous conclusions relating to the local experimentation, a false dichotomy between boson and fermion was made. Moreover, according to these conclusions, it was considered that the instability of the electron-positron pair "created" locally, prohibited it from being the ultimate component of the proton. We did not see that relation (2) affects the elementary charge, to the electron alone and by extension, to the electron-positron pair. It is the causal separation of the poles of B.O.D.Y.S, which is the origin of the stable electron-positron pair. It is not a "creation" but just a transformation. In this natural case, the symmetry between electron and positron is internal, and not external in the case of local extraction. There is no antimatter, but just a duality of symmetry. In the particular case of local creation, this symmetry is in the form of (unstable) pairs. In the general, non-local framework of stable matter, the symmetry is integrated into the internal frame of reference of the atomic hydrogen nucleus (proton). Its positive charge is compensated by the negative charge of the orbital electron. Figure (1) shows the process of delocalization and relocalization with a different alter ego than the original one.

4-1. Stochastic B.O.D.Y.S: Non-determinism implies a mode of operation without constant physical parameters and therefore a variable or oscillating process. The 1D oscillator must be dipolar to obtain a perfect zero of symmetrical nature. The uncertain zone of the zero point, randomly fixes at each cycle, a new small mo which tends towards absolute zero.

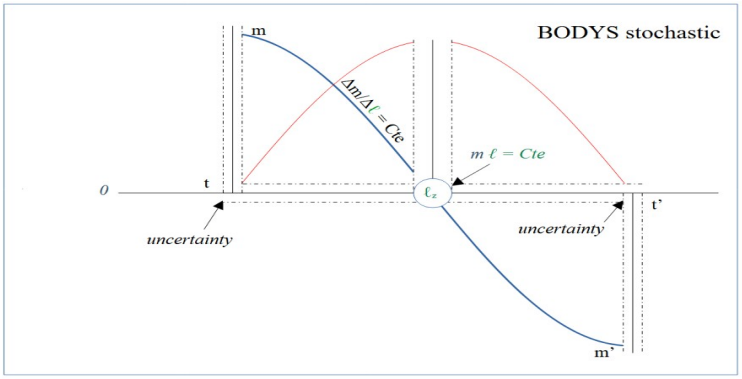

Fig. 2: In the Omniverse, the spatial amplitude of each B.O.D.Y.S is random and variable. In the B.O.D.Y.S frame of reference, symmetry ensures a perfect zero physical parameter. In the Omniverse, there is no mass-space-time continuum, because the B.O.D.Y.S (1D) are unconnected.

The constant entity $\chi = m.\ell$, implies a large spatial potential ℓo inversely proportional to a small mo. The speed is proportional to ℓo. Then, the inertia is covariant with the spatial extension. It is the growth of the inertia, which forces the slowing down. The uncertainty at the turning point is a variation factor during the return to the zero point. Without determinism, nature seeks indefinitely, an absolute inertial zero at the zero point. The flow of time t, of the left pole, is canceled by the time t' of the right pole. The torque $m.\ell$ of the left pole is strictly

canceled by the torque m.ℓ' of the right pole. The Schrödinger probability amplitude Ψ(r,t), is here in the form of a non-local spatial amplitude, because it is superluminal. In the constituted space-time (§4-3), the effective measurements are always affected by the subquantum and non-local scale. The stochastic B.O.D.Y.S oscillator of the Omniverse operates according to relation (1). The zero of the first equation is required by the inertial paradox which requires an algebraic zero in the absence of absolute zero, in the B.O.D.Y.S frame of reference. The second equation indicates the mass/space covariance. The third equation, in the "1 pole" frame of reference, indicates the inseparability of the inertial moment. The slowing down is caused by the growth of inertia with length. This random variability meets two essential requirements: 1) avoid the determinism of fixing a particular value of the m.ℓ couple; 2) oscillate indefinitely to preserve the probability of obtaining a quasi-absolute zero, at the zero point. The expectation of absolute inertial zero is the only acceptable determinism for nature. The fourth equation is the force induced by the requirement of inseparability of the poles to guarantee inertial zero. The fifth equation indicates that the cyclic variability of the moment of inertia implies that the inertial moment has a time component proportional to it, limited to the "1 pole" frame of reference.

4-2. Synchronized B.O.D.Y.S forming the BEC-fossil: the synchronization process is relative to the chance of intense mixing due to the almost infinite informational entropy. The non-flow of time offers an almost infinite potential for random synchronization attempts. This amounts to a unit probability of obtaining a non-sterile universe potential. This process is detailed in chapter 14. Below, a B.O.D.Y.S, in the synchronized and collective framework of the fossil BEC. The synchronization (§14) was randomly fixed at the ratio ξ^2 between the BEC scale (maximum amplitude) and the common zero point ℓ_{zc}.

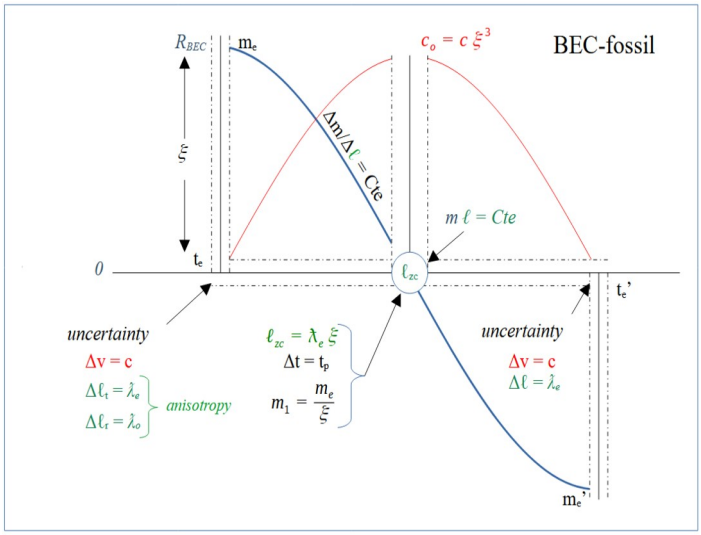

Fig. 3: A B.O.D.Y.S in the saturated fossil BEC. Saturation on the BEC area results in a reduction of the tangential elementary interval, i.e., λ_e / λ_o = ξ. This presents an anisotropy with the radial elementary interval λe (Compton wavelength of the electron).
In 2D, the anisotropy factor is ξ^2. Then, the mitosis of the BEC into ξ^2 BEC-daughters restores isotropy and therefore equilibrium. In each B.O.D.Y.S, weaving space-time, the law reigns: $\Delta m.\Delta\ell + \Delta m'.\Delta\ell' = 0$, with $\Delta m.\Delta\ell$ inseparable and non-scalar.

4-3. B.O.D.Y.S forming the BEC-son of space-time: the process of saturation, inflation, and mitosis is explained in chapters (17, 18, 19). Below figure (4) shows that the poles of the B.O.D.Y.S structuring space-time are linked. In their frame of reference, the algebraic zero is perturbed by the coupling with the particles.

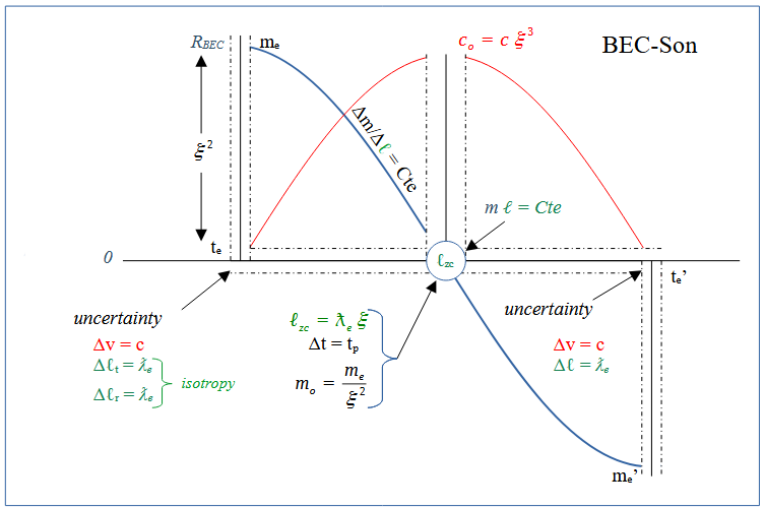

Fig. 4: A B.O.D.Y.S in one of the ξ^2 BEC-sons forming space-time (§15). All quantum particles are coupled with the subquantum B.O.D.Y.S. Mitosis has restored the isotropy of the elementary intervals and the BEC-sons are balanced and stable.

According to DUO5 theory, the perturbation relative to the quantum measurement of an electron relocates its wave state which was spread out at the subquantum scale of the BEC. The physical aspect of the wave-particle duality is related to the coupling {quantum ↔ subquantum}. As an ex-pole of B.O.D.Y.S, the electron is not an isolated particle but presents a symmetry with the subquantum scale of space-time. Its "wave" state is represented by the reduced mass which evolves according to the relation (1). The reduced mass of an unmeasured electron, $m_o = m_e/\xi^2$, oscillates in the superluminal and non-local subquantum amplitude, $\Lambda = \lambda\!\!\!^{-}e\ \xi^2$. The symmetrical image of the quantum oscillation of the electron of the Zitterbewegung type (§23), is materialized by the pole of B.O.D.Y.S with which it is intimately coupled (fig. 30). The general form of the vibrating or oscillatory movement can be expressed as a superposition of its eigenmodes. The solution of the Schrödinger equation,

$$i\hbar \frac{d}{dt}|\Psi(t)\rangle = \hat{H}|\Psi(t)\rangle \qquad (6)$$

applies to a particle, but also to the pole of B.O.D.Y.S with which it is coupled. Now this pole has n states because its position and its mass, evolve permanently over time t in all the host BEC. The expression of its state is rather of the form $\Psi(m,\ell,t)$. Thus the superpositions of states, also include the mass.

Summary

5. The electron is an ex-pole of B.O.D.Y.S

Problem situation: QED ignores the origin and physical functioning of the electron. Chapter 23 describes the Zitterbewegung of the electron as a harmonic oscillation coupled to a B.O.D.Y.S. pole. Figure (30) shows that the Compton length $ƛ_e$ corresponds to the non-local subquantum amplitude Λ, of a pole, according to:

$$\Lambda = ƛ_e \, \xi^2 \tag{7}$$

Chapter (23-2) shows that there is a variant of the Planck mass that commutes from: mp = me ξ^2 to $m_o = m_e / \xi^2$. The causes of these two parameters are explained in detail in Chapter 13, by the ratio ξ^4. Thus the electron oscillates between the Planck thickness $ℓ_p$ and its Compton length by the ratio ξ^2. Its period is given by:

$$t_c = 2\pi\sqrt{\frac{m_e}{K}} = \frac{\lambda_e}{c} = 2\pi t_e \tag{8}$$

With K the stiffness of the electron:

$$K = \frac{m_e c^2}{ƛ_e^2} \tag{9}$$

Figure (28) shows that the speed c, is constrained by the subquantum speed of the poles: c_o = c ξ^2. The period of the electron is inherited from the period of a B.O.D.Y.S, to within 2 π.

$$t_e = \sqrt{\frac{m_o}{K_o}} = \frac{\Lambda}{c_o} \tag{10}$$

With the subquantum stiffness $K_o = K/ \xi^2$. The force that binds the two poles of B.O.D.Y.S was inherited by the electron, according to:

$$F = \frac{e^2 \alpha}{4\pi \epsilon_o ƛ_e} = \frac{m_e ƛ_e}{t_e^2} = \frac{m_o \Lambda}{t_e^2} \tag{11}$$

The electron → subquantum pole coupling is the cause of its virtual appearance [16].

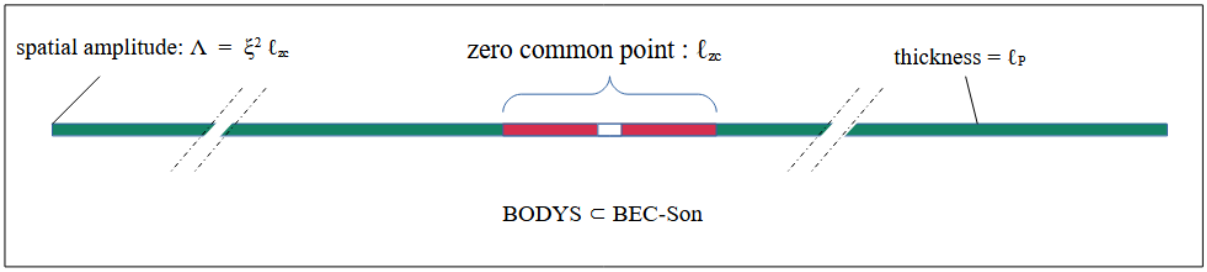

Fig. 5: The spatial amplitude of the B.O.D.Y.S is the ratio ξ^2 between Λ (or R_{BEC}) and $ℓ_{zc}$, the radius of the common zero point. It is the same amplitude ratio (ξ^2) of the electron between its Compton radius $ƛ_e$ and $ℓ_p$.

5-1. Stability and locality: the stability of the protons forming ordinary matter shows that their subquantum emergence is of a non-local type, after causal separation (§4). Thus, the local experience does not reflect the appearance of stable matter (apart from the neutrinos of

the weak force (§9). Locally, by injecting the necessary energy, we can make a pair of poles (– and +) emerge at the quantum level to form an electron-positron pair. However, this pair is unstable, because the extracted poles are local poles, opposite and neighboring and therefore without causal separation. On the other hand, the elementary components of ordinary and stable matter have undergone a causal separation according to the process of figure 1.

blending mode	local	no-local	mass
tangential symmetry mode	unstable proton antiproton	stable internal proton	yes
radial example		stable neutrino	no

Fig.6 : A l'origine (non locale), la fusion en mode tangentiel (chapitre 18) , additionne arithmétiquement les masses des électrons et positrons pour former des protons dont la symétrie est interne. L'émergence locale, sans séparation causale, rend les masses, instables. L'émergence non locale et radiale du neutrino (chapitre 25), additionne ses pôles en mode algébrique comme les B.O.D.Y.S.

5-2. Proton stability: The instability of the proton-antiproton pair of local emergence cannot be generalized to nonlocality, the cradle of all matter. There are three strong indications that the proton is composed of neutral electron-positron pairs + 1 positron:

1) the charge of the proton is strictly that of the positron (§§ 7, 7, 8); 2) the mass of the proton cannot be explained by quarks alone, as they only contribute about 1% of its mass;

3) the emission of a single, stable electron by the neutron differs from emergence by energy emission (unstable and by pair).

But if the (stable) proton is composed of electron-positrons + 1 positron, questions remain:

1/ Why is the proton's charge always represented by a positron?

2/ Why doesn't the proton expressed in "free electron" units yield an odd integer like 1840 + 1, but P = 1836.15267342153?

Answer 1 (§6) indicates that there is a 50/50 probability in the original emergence process, which breaks down as follows:

1/ Everything is causally linked in the fossil BEC

2/ Tangential fusion causes a radial inflation-like causal separation.

3/ Tangential relocalization occurs

Answer 2 (§6) indicates a reduction in the packing of fused pairs.

Summary

6. Structure of protons, neutrons, π pions, +/- pions, tauons, muons

In the context of the search for a common origin between quantum particles, it is shown here, a coherence of structure, between its six particles, according to a development of the KOIDE law, detailed in chapter (7). Firstly the law $\Delta m.\Delta \ell$ = Cte, of the relation (1) resulting from the

inertial paradox, is confirmed by the Planck constant whose numerical value is justified by the parameters of the electron:

$$\hbar = m_e \, \lambda\!\!\!^{-}_e \, c \,, \tag{12}$$

This is confirmed to a precision of 7σ (§ 8) by this new relation:

$$c = \sqrt[4]{\frac{m_e \lambda\!\!\!^{-}_e G \, \xi^4}{t_e^2}} = 2{,}997924580 \times 10^8 \; m/s \tag{13}$$

Figure 7, below, shows two measurements of proton radius, depending on the type of scattering. By simply applying the law $\Delta m.\Delta \ell$ = Cte, the result of relation (14), is in agreement with the numerical value of the measurement by muonic hydrogen scattering:

$$R_P = \frac{4 \lambda\!\!\!^{-}_e}{P} = 0{,}8412356402 \, fm \,, \tag{14}$$

The factor 4 is consistent with table (8), below. The proton is measured at P = 1836.152673 "free electron" units. The dressing rate of the electron at rest is represented by the anomaly rate of its magnetic moment, (§8-2). The dressing rate of fused and neutral pairs, σ_{pn} = 0.001480284328, is given by relation (38), (§16). Thus the dressing rate of the proton at rest is given by: σp = 1.0026399365 = $\alpha_e + \sigma_{pn}$ = 1841/P.

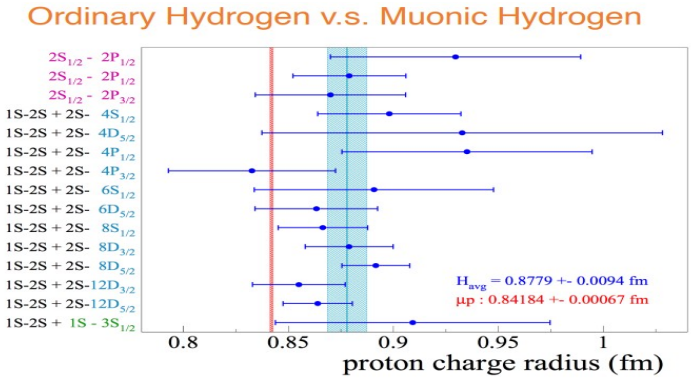

Fig 7 : Jefferson Lab diagram (Exploring the Nature of Matter). The two measurement methods give different numerical values of the proton radius. With the muon hydrogen scattering method, the radius is measured at 0.84184(67) fm [12]. With the electron-proton scattering method it is given to: 0.8779(94) fm[13].

Each group is represented by P/4 = 458.78 units. Now the ratio between the two measured values (fig. 7), of the order of 1.007, reduces this number to 454.78, a difference of about 4 whole elementary units or 2 pairs. If the "electron-proton" type measurement brings a perturbation which moves two pairs from the external group to the interior, then this reduction in mass results in an increase in the radius, according to $\Delta m.\Delta \ell$ = Cte. Figures 14 and 15 indicate that each of the 4 groups is in the form of a spherical shell of thickness r << RP. This corresponds perfectly to all the observations concerning them. This consistency [14] implies that the proton is made up of 4 groups of 460 units (electrons or positrons) + a single positron. Chapter 7 confirms this table by a series of exact relations.

mass in electron units	muon	pion π°	pion+/-	proton	tauon	neutron
measured mass	206,76	264,76	273,13	1836,15	3479,3	1838,72
total bare mass	207	270	277	1841	3481	1842
entire neutral part	206	270	276	1840	3480	1840
dressing rate	1,00112	1,01979	1,01416	1,00264	1,00048	1,00180
group number	1	3	3	4	1	4
number of quark intervals	0	2	2	3	0	3
number per neutral group	206	90	92	460	3480	460

Tab. 8 : Muons and tauons have a single group and therefore no quark gap. The neutrality of the neutron is ensured by a lone pair, whose electron is located at the periphery (fig. 12 and 13). The 206 units of the muon can only be divided by 1 to form an even number. The only possible divisor of pions is 3, to give even groups. The tauon is ambiguous because it has a multiple divisor (3,4,5). This ambiguity results in decay modes that can include quarks.

Summary

7. KOIDE's relationships become accurate

This 2016 publication [14], is a first approach to the exact relationships between certain composite particles, when expressed as a whole number of electron-positrons. Some tests like this paper [15], were carried out in the context of a reunification of all particles towards a common origin. According to table (8), we find exact links between the six particles cited. Below, relation (15) indicates the links between, from left to right:

- electron (1 isolated pole),
- neutrino (zero algebraic sum of 2 opposite poles), quantum replica of a B.O.D.Y.S,
- neutral part of a muon (arithmetic sum of a group of 206 fused poles),
- π° pion (arithmetic sum of 3 groups of 90 fused poles),
- proton (arithmetic sum of 4 groups of 460 fused poles + 1),
- neutral part of a tauon (arithmetic sum of a group of 3480 fused poles),
- charged pion (arithmetic sum of 3 groups of 92 fused poles + 1),
- whole muon in the denominator (arithmetic sum of a group of 206 fused poles + 1).

$$\begin{matrix} e & \nu & \mu_n & \pi^\circ & p & \tau & \pi^{+/-} \\ 1 & + 2 + & 206 & + 270 + & 1841 & - \dfrac{3480 \times 276}{2 \times 207} & \equiv 0 \end{matrix} \qquad (15)$$

$$207 \equiv \mu = \frac{3}{4}\ \pi^{+/-} \equiv \frac{3}{4}\ 276 \qquad (16)$$

$$1842 \equiv \frac{206 + 3480 + 1840}{3} \qquad (17)$$

$$3480 \equiv \frac{3}{2}(-2+206+276+1840) \qquad (18)$$

Many references [16] [17] indicate that the Fibonacci sequence leading to the golden number is observed at all scales (astrophysics, chemistry, biology, etc.). This is not a mathematical phenomenon but a physical phenomenon, inherited from the mitosis-expansion of the fossil BEC, in 5 phases [7]. The Fibonacci sequence relating to fractal mitosis has been limited to 5 phases, namely: 1, 2, 3, 5, 8. The Golden number of the mitosis of the BEC-fossil is then limited to the ratio: 8/5 = 1.6. Then the complexity of the development continued the Fibonacci sequence until obtaining the complete Golden number by the ratio of the last two numbers, namely: φ = 1.618033… Thus, the following chapters show that the first 5 numbers of the Fibonacci sequence are omnipresent at all scales of the physics of the universe. Below the table shows 2 variants of the Fibonacci sequence, in 5 ranks:

Numeral	1	2	3	4	5
Fibonacci	1	2	3	5	8
variety 1	1	$1+2^2=5$	$2^2+5=3^2$	$3^2+5=14$	$14+3^2=23$
variety 2	1	2	$1+2=3$	$\Sigma_{123}=6$	$\Sigma_{123}+5=11$
8th Fibonacci rank: 11 + 23 = 34					

Tab. 9: Two variants of the Fibonacci sequence, relating to the fractal mitosis of the fossil BEC (1 to 5). They show the coefficient 11 which plays a role in the relations (31 and 91). The coefficient δ = 23 in the 5th place plays an important role, below, in the exact links between particles.

This number δ =23 is present in the relationships between composite particles:

$$\delta \equiv 23 \equiv 3\times5+8 \equiv 2^5-3^2 \equiv \frac{2}{5}\frac{1840}{\sum_{5+1}F} \equiv \frac{270}{3^2} \qquad (19)$$

With ΣF ≡ 1+2+3+5+8+13 ≡ 2^5, the first 5+1 Fibonacci numbers, relating to the fractal mitosis of the fossil BEC. The search for a single original particle like the preon is shared by physicists [18]. The following chapters show, by several different ways, that the electron-positron pair is the quantum copy of the subquantum B.O.D.Y.S [6] acting as a preon.
It is the ultimate element of all composite particles. It is the structural and physical element of space-time. This unique origin is the B.O.D.Y.S, which represents the only solution to the inertial paradox.

$$1840 \equiv \delta \times 2\times5\times8 \qquad (20)$$

and

$$230 \equiv \frac{1840}{8} \equiv 2\times5\ \delta \qquad (21)$$

In summary, the emergence of subquantum pole pairs follows two distinct modes:
1/ the tangential mode (without causal separation) which causes local and neighboring pole

pairs to emerge, giving rise to opposing quantum particles that annihilate each other.
2/ the radial mode (with causal separation) which causes non-local and therefore stable pole pairs to emerge, which merge and algebraically cancel their mass, like the neutrino (Chapter 25).

Summary

8 Five-phase mitosis from factor ξ to 7σ

The DUO5 theory shows that the RBEC radius of the fossil BEC is strictly ξ^5 times the Planck length, which also determines the thickness of the B.O.D.Y.S. “rope”. The fractal mitosis of the fossil BEC in 5 phases has determined all the observable elements of the expanding universe state. The base 5 logarithm of ξ^5 gives precisely the neutral and integer part of the proton according to:

$$1840 \equiv \delta \frac{\log_5(\xi^5)}{k_5} \qquad (22)$$

with δ =23 and the inevitable error between the geometric progression of mitosis (in 5 phases of reason 2) i.e. 2^5 and the random factor ξ^2, of mitosis:

$$k_5 \equiv \frac{\log_5(\xi^2)}{2^5} = 1{,}00050420558601 \qquad (23)$$

8-1. Physical cause of the existence of the proton and factor ξ: Chapter (17) details the process of the primordial fractal mitosis of the universe, between matter relative to the factor $(\alpha^2)^5$ and the mitosis of the BEC of factor ξ^2. The convergence between these two random factors (ξ-α), at the end of the fractal mitosis, necessarily implies an adjustment parameter. This parameter is none other than the CAUSE of the existence of the proton of mass m_P = 1.672261932595(52)×10^{-27} kg [19] or: P = 1836.15237342152(52) expressed in electron unit (dimensionless).

1D	5 phases in dimension 2					3D
annihilation	1th mitosis	2th mitosis	3th mitosis	4th mitosis	5th mitosis	final mitosis
α	$(\alpha^2)^1 / \xi^{-2/5}$	$(\alpha^2)^2 / \xi^{-4/5}$	$(\alpha^2)^3 / \xi^{-6/5}$	$(\alpha^2)^4 \ \xi^{-8/5}$	$(\alpha^2)^5 \ \xi^{-10/5}$	$(\alpha^3)^{-5} \ \xi^3$
0	1	2	3	5	8	13
	5 Fibonacci sequence					

Tab 10 : All matter (inert and living) and all physical phenomena are inherited from mitosis in 5 phases.

The following relation indicates that the adjustment parameter between the two random source factors is the proton with an unprecedented precision of 7σ confirmed by relation (25):

$$P = \alpha \frac{(\alpha^2)^5}{\xi^2} \frac{4\pi}{3} \frac{\xi^3}{(\alpha^3)^5} = \frac{4\pi\xi}{3\alpha^4} = 1836{,}15267342153, \qquad (24)$$

With ξ = 1.545819790014×1011. The first phase of interval widening is the α rate in 1D generated by annihilation. This is the trigger for fractal mitosis (§18).

8-2. Confirmation of the factor ξ by the anomaly of the magnetic moment of the electron

The standard model proposes a solution [20] to try to equalize the anomaly rate of the electron magnetic moment, measured[21] at 1.00115965218085(76) with a precision of 7σ. From the Landé factor, it proceeds to 941 corrections based on Feynman diagrams to obtain an occurrence < 6σ. However, Feynman said on this subject: "it took this deception to save QED". The DUO5 theory reaches an occurrence at 7σ, with only 4 corrective terms whose bases are strictly the mitosis factors:

$$\alpha_e = \alpha_1 - \frac{2}{3\sqrt{\xi}} - \frac{1}{2\pi\alpha^3} - \frac{4\pi}{\xi} - \frac{4\pi}{\xi\alpha} = 1{,}00115965218053(28) \qquad (25)$$

with the Landé factor in the form :

$$\alpha_1 = 1 + \frac{1}{2\,\alpha\,\pi} = 1{,}00116140973209(52), \qquad (26)$$

Moreover, these 4 corrective terms have a meaning that allows us to reveal the physical origin of this anomaly (§16). It comes from the virtual dressing of the electron via the coupling with the B.O.D.Y.S, according to the universal factors (ξ-α).

8-3. Confirmation by the anomaly of the muon's magnetic moment

The origin of the muon's existence is one of the 72 enigmas of the standard model. According to a variant of Boltzmann's formula: S = KB ln(Ω) relative to the number of complexions, we set: Ω = 2 ξ^8 elements of matter before primordial annihilation. And we obtain:

$$m_\mu = a_2^{-1}\ln(\Omega) = 206{,}768270115 \qquad (27)$$

with:

$$\alpha_2 = 1 + \frac{\sqrt{\xi}}{2\pi\alpha^4} + \frac{\delta}{5}\frac{\alpha^2}{\xi} - \frac{\alpha^2}{5\xi} = 1{,}000177978339 \qquad (28)$$

with δ =23, according to relation (25). We obtain with an occurrence at 7σ, with the measurement of the mass of the muon, mμ = 206.7682703(94) [22], expressed in electron unit. The coupling between quantum particles and the B.O.D.Y.S forming space-time, is dominated by the ξ-α factors, which are the factors of mitosis-expansion.

8-4. Confirmation of the coupling factors (ξ-α), between particles and B.O.D.Y.S: The previous relations clearly show that the factors relating to the pole → electron transformation are those which fix the ratio between the quantum and subquantum scale. Chapter (23)

indicates that the ratio between the Compton length of the electron and the thickness of the B.O.D.Y.S "string" (Planck length) is ξ^2.

8-5. Mitosis, Fibonacci, duality and quintessence: The mitosis of living things did not appear magically, because it is inherited from the geometric progression of reason 2 and the 5 phases of mitosis of the fossil BEC. The origin of the growth of the population of stars in primordial galaxies is detailed in chapter (31).

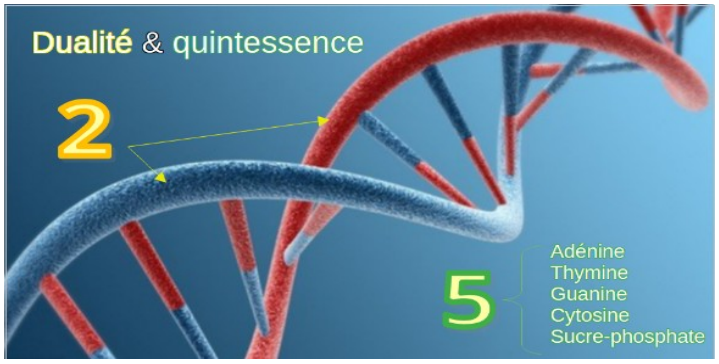

Fig.11 : DNA reproduces the 5 phases of mitosis-expansion and the universal duality that is consubstantial with the symmetry of Nature. The pair 2, 5 or DUO5, is found throughout this study within the framework of the Fibonacci sequence that characterized the original fractal mitosis.

Below is one of the many examples of the structural inheritance of the original fractal mitosis:

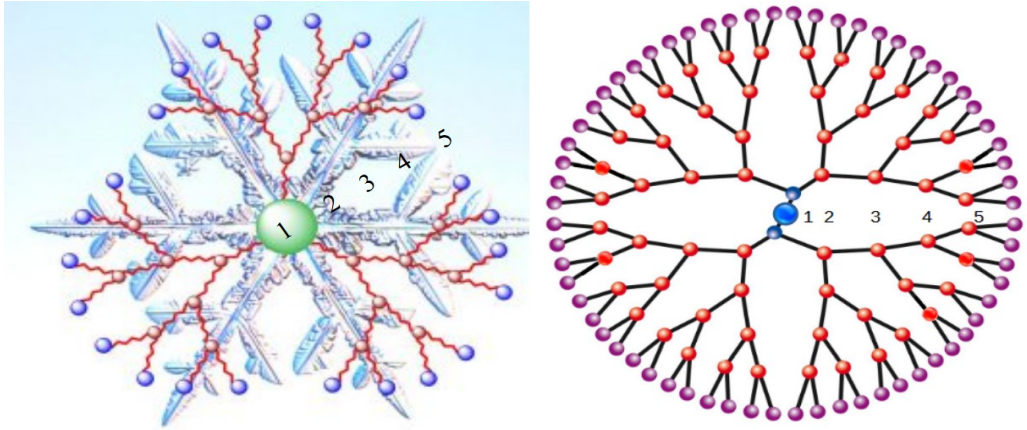

Fig. 12: A snowflake or a dendrimer molecule, reproduces the 5 phases of mitosis-expansion and the universal duality which are consubstantial with Nature.

The 5 phases of fractal mitosis are also found in:

- 5 universe scales: Omniverse→ BEC-fossil→ Expanding Universe→ Galaxy→ star.
- 5 B.O.D.Y.S phases: Symmetry→ Stochastic→ Synchronization→ Saturation→ Separation
- 5 forces: Strong; Coulomb; Weak; Severe; Subquantum Severe Component, g.
- 5 BEC scales: B.O.D.Y.S thickness (Planck length); Electron Compton length; Zero-point radius; B.O.D.Y.S string active length; BEC-child radius.
- 5 ratios: ξ = 1D mitosis; ξ^2 = 2D mitosis; $\xi 3$ = RBEC/ electron Compton length; ξ^4 = Coulomb/gravity ratio; $\xi^5 = R_{BEC}$ / Planck length.
- 5 senses of the animal kingdom: sight; hearing; smell; taste; touch.

Summary

9. Weak force and duality of locality

The standard model considers the decay of the neutron, according to the Feynman diagram. Under the action of the W gauge boson, an electron and an anti-neutrino are emitted.

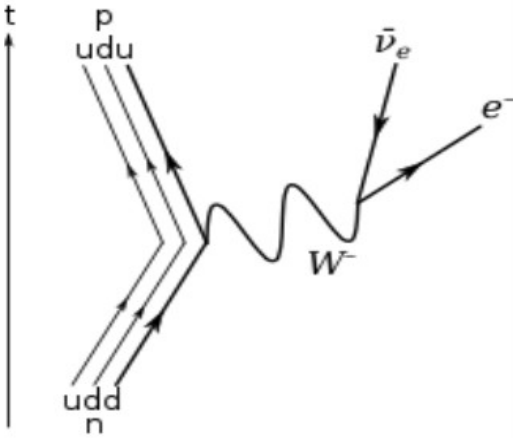

Fig.13 : This diagram highlights the switching of quarks, even though their masses represent only 1% of the proton's mass. It describes the effects but does not explain the causes. Feynman himself said, "Nobody understands quantum behavior." There is a confusion between "all localities are the same" and "nonlocality" with causal separation. This confusion leads to the inconsistency between the "creation" of an unstable electron-positron pair and the emergence of a single, stable electron that would be compensated by an antineutrino. The rule of conservation of leptonic number is a speculation to hide this inconsistency.

The Standard Model justifies the anti-neutrino by the empirical rule of the conservation of the leptonic number. This diagram does not give the physical explanations relating to the emergence of a single and stable electron and the origin of the neutrino and the W boson. Only the effects are described. The MS admits however that the neutrino can be of Majorana type, i.e., be its own "antiparticle". According to the DUO5 theory, the transition of the neutron into a (stable) proton is caused by the expulsion of its single electron (§10). The perturbation affects the symmetry of the coupled subquantum B.O.D.Y.S with emission of the W boson according to the relation (29), below. There are two assembly modes forming the composite particles:

- 1) The neutrino mode, of the 1D radial type, structured by two poles oscillating in radial opposition, like a B.O.D.Y.S, but on a quantum scale. It is characterized by the algebraic sum of the poles, which cancels out masses by symmetry.
- 2) The mode relating to quantum mass particles, of the 2D tangential fusion type. It is characterized by an arithmetic sum of the masses and a cancellation of the electric charges in the neutral part.

Below are the Feynman diagrams, adapted to DUO5 theory, for the tauon, the neutron, and the muon.

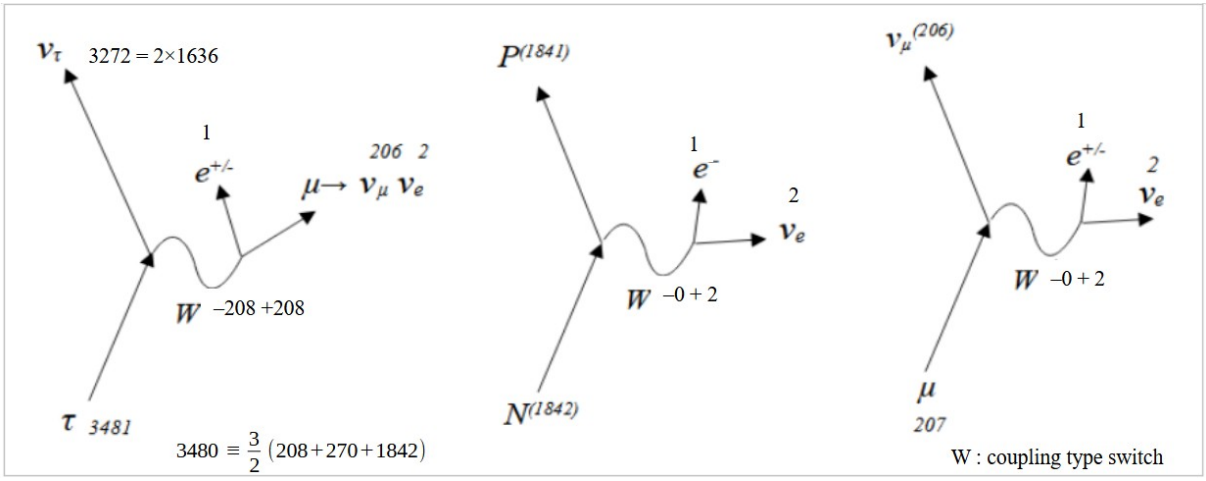

Fig. 14: According to table (8), the decay of the neutron and the muon generates a perturbation of the subquantum coupling which causes the stealthy transition of the W boson from the B.O.D.Y.S, according to relation (29). The W boson changes the coupling mode according to {stacked mass elements → opposite non-mass elements}. This transition extracts two subquantum poles in the form of the Majorana type electron neutrino, in which the cancellation of the masses allows a mediation at speed c. The alteration of spatial symmetry $\Delta\ell$ of the B.O.D.Y.S results in an extraction Δm. Perturbations can change the electron neutrino, by federating other dipoles and switching into neutrinos of other types. The relation (29) below reduces the energy transfer rate of W from ξ to $\sqrt{\xi}$, because the B.O.D.Y.S → particle coupling is of type 1D → 2D, according to chapter (10). The tauon diagram indicates that the 208 elements form an unstable muon that W switches into a stable, massless neutrino. The decay of the tauon is hybrid, because it can include quarks. This ambiguity comes from the fact that it has three modes of division into even numbers, while the others have only one.

The coupling factor ξ (§11) {particle ↔ B.O.D.Y.S} is the source of gauge bosons. In chapter 20 on the strong force, relation (44) indicates the precise cause of the furtive appearance of the W boson. For example, when the neutron decays, it modifies its coupling with the 1D B.O.D.Y.S. This reveals the energy relative to the reduced interval $\lambda o = \lambda e/\xi$ of the components of the neutral parts. This critical interval is inherited from the saturation of the fossil BEC, the cause of which is given by relation (43), (§ 17-3). Neutrons, protons and other composite particles are comparable to hollow spheres. Thus, the 1D →2D coupling results in an intensity diffusion of ratio $\sqrt{\xi}$. The mass of the W boson of relation (29) is consistent with its last measurement at the LHC in 2024 [23] i.e. 80.360(9.9) GeV.

$$W = \frac{2}{5}\sqrt{\xi} = 1{,}572676592317 \times 10^5\, uel = 80{,}3636088505\, GeV\,, \qquad (29)$$

We find the main Fibonacci numbers (2 and 5), relating to fractal mitosis, which all things have inherited. The mass of the Higgs boson, measured [24] at: 125.22(14) GeV, is given by (28) by the same type of subquantum extraction:

$$H^\circ = \frac{5}{8}\,\frac{1}{\sigma_P}\sqrt{\xi} = 2{,}4508371209 \times 10^5\, uel = 125{,}234519722\, GeV\,, \qquad (30)$$

With the proton dressing rate (§ 6) $\sigma_P = 1841/\,P = 1.0026399365$. Chapter 16 shows how the dressing is distributed between the single positron and the 1840 fused and neutral units. The 5

phases of fractal mitosis leave an omnipresent trace (§ 8), in the relations between the subquantum and quantum levels. The standard model has neglected the numerous proofs which show that duality is consubstantial with Nature. The duality of locality is expressed by the duality relative to the quantum ↔ subquantum coupling. The speed of subquantum B.O.D.Y.S is superluminal as shown by the extended causality of entangled particles [25] [26] [27].

Summary

10. Proton structure and 5 types of particles

Like all particles, the proton is intimately coupled with the B.O.D.Y.S structuring subquantum space-time. This coupling disrupts the symmetry of the B.O.D.Y.S by shortening their local amplitude $\Delta\ell$. This generates a curvature of space-time around the proton, as around any mass. But this curvature is not a geometric cause, but just an effect. The subquantum alteration $\Delta\ell$ is compensated by an injection Δm to the proton, according to $\Delta m.\Delta\ell = Cte$. This is the dressing rate of the proton which is revealed in table (8), namely: $\sigma_P = 1841/ P = 1.0026399365$. This (virtual) dressing rate is partly reflected by the Fermi sea, observed within the proton. Thus the neutral part of the 1840 units (electron-positrons) fused, are less massive than the free electron taken as a unit to specify its mass P = 1836.15999, in electron units. Below figure (15) revisits beyond the standard model, the Feynman diagram of figure (13):

10-1.Neutron → proton reaction:

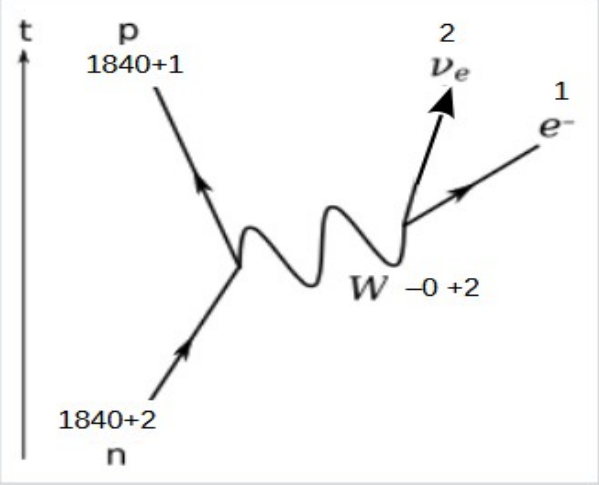

Fig. 15: According to chapters (6, 7, 8, 9), the neutron contains 920 electron-positron pairs fused and electrically neutral. It is formed of 1840 units to which is added the single electron-positron pair. The W boson emits a pair of opposite poles to form the neutrino in which the opposite masses cancel each other out as in a B.O.D.Y.S. The single electron is ejected and its positron is kept in the proton. The W boson (representing the coupling with the B.O.D.Y.S) is the furtive response of the subquantum level, to the disturbance caused by the modification of the neutron.

The 1840 neutral units of the neutron are conserved in the proton. The electron of the lone pair is ejected and the positron is conserved in the proton. The W boson extracts two neighboring poles, delocalized and opposite, to form the electron neutrino.

10-2. The 5 structural modes:

1) Subquantum B.O.D.Y.S: The origin is the inertial paradox. Two 1D poles oppose each other and cancel out all physical parameters. But if the spatial symmetry is perturbed $\Delta\ell$, it emits a Δm at the quantum level.

2) Quantum NEUTRINO: The origin is an n → p perturbation. Depending on the case, 2 to n 1D poles oppose each other and cancel out all physical parameters. But if the spatial symmetry undergoes a $\Delta\ell$ perturbation, it reveals a Δm proportional to the degree of perturbation. The number n varies depending on the perturbations encountered.

3) Stable 2D composite mass PARTICLE: The origin is the fusion between neighboring opposite poles causally separated from their respective B.O.D.Y.S. The type of bond is no longer opposition but radially stacked fusion. Only the charges are masked. The symmetry is internal, without appearing as a pair as it does locally.

4) Unstable 2D composite mass particle: the origin is a local emission $\hbar$, ν, with ν calibrated at n ν_o, the frequency of a B.O.D.Y.S. The instability comes from the relocation of the poles of the same B.O.D.Y.S. The external symmetry results in two opposing entities that annihilate each other.

5) PHOTON: the origin is a local emission $\hbar$, ν, with ν as a spectrum of sub-harmonics of the B.O.D.Y.S. frequency ν_o.

The following table summarizes the 5 types of particles.

Parameters	B.O.D.Y.S (préon)	NEUTRINO electronic	PARTICLE stable	PARTICLE unstable	PHOTON
Origin	dipole solution to the inertial paradox	subquantum extraction with the W boson	opposite poles neighbors of different B.O.D.Y.S	opposite poles of the same B.O.D.Y.S local energy emission	local energy emission $\hbar$, ν, with ν, subharmonic of the ν_o (electron)
Modality	2 poles in opposition cancel the masses	2 poles in opposition cancel the masses	staking of pairs that cancel out electric charges internal symmetry	staking of pairs that cancel out electric charges external symmetry	2 frequencies in opposition which cancel the mass fraction
Stability	yes if not disturbed	yes if not disturbed	yes except partial cancellation of dark matter	no, because relocation and annihilation	yes but the frequency decreases as a function of expansion
States	$m_0\|Ł(S)\rangle$	$m_0\|S(Ł)\rangle$	$m\|S(Ł)\rangle$	$m\|\hat{S}(L)\rangle$	$\nu\|S(Ł)\rangle$
Symbol	$m_0 : \sum m = 0$; Ł = non-locality ; L = locality ; S = stability ; $\hat{S}$ = instability ; ν = frequency < ν_e				

Tab. 16: Summary of the physical parameters that distinguish 5 types of particles. The W boson makes the transition according to relation (29), excluding gauge bosons and dark matter (§12).

The following artist's impression shows a neutron made up of 4 neutral groups + an electron-positron pair. This pair oscillates between the 4 neutral groups which polarize 3 intervals, forming the 3 quarks u,d,d. Just after the original radial causal separation (or inflation), all the protons had a collective probability of 50/50 that the single electron would be placed at the

periphery, offering the positron a more stable place. Figure 6 shows how the polarization games caused the neutron to always eject its single electron. Ordinary, stable matter is not concerned by antimatter since the antiproton only has a (furtive) existence in local experience. Quarks are not components but just inductions that take shape in confinement. This is consistent with the fact that free quarks are unstable. Fractional charges are divisions of the single positron charge. Relation (24) shows that the proton results from the tangential fusion between neighboring poles. Thus this type of fusion adds the masses arithmetically, unlike the radial and algebraic addition of the B.O.D.Y.S, which cancel the masses.

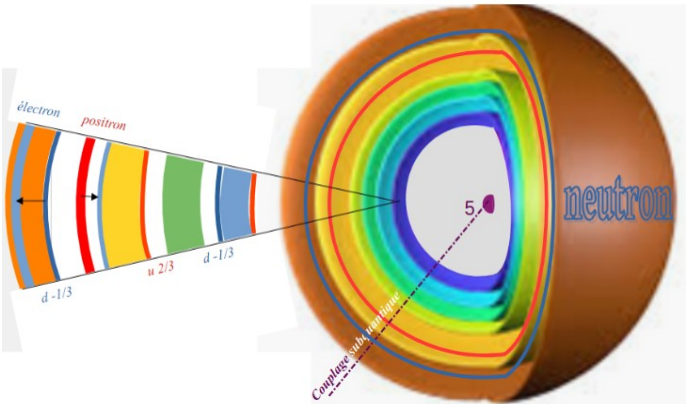

Figure 17 : Artist's drawing of a neutron consisting of 4 neutral groups with a single electron close to the edge and a single positron more centered. The negative (d) quark tends to repel the electron outwards and the positron inwards. Electron-positron pairs are in spherical wave-particle hybrid form. Thus the 1D → 2D subquantum coupling results in the factor $\sqrt{\xi}$.

Due to the oscillations between the "electron-wave" layer and the "positron-wave" layer, the neutron presents an instability which results in the ejection of the electron. Below is an artist's drawing showing the internal structure of a neutron:

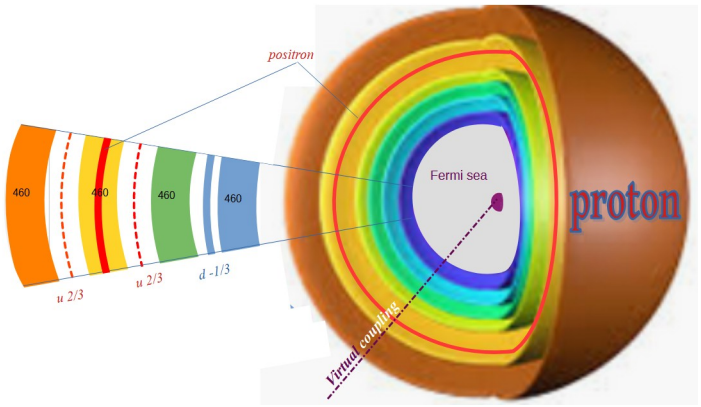

Figure 18: Artist's drawing of a proton from the neutron that has lost its peripheral single electron. The proton's single positron is located between two positive inductions (u, u) that push it back to a stable, central position. It is the radial oscillation of the positron that generates the quarks. The fact that they are unstable in the free state is consistent with their internal stable induction.

The positron finds stability between the polarizations (quarks) of the 3 intervals formed between the stacks of neutral layers.

10-3. Proton → neutron reaction:

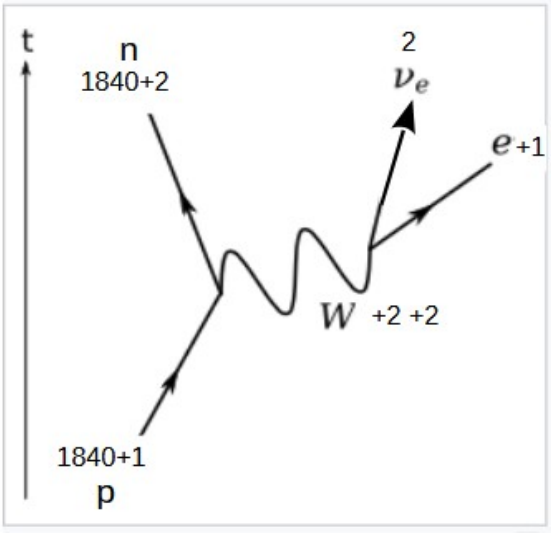

Fig.19: Consistent with chapters (6, 7, 8, 9), the proton contains 920 electron-positron pairs fused and electrically neutral. This gives 1840 units + 1 single positron. The W boson (vector of the coupling with the subquantum channel) extracts 1 pair as poles of B.O.D.Y.S in the framework of subquantum nonlocality. At the same time, it emits a pair of opposite poles to form the neutrino in which the opposite masses cancel each other out as in a B.O.D.Y.S. The single electron is ejected and its positron is retained in the proton. The W boson has modified the type of binding of the neutron lone pair, in which only the charges are neutralized in a mode where, in addition, the moments of inertia are neutralized.

10-4. Abnormal neutron → proton reaction:

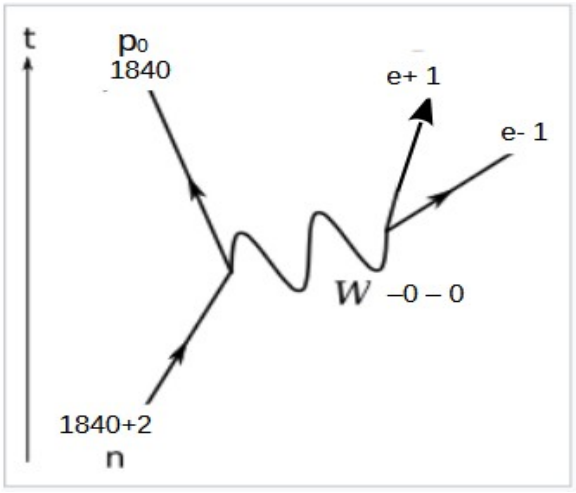

Fig. 20: The enigma of baryon number violation may be a consequence of this reaction, in which, for example, the neutron releases its lone pair. The transition occurs via the W boson, which, unlike in general, renders the pair unstable.
The W boson relocates the stable pair emitted by the neutron, rendering it unstable.
This reaction reduces the mass of the proton which becomes a candidate for dark matter as suggested here [28]. See chapter 12.

The proton thus reduced to P_o, could lose its harmony and be a candidate for dark matter as suggested in this publication [28]. Chapter (31) develops other possibilities with a W(+0, +970) emission which would correspond to mesons like the kaon.

Summary

11. Cosmic ray, subquantum mining

Within a galactic black hole, the very high density tends to bring the neighboring poles of subquantum B.O.D.Y.S closer together. This produces the same phenomenon as on the saturated fossil BEC. The fusion of the poles masks their charges and breaks the radial link of the B.O.D.Y.S. The poles are extracted with the factor ξ, because the transfer is without change of dimension (1D → 1D). This is different from the extraction of the W boson which diffuses in the 2D spherical proton, according to $\xi \rightarrow \sqrt{\xi}$, according to the weak force process

of chapter 9. The electron-positron pairs fuse into proton P and give the measured energy of cosmic rays [29] : $w_{max} = 3{,}2\times10^{20}$ eV :

$$w_{max} = \frac{11}{5}\xi P = 6{,}24439\times10^{14}\ ue = 3{,}19088\times10^{20}\ eV\,, \qquad (31)$$

In which we still find the factor 5 relating to the 5 phases of fractal mitosis, §8, because all quantum or cosmological phenomena are inherited from fractal mitosis.

Summary

12. Dark matter, partial causal relocation

In line with the consequences of the inertial (and therefore existential) paradox that led to the "dipole oscillator" form of stochastic B.O.D.Y.S synchronizing in the fossil BEC, a generalized causal separation took place. This causal separation occurred in the radial axis of the fossil BEC, because of its saturation. The reduction of the tangential elementary interval produced the generalized fusion of neighboring poles (chapter 17-3). The masking of electric charges, relative to the fusion, broke the radial link of (almost) all the poles present on the area of the fossil BEC. The breaking of the radial link allowed the poles to be freed from their causal link. This liberation revealed all their physical parameters [M, L, T, Q]. Thus the radial delocalization was compensated by the tangential relocalization. This relocation is required by the inertial paradox which prohibits a definitive causal separation of the poles. Thus the development of the fusion took place according to chapter (8), within the framework of the expansion caused by the final speed of the poles no longer being able to turn back. Mass packets in the process of being formed saw their intervals increase. Eventually the galaxies were formed. Angular gaps separated them. Then gravitation proceeded to progressive relocations by causing collisions of galaxies.

12-1. Galaxy collisions : Galaxy collisions partially relocate elements of masses separated tangentially by small angles relative to their original position (fig.39). If it were a meeting of masses whose expansion is diametrically opposed (angle π), the annihilation would be total (binary), as experienced locally. But this is not the case, because the collisions occur between galaxies whose neighboring origins on the BEC-fossils are separated by only a small angle ($\varphi << \pi$). This small relocation distorts the harmony of electrons which can no longer form protons and therefore visible matter. The protons thus degenerated are no longer identifiable by their emission at 21 cm. Below is figure (19) which shows the principle of fractal mitosis which generates at each of the 5 ranks, a speed c, oriented in all directions.

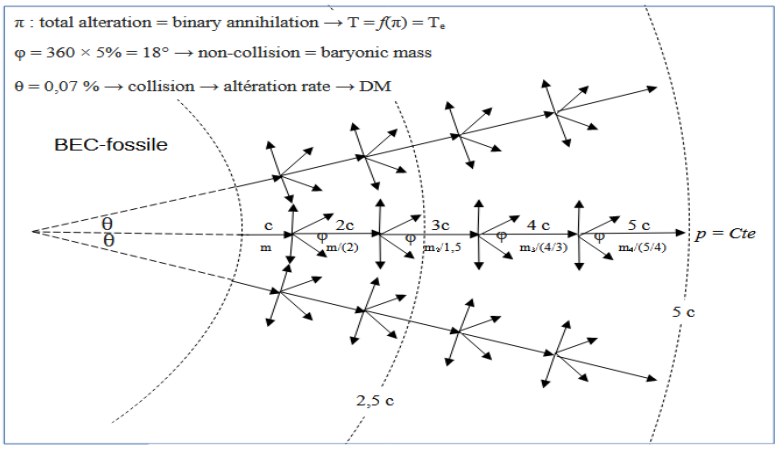

Figure 21 :Partial annihilation by galaxy collisions. If the angle is π, the annihilation is total, as for a locally emerging electron-positron pair. But during fractal mitosis-expansion, the angles of causal separation of neighboring galaxies are small. The annihilation is not binary, but alters the integrity of matter elements at a rate that depends on the angle. This is the key to dark matter, which is just degenerate matter.

12-2. DM within black holes :The emission of cosmic rays, deflected by magnetic forces, can recombine at low angles and form dark matter.

12-3. DM in the Sun : On a smaller scale, the emission of cosmic rays can recombine under the magnetic effect of the spicules, to partially annihilate by generating heat proportional to the angle[30], according to figure (20) below. For an average magnetic spicule width of the order of 700 km, we obtain with the radius of the sun (R= 4×10^9 m), the tangent of an angle which gives a temperature ratio with that relating to the annihilation of the electron, which is consistent with the measurement, i.e. approximately 1 million degrees.

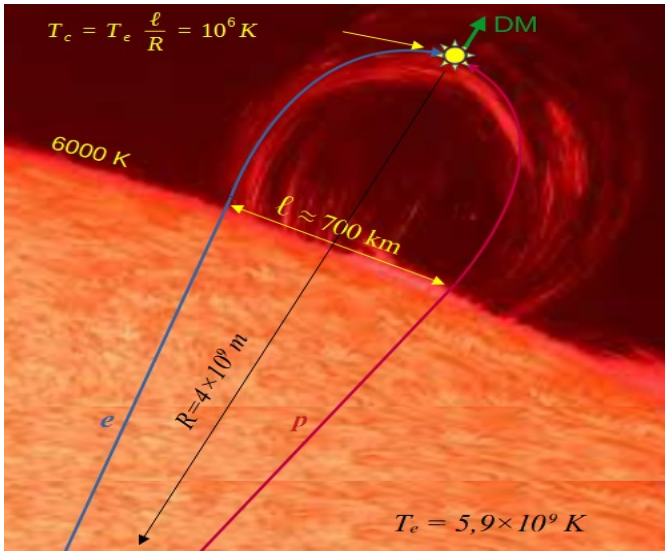

Fig.22: Artist's rendering of a solar magnetic spicule. Cosmic rays are emitted from the center. They are deflected by the magnetic field of the spicule, whose active size is approximately: ℓ = 700 km.
The tangent of the annihilation angle, l/R, gives the temperature ratio to that of total annihilation of electron-positron, i.e., T_e = 5.9×10^9 K. With this ratio, the annihilation temperature is given as Tc = 10^6 K. This is consistent with the measured million degrees, which poses a puzzle to the Standard Model.

12-4. Temperature of galaxy clusters: It also seems to have the same ratios between causal separation angle and temperature. Indeed, if the average cluster has: 1) a diameter of D = 3×10^{23} m (10 M parsecs); 2) an average distance from the fossil BEC of R = 7 Gyl, then its annihilation angle: D / R = 0.005, which gives an average temperature of 3×10^7 K, which is consistent with the measurement of the Chandra cluster [31]. In line with the requirements of the inertial paradox, repeated assaults of partial relocations by collisions will end in a total relocation. This is consistent with the clouds of dark matter, observed during galaxy collisions

[32]. At each stage of partial relocation by collisions, the annihilation rate increases. Eventually, the relocation becomes complete and ensures the return to the stochastic state of the Omniverse.

Summary

13. Gravitation and causal separation

The Standard Model neglected the following relationship which indicates the ratio ξ^4 between the Coulomb and gravitational forces, with a numerical precision of 7σ, according to Chapter (8).

$$\xi^4 = \frac{\left(-\frac{e^2\alpha}{4\pi\epsilon_o}\right)}{-G\ m_e^2} = 5{,}7099913695277 \times 10^{44}, \qquad (32)$$

Below, the figure shows how gravitation on the fossil BEC was born, following the radial causal separation of the opposite poles.

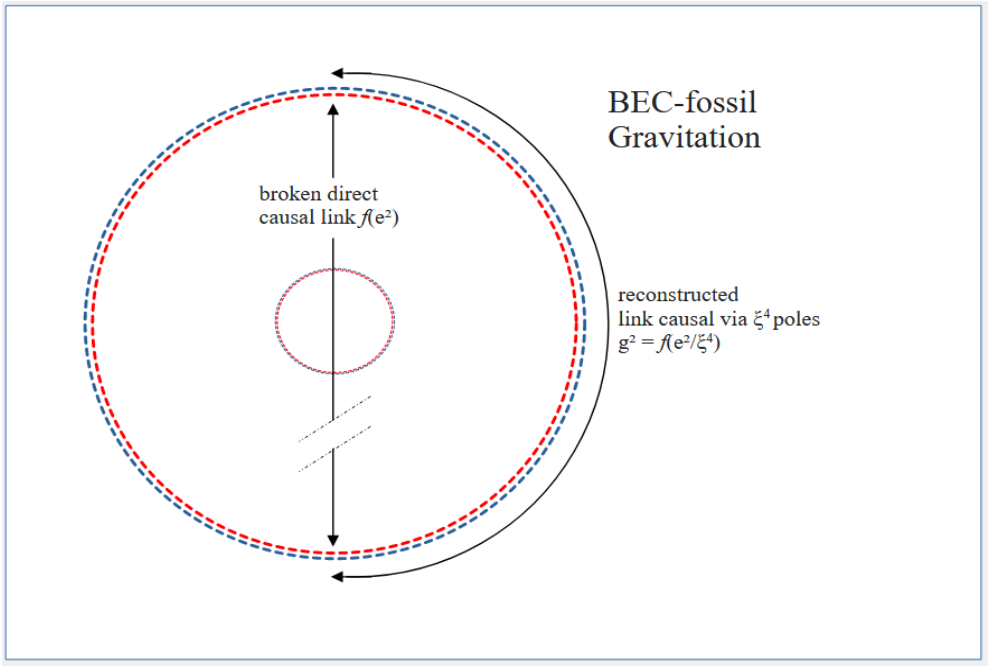

Fig. 23: The fusion of the poles, relations (40, 41, 42, 43), masked the charges that connected the opposite poles on the fossil BEC. This masking broke the radial link between each opposite pole. But the causal link of each pole is reconstructed tangentially via the ξ^4 poles present on the half circumference of the fossil BEC. The square of the unit elementary charge e^2, is divided by the number of poles or $g^2 = e^2/\xi^4$. The gravitational force is of Coulomb nature.

Relations (2, 3, 4) clearly indicate that the square of the elementary charge is relative to $\Delta m.\Delta \ell$ and therefore: $F_C = f(Q^2) = f(m.\ell)$. Thus the gravitational force $F_G = G\ m^2/r^2$, which is analyzed as [M L T^{-2}], returns to $FG = f(M.L/\xi^4)$ by considering the time $T = f(\ell)$ as proportional to the amplitude ratio of the oscillation. The standard model neglected relation

(32) and the following relations, which indicate that the gravitational constant G, is given by the parameters of the electron (ex-pole). As ξ^4 is determined at 7σ, with relations (24 and 25), the same is true for the constant G.

$$G = \frac{\lambda\!\!\!^{-}_e \, c^2}{\xi^4 m_e} = 6{,}672420680585 \times 10^{-11}\ m^3 kg^{-1} t^{-2}, \qquad (33)$$

This numerical value is lower than that recommended by CODATA (6.674×10^{-11} m³ kg^{-1} t^{-2}). The following figure shows that the measurements of Newton's constant G vary over time [33]. CODATA has arbitrarily chosen to take the average value of the different measurements. Below the variation of the measurements indicates that it is not a regular cycle but rather a sporadic variation.

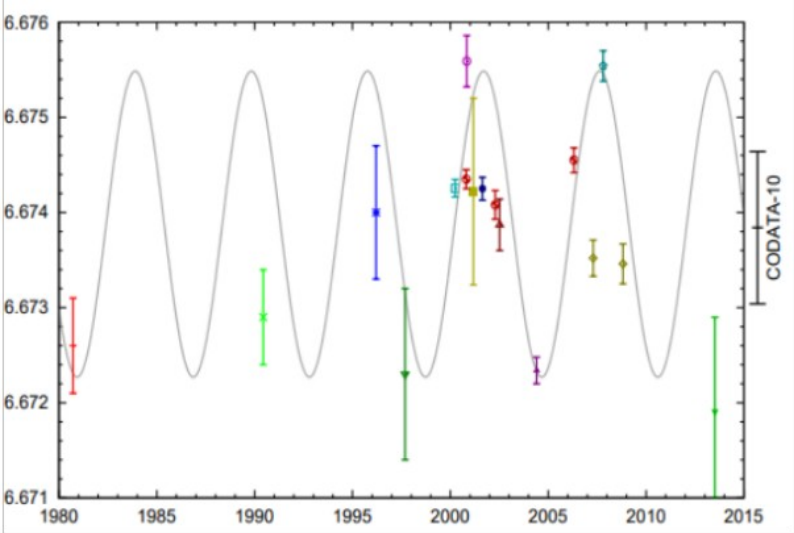

Fig. 24: Since the physical disturbances that cause these variations are unknown, it seems prudent to consider other options than the average. For example, the low values measured at 6.672×10^{-11} m³ kg^{-1} t^{-2}, correspond to the reference value (excluding disturbances).

It is widely proven that the inertial component of masses is constant. Chapter 11 indicates that a part of the cosmic rays recombine in galaxies and partially annihilate to form sporadic bursts of dark matter. It is possible that these random bursts have a subquantum impact which would disturb [34] [35] the gravitational component of masses. In any case, relation (32) is guaranteed by the very high precision to 7σ, of the factor ξ, determined by relations (24, 25).

Summary

14. Synchronization and saturation of the fossil BEC

14-1. Synchronization: the synchronization flow meets three requirements, for each stochastic B.O.D.Y.S:

1) merge into a common "zero point";

2) share a common phase;

3) share a common frequency.

Their synchronization is based on a self-influenced pooling of phase, frequency and the fusion of zero points. The generalization of synchronization tends to form a fossil Bose-Einstein condensate [36]. The cosmic, one-dimensional, fossil BEC discussed here is different from the classical cosmic BEC described in the "Expanding Universe Bubble" state [37] [38]. The Gross-Pitaevskii equation, the gravitational and relativistic aspect and the notion of inflation do not yet exist, because this is the precursor BEC. The time-independent form of the Gross-Pitaevskii equation is:

$$\left(\frac{\hbar^2}{2m}\nabla^2 + V_{ext}(r) + Ng|\Phi(r)|^2\right)\Phi(r) = \mu\Phi(r), \qquad (34)$$

Where Φ is the wave function of a single particle of mass m. This equation is constructed by considering a number N of ultracold bosons in an external confining potential V_{ext}, interacting with an internal potential depending on the interval between two bosons. This gives the Hamiltonian with $V_{int}(|r_i - r_j|)$:

$$H = \sum_{i=1}^{N}\left(\frac{P_i^2}{2m} + V_{ext}(r_i)\right) + \frac{1}{2}\sum_{i\neq j}^{N}(|r_i - r_j|), \qquad (35)$$

The fossil BEC, immersed in the Omniverse (without mass-space-time continuum), has no external confinement potential. According to DUO5 theory, confinement is ensured (§4) by the binding force between the poles, $F = f(\sqrt{\Delta m}.\Delta\ell \times \sqrt{\Delta m}.\Delta\ell')$ according to:

$$F = \frac{e^2\alpha}{4\pi\epsilon_o\lambda\!\!\!^{-}_e} = \frac{m_e\lambda\!\!\!^{-}_e}{t_e^2} = \frac{m_o\Lambda}{t_e^2} \qquad (36)$$

with $\Lambda = R_{BEC}/\xi^2$, and mo the mass leaving the common zero point. The link: $e^2 = f(m.\ell)$ of relation (4) is confirmed for the electron, ex-pole of B.O.D.Y.S.

14-2. Saturation of the BEC-fossil : Chapter 17-3 details the saturation process of the fossil BEC. Figure 3 of Chapter 4-2 shows that the radial elementary interval between layers is constant, because Δv Δt = Cte, with the upper limit at the zero point: $c_o\, t_P = \lambda\!\!\!^{-}_e$, which is the Compton length of the electron. On the other hand, the tangential elementary interval is variable. From the common zero point (Planck length ℓ_P), it increases by the factor ξ at the radius of the fossil BEC, where the critical interval is given at: $\lambda\!\!\!^{-}_o = \xi\,\ell_P$. Now Chapter (17-3) shows that this critical interval allows the Coulomb force to merge the neighboring poles during the short stopping time on the area of the fossil BEC. This interval anisotropy is the cause of mitosis (§8-2) of factor ξ^2 in 2D. This amounts to ξ^2 BEC-son whose elementary intervals are perfectly isotropic. According to relation (63), the radial causal separation,

revealing the mass $\mathcal{M} = m_e\, 2\xi^8/\alpha^2$ of the poles of B.O.D.Y.S on the BEC-fossil, has been relocated in the tangential axis on the surface of its area. Relation (32) and figure 18, indicate that ξ^4/α poles are distributed on the circumference of the BEC-fossil. This means that the unitary Coulomb force is divided by ξ^4/α through the number of ξ^4/α poles, which is the source of gravitation.

Summary

15. Space-time, structure and mediation

According to DUO5 theory, spacetime is not a mathematical being. Its geometry is not a cause but an effect. DUO5 theory is close to John Wheeler's geometrodynamics in some respects. First, there is a single source between matter and spacetime. Second, the mediation of forces does not need a boson, because there are just successive compressions of spacetime. Bosons are only effects and not causes. According to DUO5 theory, spacetime is a physical being structured by B.O.D.Y.S. included in entangled BECs. Relation (24) (§ 8-2) shows that the fractal mitosis of the fossil BEC is hybrid because it produced: a) ξ^2 entangled BEC-sons forming spacetime; b) $2\,\xi^2/\alpha^2$ expanding matter elements. These two categories have the same elementary origin, the B.O.D.Y.S. As far as matter is concerned, these are the poles of B.O.D.Y.S which were causally separated on the area of the BEC-fossil.

15-1 : Distribution of BEC-sons : The ξ^2 BEC-sons are grouped in two ways: 1) ξ^2 of them occupy intergalactic space; 2) $\xi^2 - \xi^2/\alpha^2$, form halos around galaxies. Chapter (21) details the quantum impact of the internal radial deceleration γ_o of each BEC. Therefore, there is a binding force between each entangled BEC.

15-2 : The inter BEC-sons link force : Chapter (21-1) shows that there is a small constant gravitational component at the subquantum scale of BECs. This centripetal acceleration γ_G is about 70 times greater than γ_o. Thus, the BECs forming halos around galaxies, strongly bound, do not participate in the expansion. Chapter (21-2) indicates that the positive acceleration relative to expansion γ_{exp} is 11 times stronger than γ_o, the negative acceleration of intergalactic BECs. However, Chapter (12), on dark matter, indicates that some intergalactic BECs may contain dark stars, thus increasing their ability to resist expansion. These dark stars are responsible for the widely observed gravitational zooms.

15-3 : mediation of forces: Chapter (23) details the inseparable coupling between an electron (or positron) and a subquantum B.O.D.Y.S pole. As indicated above, the mode of mediation of forces is strictly linked to the coupling {quantum ↔ subquantum} and to

transfers of the type: $\Delta m.\Delta \ell = Cte$. A bit like John Wheeler's geometrodynamics, the perturbation created by a force amounts to altering the symmetry of the B.O.D.Y.S poles. This compression propagates at the speed of light, according to figures (33, 34) (§ 22-2). This is the physical explanation of the "curvature of space-time" effect, proposed by Einstein's geometric model. The photon is not the cause of the mediation of electromagnetic forces, but just an effect. The elementary physical structure of space-time that arises from the inertial paradox is the B.O.D.Y.S.

Summary

16. Intrication and moment anomaly of electron

Chapter 8-4 proposes a calculation that reaches a numerical occurrence at 7σ, with the measure αe = 1.00115965218053, for the electron. This calculation is based on the incidence of the universal coupling rate ξ, between the quantum and subquantum scale. According to the law resulting from the inertial paradox, $\Delta m.\Delta \ell = Cte$, the electron is “dressed” by a subquantum ⟶ quantum transfer = $+\Delta m$. This $+\Delta m$ contribution reduces by $-\Delta \ell$, the Compton length to its measured value, i.e. ƛe. But the flow rate at the subquantum scale, $-\Delta m$ brings a credit to the amplitude: $+\Delta \ell$. The non-locality of entangled particles [8], clearly indicates that the magnetic moment is coupled at the subquantum scale. Thus the effective length of the magnetic moment ƛeo, is greater than the Compton length $ƛ_e$, according to: $ƛ_{eo} = ƛ_e + \Delta \ell = ƛ_e\, \alpha_e$. This relationship comes from:

$$\mu_e = -\frac{e\ \alpha_e\ \hbar}{2 m_e} = -\frac{e\ \alpha_e\ ƛ_e\ c}{2} = -\frac{e\ ƛ_{eo}\ c}{2} \qquad (37)$$

In the second relation, the replacement of the Planck constant by its components causes the electron mass to disappear, whose $+\Delta m$ dressing compensated for the $-\Delta \ell$ reduction in the Compton length. This anomaly confirms the DUO5 theory, based on the law: $\Delta m.\Delta \ell = Cte$. The proton dressing rate, (§10) $\sigma_P = 1841/P = 1.0026399365$, is composed on the one hand of that of the single positron (α_e =1.00115965218053) and on the other hand of that of the 1840 fused and neutral units. We obtain the weak coupling contribution, relative to the fused pairs σ_{pn}:

$$\sigma_{pn} = (\sigma_p - 1) - (\alpha_e - 1) = 0{,}0014802843828 \qquad (38)$$

The fusion into proton and neutron brings each of the 1840 neutral units to this unit dressing rate:

$$\sigma_{fus} = \frac{\sigma_{pn}}{1840} = \frac{1}{\pi \sqrt{\xi}} - \frac{\delta \alpha}{4 \xi} = 8{,}045030(6) \times 10^{-7} \qquad (39)$$

With δ = 23 seen in chapter (7). This relationship, specified at 7σ, indicates that the fusion of the electron-positron pairs forming the neutral group of the proton, has reduced their dressing rate and therefore their unit mass.

Summary

17. Inflation and causal separation

The Standard Model envisions a phase of superluminal inflation at the origin of the observable universe. This inflation phase is proposed to resolve the incompatibility between the horizon problem and the cosmological principle. There is also the flatness problem related to Friedmann's mathematical models, which speculate on the appearance of the universe without spatial curvature.

17-1. Spatial Curvature : This topic is covered in more detail in Chapter 29. DUO5 theory distinguishes two types of spatial curvature:

- Locally, the presence of inertia alters the symmetry of the B.O.D.Y.S forming spacetime. This causes a geometric curvature that is the consequence of the alteration of spatial symmetry $\Delta\ell$. According to the law $\Delta m.\Delta\ell$ = Cte, this $\Delta\ell$ results in an emission Δm towards the masses responsible for the perturbation. This alteration of spatial symmetry generates a spatial curvature that is a consequence and not the cause of a particular geometry.
- Overall, all BEC-son forms a Euclidean geometry whose radius of curvature is verified as positive (§28 and §30). Indeed, the inertial paradox requires that the causal separation that brought about the poles forming matter must necessarily relocate to cancel all the masses. This is the role of gravitation which, after optimal expansion, implies a general return to relocate all the elements of matter and cancel them. The mediation of forces involves the successive deformations of the B.O.D.Y.S of space-time, a bit like the geometrodynamics of John Wheeler §27.

17-2.The concept of inflation: The inflation of the Standard Model is a mathematical being invented to solve the enigma of causality and the horizon. It turns out that the DUO5 theory naturally implies an inflation phase that results directly from the operation of the fossil BEC. Explanation: according to (§14), the fossil BEC, before saturation, has ξ^3 layers of B.O.D.Y.S poles that oscillate between the common zero point and the cusp. Each of the layers has ξ^8 poles, or a total of ξ^{11} poles. Each oscillation cycle occurs in time $t_e = \lambda\!\!\!^{-}_e /c$. Figure (3) shows that the radial interval between layers remains constant. It is fixed at the Compton length of the electron, or $\lambda\!\!\!^{-}_e$. On the other hand, synchronization saturation leads to reducing the tangential interval by the factor ξ. It is shown below that this critical interval when stopping at the cusp point on the area of the fossil BEC, causes the

neighboring poles to merge and mask their charges. This causes a radial causal separation which amounts to the layer concerned undergoing an inflation from co to c leading to expansion. The area of the common zero point contains $2\xi^8$ poles each and separated by the Planck length. Thus the speed compensating the mass, the momentum is constant. The first layer to reach the critical tangential interval, exceeds the area of the fossil BEC at the speed c. The poles of B.O.D.Y.S forming the fossil BEC, oscillate in layers from the common zero point, to the cusp point, according to the ratio ξ. The elementary interval tangential to the common zero point, is the Planck length ℓ_P. This interval increases by the factor ξ at the cusp point to reach $\lambda\!\!\!^{-}_o$. On the other hand, the radial elementary interval remains constant, at the Compton length of the electron. The anisotropy of the intervals, by the factor ξ in 1D, is the cause of the BEC instability.

17-3. Saturation of BEC-fossil: during the pole crossing, the elementary tangential intervals between poles are maintained by the Lorentz repulsive force.

$$F_L = \alpha \frac{\mu_o i^2}{4\pi} \frac{\Delta\ell_r}{\Delta\ell_t} \qquad (40)$$

With the ratio anisotropy $\Delta\ell_r/\Delta\ell_t = \lambda\!\!\!^{-}_e /\lambda\!\!\!^{-}_o = Cte = \xi$ (radial gap / tangential gap). Inflation (which precedes expansion), is the last oscillation before causal separation. Causal separation is caused by the fusion of neighboring poles on the fossil BEC, which masks the charges radially linking the poles. Fusion is caused by the gap reduction at the cusp point, which allows the action of the Coulomb force F_C, between neighboring poles. This is possible in the short stopping time at the cusp point $t_a = t_e /\xi$. The elementary tangential surface facing each pole is: $s = \lambda\!\!\!^{-}_e \times \lambda\!\!\!^{-}_o$.

$$F_C = -\frac{e^2}{4\pi\epsilon_o s} \qquad (41)$$

With $F_C + F_L = 0$, but F_C active only when stationary. Acceleration is given by:

$$\gamma = -\frac{F_C}{m_e} \qquad (42)$$

This acceleration allows fusion because it covers the reduced tangential interval, $\lambda\!\!\!^{-}_o$, in the stopping time, t_a.

$$\lambda\!\!\!^{-}_o = \gamma t_a^2 \qquad (43)$$

The tangential fusion between neighboring and opposite poles masks the charges, which breaks the radial link of each B.O.D.Y.S. The expansion of the Universe is the consequence of the final speed of inflation, reduced to c. Figure (23), shows that gravitation was born tangentially to compensate for the radial causal separation. This is also a consequence of the inertial paradox which requires a definitive non-separation of the poles of B.O.D.Y.S.

Summary

18. Fusion and annihilation

Chapter (17-3) shows how the saturation of the fossil BEC caused widespread tangential melting, by abruptly masking the charges.

blending mode	local	no-local	mass
tangential symmetry mode	unstable proton antiproton	stable internal proton	yes
radial example		stable neutrino	no

Tab. 25 : At the non-local origin, fusion in tangential mode arithmetically adds the masses of electrons and positrons to form protons whose symmetry is internal, via the majority neutral part. During local emergence, the causal non-separation makes the opposite masses unstable. The non-local and radial emergence of the neutrino adds its poles in algebraic mode.

This abrupt masking of the charges generated a d_e/d_t^2 which furtively radially relocated the poles, thus creating a generalized annihilation of factor α (in 1D). But relation (23) indicates that the synchronization was done with an error rate which generated a dispersion of the amplitudes of the B.O.D.Y.S, leading to a non-smooth area of the BEC-fossil. It includes "bumps" which are beyond the radial causal link between poles of the BEC-fossil. The total surface of these bumps is worth $1/\alpha^2$ of the total surface of the BEC-fossil, or $1/\alpha$ in 1D. Relations (3, 4) testify to the ratio α, between the classical radius of the electron and its Compton length. The annihilation widened the tangential intervals of the α factor in 1D and then in α^2 in 2D during mitosis, as indicated by relation (24). The original mass survived from the observable universe is given as: $\mathcal{M} = \text{me } 2\ \xi^8/\alpha^2$. It is compatible with current estimates (including DM), i.e. ~ 3×10^{55} kg. The fusion occurred in 5 phases, according to relation (24). The masking of the electric charges broke the radial causal link of the B.O.D.Y.S poles of the layer that reached speed c on the area of the fossil BEC. This is the cause of the expansion.

Summary

19. Expansion mitosis universe

The standard model rightly rejects the idea that the universe can have a center, as a predetermined absolute value. The entire DUO5 theory shows that duality is consubstantial with Nature. Thus, if the Omniverse does not actually have a center (nor a mass-space-time continuum), the observable universe does, represented by the fossil BEC. Chapter (28) indicates that the trace of the fossil BEC is observable on the Eridanus side and Chapter 21 proposes a calculation of the acceleration. This acceleration of the expansion, measured locally (in the cosmological sense), is strictly compensated by the deceleration of the leading layers. The expansion is not global. This reasoning has no chance of justifying the origin of

this accelerating energy. It is contrary to the idea of a symmetry between the gravitational potential and the sum (mass energy + kinetic energy) of the expanding masses. This is the flaw in the self-reference of mathematicians, who accept infinite and absolute values for physical parameters. It is shown below that the average value of the expansion at 2.5 c is slowing down. But for an observer located in a lower expansion layer, the expansion accelerates towards the attractor of the middle layer which is slowing down, under the effect of gravity. For this to happen, an inter-BEC force must radially connect all intergalactic BECs. Chapters 19 and 30 describe in detail the existence of this 5th force.

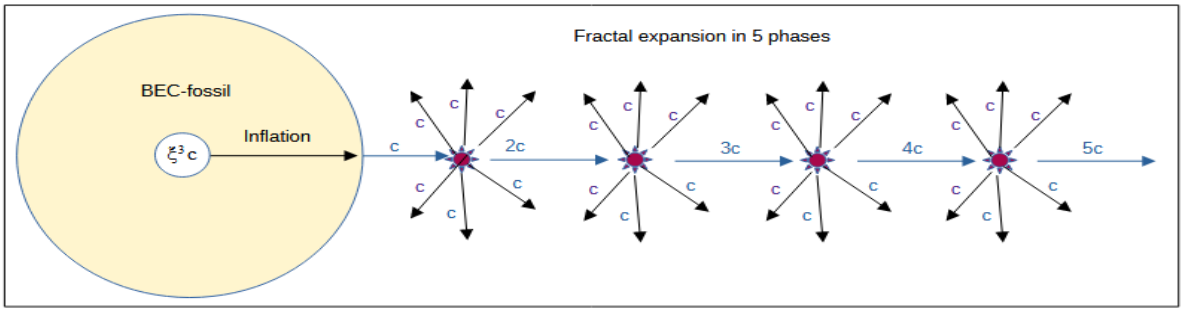

Fig. 26 : The fractal aspect of mitosis-expansion generated velocity layers from 0 to 5c. The middle layer at 2.5c is an attractor. This fractal progression explains the numerous galaxy collisions.

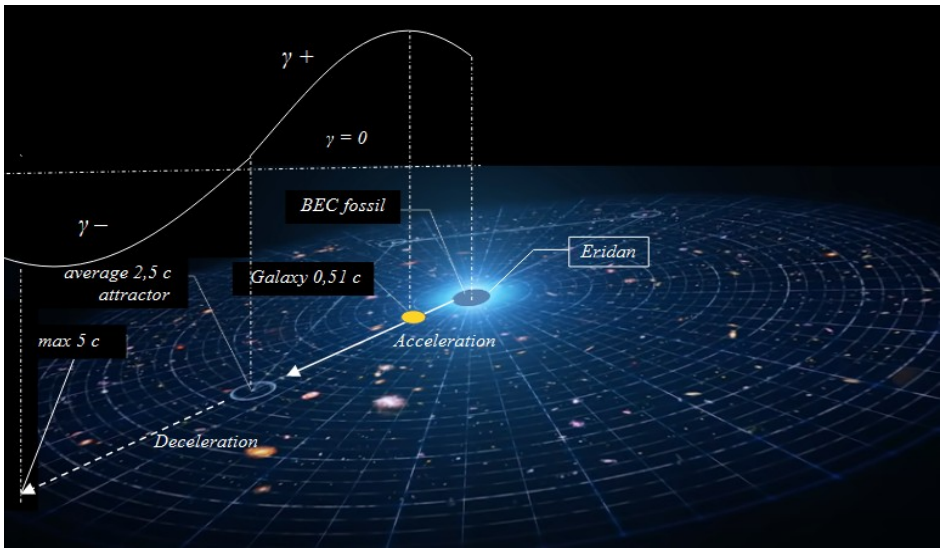

Fig 27 ; Our Galaxy is accelerating toward the 2.5 c attractor, which is decelerating slightly due to gravitational potential. This acceleration is offset by the deceleration of the layers beyond the middle layer. The acceleration is slower at the beginning of the expansion, consistent with observations from the JWST space telescope [39]. By analogy, this is the starting effect of the last car of a train whose locomotive is the attractor at 2.5c. It begins to accelerate slightly, then accelerates more sharply.

19-2. BEC-son structuring space-time: The space-time of the Standard Model is a mathematical being in the form of a Riemannian geometry. Chapter (27), on relativity, shows how Einstein made the mistake of projecting his remarkable thought experiment about the spinning disk onto the universe scale. His motivation for rejecting Euclidean geometry was laudable, because it implied (in his eyes) the ineptitude of an absolute center. In full

agreement with the rejection of an absolute center, the DUO5 theory implies a center for the expanding universe state, which is typically random and relative to the Omniverse state. Moreover, the mitosis-expansion in velocity layers allows for a Euclidean geometry that perfectly explains the puzzles relating to the acceleration of the expansion, its slight anisotropy, dark matter and the anomaly of the enormous "cold hole" of Eridanus. Einstein saw gravitation not as a force, but as a spatial curvature. In fact, curvature is a consequence and not a cause. Chapter (17) indicates that the cause of this curvature is the consequence of the particle ↔ B.O.D.Y.S coupling. These are the physical elements of the BEC-sons that form space-time, born from the fractal mitosis of the BEC-fossil. This mitosis-expansion, described by relation (24), is in the form of layers of speeds (from 0 to 5 c), within the framework of a Euclidean geometry. An observer can see that everything is moving away around him. Below is an artist's drawing showing the scales of the universe.

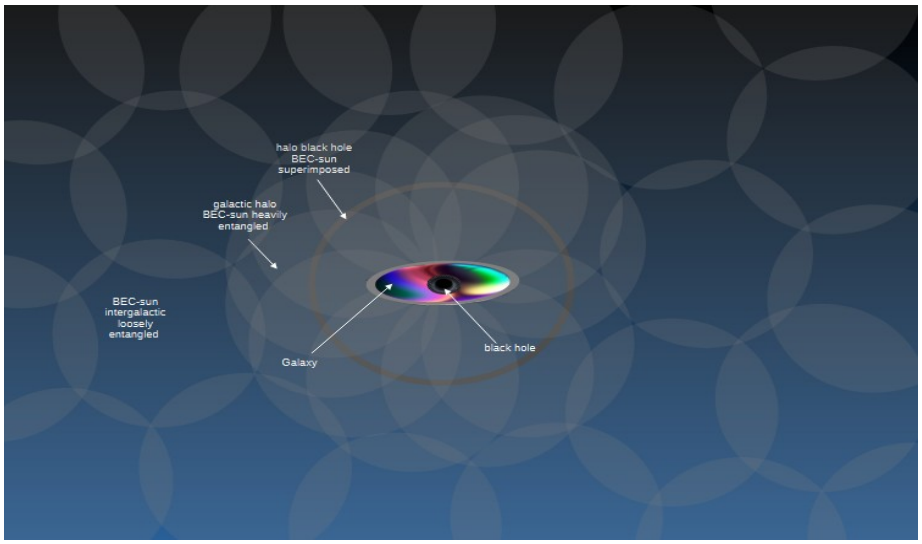

Fig. 28: Spacetime is in the form of an entanglement of BEC-sons in three modes: 1) superimposed around a galactic black hole; 2) tightly packed around a galaxy; 3) weakly coupled in intergalactic space and therefore sensitive to expansion.

Summary

20. Strong force (Coulomb origin)

The Standard Model considers that the strong force, responsible for the cohesion of atomic nuclei, occurs through the exchange of hypothetical gluons. Ignoring the cause and physical structure of the proton (Chapter 8), the Standard Model has developed a mathematical being that speculates on "color" charges. Yukawa's theory suggests a constant based on the exchange of quarks in nucleons, which gives rise to mesons. Below is the particular curve of the strong force.

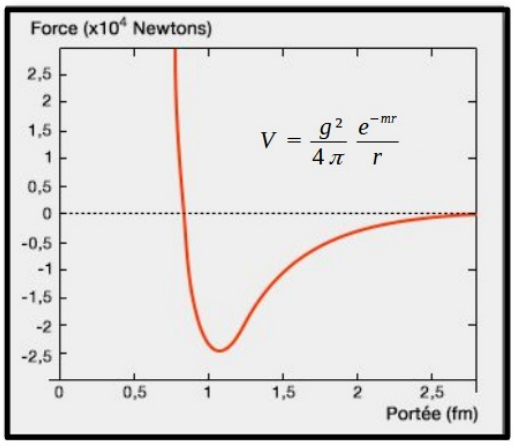

Fig. 29 : Without knowing the physical structure of protons and neutrons, based on electrons and positrons, Yukawa attempted to retrace the experimental curve by formulating his own formula, based solely on the effects.
Below 1 Fermi, the force is very strongly repulsive.
Between 0.9 and 1.2 Fermi, the force becomes strongly attractive.
Then, the attractive force decreases rapidly.

According to DUO5 theory, the gluon is a mathematical speculation, itself derived from speculation about the (magical) pre-existence of quarks. Table 7 shows that these are inductions by internal polarizations. In 1979, the PETRA particle accelerator, producing electron-positron collisions, showed a third jet that was attributed to the gluon. If the proof of the third jet is proven, its attribution to a gluon is just a speculation.

With the "*unreasonable efficiency of mathematics*" [40] finds self-consistencies that claim to replace physical beings. According to the indices given by Table (7), the exact relations of Chapter (7), Figures (17, 18), the proton is made up of electron-positron pairs of non-local emergence. Causally separated, they have a boson status. This configuration was rejected by the Copenhagen school, which imprudently transposed the status of fermion to non-locality, resulting from a causal separation. This is the consequence of the cosmological "principle", which denies the duality of locality. This epistemological error leads to considering the pre-existence (among others) of 8 gluons and 8 quarks that would have appeared magically and would have combined into protons, without justification. This contradicts the logic that complexity developed over time. Which means that simplicity is the strong principle going back in time. Below is a proton-neutron pair (figures 17 and 18), resulting from non-local fusion, which causally separated the electron-positron pairs, giving them boson status.

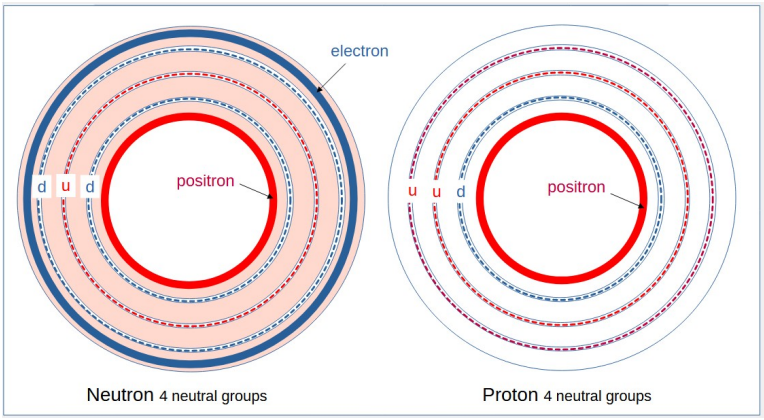

Fig. 30: relation (14) gives the radius of the proton (0.84 Fermi) via the law ΔM.ΔL=Cte. Chapter (7) shows that Proton and Neutron have 4 neutral groups and 3 polarized intervals (the quarks) in coherence with table (7). The measurement of the electric charge of the proton is strictly that of its single positron. The neutrality of the Neutron is ensured by the algebraic sum of the negative charge of the single electron and the positive charge of its single positron.

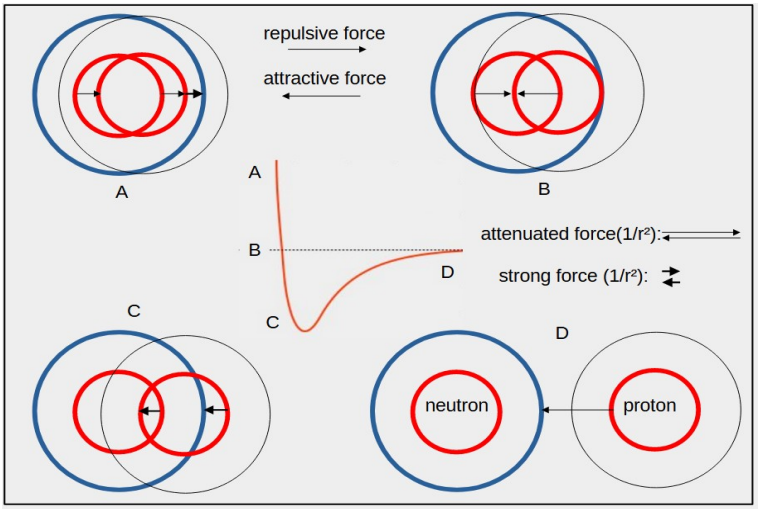

Fig. 31 : Simplified view of the proton and neutron: the strong force curve corresponds perfectly to the Coulomb interactions between the positron-electron pair of the neutron and the positron of the proton.

The following relationship gives an approximation of the maximum repulsive force (figure 29). Phase A shows 2 equal repulsive forces, $F_{1,2}$ between positrons which repel each other with an interval estimated at $ƛ_{pp} = 1/6$ of the radius of the proton r_p. To this must be added the force F_3 which is exerted between the positron of the proton and a part of the charge of the electron (ratio with respect to the positron), estimated at: $e_e = e/6$. The interval (electron-positron is estimated at: $ƛ_{pe} = ƛ_{pp}/4$.

$$F_{max} = 2\frac{e^2}{4\pi\epsilon_o ƛ_{pp}^2} + \frac{e_e^2}{4\pi\epsilon_o ƛ_{pe}^2} = 2{,}87\times10^4\,N \qquad (44)$$

This approximate result is close to the maximum force measured at $F \sim 3\times10^4$ N (Figure 29). Phase B indicates that the two opposing forces cancel each other out. Phase C shows that the attractive force is maximal. Phase D indicates that around 2.5 Fermi, the force is equivalent to the Coulomb force for a ratio of active charges opposite each other, estimated at: $e'_e = e_e/3$. Like all forces, the strong force is of Coulomb origin. But its origin stems from the inseparability of the B.O.D.Y.S poles required by the inertial paradox. Indeed, the unique solution to this paradox is the inseparability of the B.O.D.Y.S poles to obtain a perfect symmetrical zero, failing the impossible absolute zero inertia. The interval between the fused pairs of the neutral part of the proton must be equal to that prevailing on the fossil BEC, that is: $ƛ_o = ƛ_e/\xi$. However, during the weak force, the unitary and fleeting energy, to reorganize the polarized intervals, is worth ξ times that of an electron, according to:

$$E_o = \frac{\alpha e_e^2}{4\pi\epsilon_o ƛ_o} = \xi m_e c^2 \qquad (45)$$

This explains the physical cause of the W boson of relation (29). Indeed the energy extracted from the 1D string of a B.O.D.Y.S of ratio ξ with that of an electron, is diffused in 2D via the ratio $\sqrt{\xi}$.

Summary

21. Acceleration expansion, 5th force

In the context of a BEC-son (isolated and without central star), the incidence at the quantum scale of the deceleration of a pole of B.O.D.Y.S leaving the common zero point, is given by:

$$\gamma_0 = -\frac{4}{5}\frac{\alpha^2 c^2}{\xi R_{BEC}} = -6{,}12\times10^{-12}\ m\ s^{-2} \qquad (46)$$

21-1. Pioneer's deceleration : These probes exhibit an abnormal deceleration [41] of: –8.74(1.33)×10^{-10} m/s². They evolve in the BEC-son, centered on the sun. They undergo the deceleration of relation (46) but also the subquantum and therefore constant incidence of the gravitational acceleration of the Sun of mass: M0 = 2×10^{30} kg:

$$\gamma_G = -\frac{5}{8}\ \xi\ \alpha\ \frac{G M_0}{R_{BEC}^2} = -8{,}68\times10^{-10}\ m\ s^{-2} \qquad (47)$$

With the sum of the two contributions, we obtain the Pioneer acceleration:

$$\gamma_{Pioneer} = -\left(\gamma_0 + \gamma_S\right) = -8{,}75\times10^{-10}\ m\ s^{-2}, \qquad (48)$$

This calculation is compatible with the measurement: –8,74(1,33)×10^{-10} m/s².

21-2.Average deceleration of expansion: with c_{exp} = 5c, we obtain the average rate of deceleration of the expansion:

$$\gamma_{exp} = \frac{c_{exp}^2}{2\mathscr{L}} = 4{,}78\times10^{-11}\ m\,s^{-2}, \qquad (49)$$

The length $\mathscr{L}$, is the maximum expansion limit, (chapter 30), specified at 7σ.

$$\mathscr{L} = \frac{2\ G\xi^8 m_e}{\alpha^2 c^2} = 2{,}3483486100436\times10^{28}\ m, \qquad (50)$$

21-3. The expansion does not affect galaxy halos: Considering as a first approach, that the relation (46) is consolidated with each star of the Galaxy, we note that γexp < γ_G. This allows the halos of galaxies not to stretch unlike the inter-galactic BEC-daughters. Only the BEC-son forming the inter-galactic space-time are concerned by the expansion, because $\gamma_o < \gamma_{exp}$. Thus the average expansion layer at 2.5 c, represents an accelerating attractor for the layers of BEC-daughters located downstream and a decelerating attractor for the layers of BEC-daughters located upstream. But overall, the average layer decelerates under the action of gravitation.

Summary

22. Origin speed c and space-time:

Albert Einstein wisely used the constancy of the speed c to derive a coherent mathematical model. But once again, with the "*unreasonable efficiency of mathematics*" [40], and the self-reference that is specific to them, he managed to elude the physical causes of the structure of space-time. This amounts to considering that the constancy of the speed c, arrived magically. The geometry of space-time is not a cause but just a consequence. The root cause of the mediation of photons is the woven structure of B.O.D.Y.S. The DUO5 theory, indicates that these causes, arise, like everything else, from the inertial paradox and the fractal mitosis of the synchronized fossil BEC.

22-1. BEC-sons structuring space-time : We have seen that space-time is not a mathematical being, but a tangle of BEC-sons woven by subquantum B.O.D.Y.S. Figure 28, below, shows the principle of the concentric layers of the poles of B.O.D.Y.S (equipment of a BEC-son), which oscillate at the maximum speed of $c_o = c\ \xi^2$. The mediation of a photon cannot jump from one pole to the other. To progress in a BEC-sons, it must pass through the common zero point, at the speed of the poles which varies from c_o to c, as it moves away from the center.

22-2. Mediation of a photon at speed c: According to Thales' law (figure 33), the photon, without apparent mass, circulates at speed c in the BEC-son of space-time. Figure (33) shows that this speed is the reduced reflection of the speed co of the subquantum poles. $c = c_o\ \Delta x/\Delta r$ = Constant. Thus the photon is an "effect" of the mediation of forces (G and EM) and not a "cause". The physical cause of the propagation of the force field is the local alteration of spatial symmetry of the B.O.D.Y.S, relative to the energy $\hbar\ \nu$. This alteration amounts to a sort of curvature of space-time. It is necessary to insist here because this curvature is an effect but not a cause. Contrary to appearances, the law $\Delta m.\Delta \ell$ = Cte, also applies to photons. Indeed, the structure of a photon is similar to that of a Majorana neutrino, which resembles a dipolar B.O.D.Y.S., but on a quantum scale. The difference lies in the fact that while the neutrino has poles whose variation is fixed, the photon has a spectrum of poles that reflects its frequency spectrum. Contrary to appearances, the photon also causes a local spatial alteration $\Delta \ell$ that causes a transfer Δm to the two opposite poles of the photon. This does not change its mass since the two poles cancel each other out. Below, Figure (33) shows the B.O.D.Y.S. "strings." They have intervals that indicate that spacetime is not continuous but contains quanta. The velocity c is the quantum reflection of the velocity co of the subquantum level.

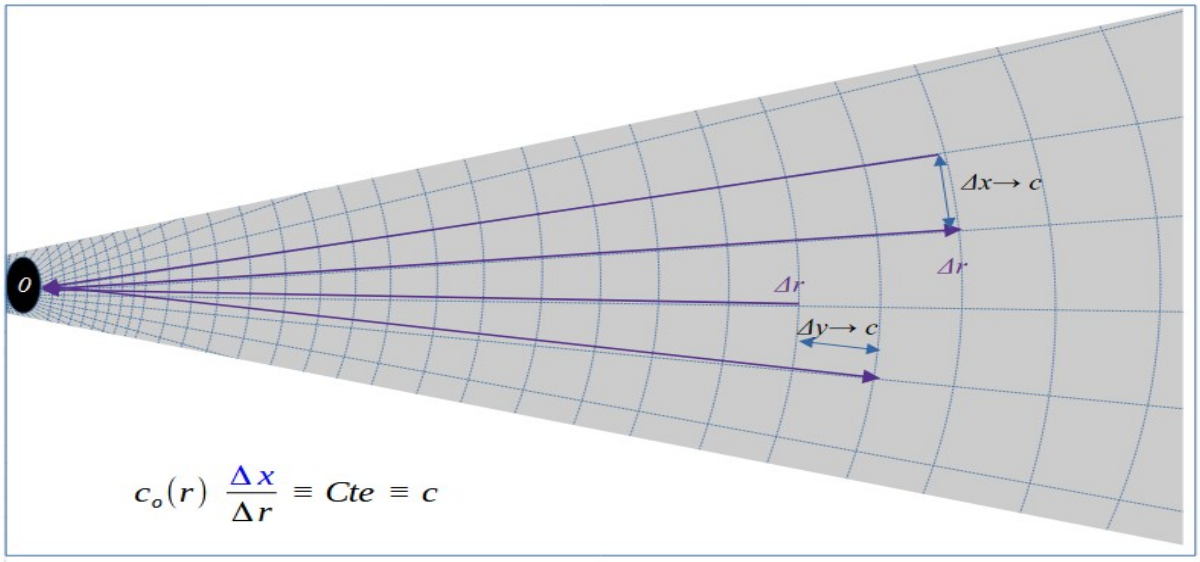

Fig 33 ; principle of mediation of a photon in a BEC-son of space-time. To progress tangentially from one pole to the other, it must pass through the zero point common to the superluminal speed of the subquantum scale. Its mediation is isotropic, It is Thales' rule which imposes the constant according to: c = Δx/Δr. This is the origin of Heisenberg's uncertainty, of Schrödinger's wave packet reduction, of De Broglie's wave-particle duality and the extended causality of Aspect's entangled particles.

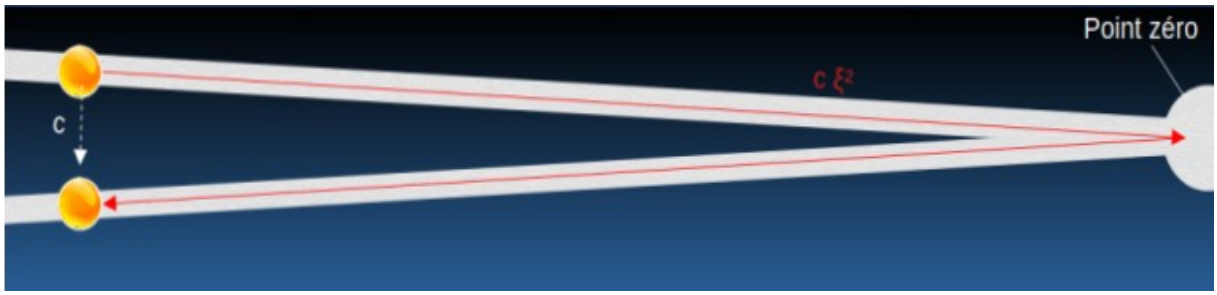

Fig 34 ; Analogy with roads in the sea (in blue). The vehicle must pass at high speed (ξ² c) through the zero roundabout, because it cannot cross the sea. In appearance, it crossed the sea at speed c. There is no continuity of space-time, but interval quanta. The variation of interval with the radius Δr, is compensated by the variation of the time to return to the zero point. Thus c = Δx/Δt = Δx/Δr = c_o/ξ^2.

22-3. Mediation of an electron : The electron, having a mass, undergoes the relativistic effect. Its coupling rate with a subquantum pole increases with its kinetic energy. The mass of its wave state, to pass from one pole to the other, is reduced by the factor ξ² (see the following chapter). On the other hand, its momentum is constant in both states, excluding the relativistic effect. Chapter (24) details the physical origin via the subquantum channel of special relativity.

Summary

23. Electron and Planck mass (origin)

23-1. Zitterbewegung : This "trembling" of the electron is the subject of many conjectures [42], [43]. In 1930 Schrödinger discovered that the Dirac equation contains an oscillatory

motion. Feynman postulated an interaction between the electron and an "ocean of virtual particles", according to the rules of QED. In agreement with the oscillatory aspect of Schrödinger, the DUO5 theory clearly indicates that the electron is the heir of a pole of a B.O.D.Y.S oscillator and behaves in its image. On the other hand, this study provides a more rigorous physical definition of the notion of "ocean of virtual particles". As seen in chapter (7), the coupling of particles with the B.O.D.Y.S, generates a disturbance and therefore a dressing rate. This dressing is in the form of sub-harmonics of the frequency of the B.O.D.Y.S. Here the vague absolute notion of "vacuum" is replaced by a space-time physically structured by the B.O.D.Y.S. All electronic Zitterbewegung models consider the existence of a particle with oscillatory, helical or toroidal motions. According to the DUO5 theory, the oscillation of the electron is consistent with its origin as a B.O.D.Y.S. pole. The Zitterbewegung is one of the traces of its subquantum origin. By setting Λ the useful oscillation length of a pole in a BEC-son, between the radius of the BEC and the radius of the common zero point:

$$\Lambda = \frac{R_{BEC}}{\xi}, \tag{51}$$

we obtain the following relation which indicates that the volume of an electron is strictly equal to the volume of the B.O.D.Y.S string whose thickness is the reduced tangential interval on the saturated BEC-fossil, $ƛ_o$.

$$ƛ_e^3 = \Lambda\, ƛ_o^2 = \frac{\alpha^2 \mathscr{L}}{2}\, \ell_p^2, \tag{52}$$

With $\mathscr{L}$, the maximum expansion of the universe, given by relations (65 to 72). Relations (24, 25) also confirm this occurrence with the numerical determination of the factor ξ at 7σ. Figure (35), shows the spatial oscillation ratio ξ^2, between a pole and the electron. The electron oscillates between the Planck length and its Compton length, with ratio ξ^2 [6], according to the law $\Delta m/\Delta \ell = Cte$, inherited from the inertial paradox. The channel of the 1D subquantum coupling, is fixed at the Planck length, ℓ_p. When the electron oscillation is at the ℓ_p level, its mass is reduced according to: $m_o = m_e/\xi^2$. This reduced mass has access to the subquantum extended causality of the wave state, throughout the BEC. Thus, at the subquantum level, the mass reduction by factor ξ^2 is compensated by a spatial increase by the same factor:

$$R_{BEC} = \xi^2 r_z \quad ; \quad ƛ_e = \xi^2 \ell_P, \tag{53}$$

Below figure (35) shows that the electron is both a quantum monopole and a subquantum dipole. It has the same oscillation ratio as the pole with which it is coupled. Its spin is the same as that of the pole which circulates at the speed co of the subquantum level. This explains the non-locality of the entanglement shown by ASPECT.

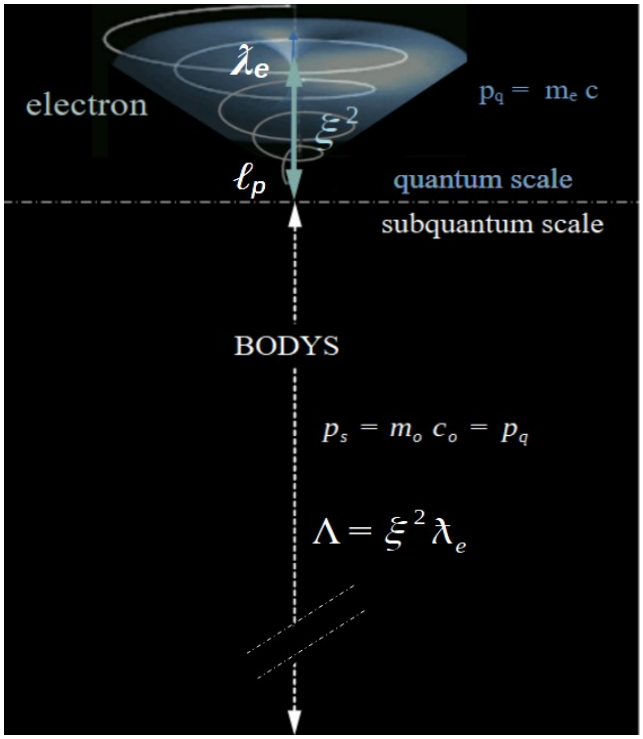

Fig 35 ; Electron oscillation. The electron is a pole of BODY, causally separated. It therefore oscillates like the pole of the BODY to which it is coupled. They have the same oscillation factor, ξ^2.

The electron's spatial amplitude is ξ^2 times smaller than that of the pole because its mass is, on average, ξ^2 times larger, relative to its Compton length and quantum velocity, c.

The pole's spatial amplitude is ξ^2 times larger than that of the electron, relative to its average velocity, co.

Chapter 16 shows that the electron's wrapping rate is revealed by its magnetic moment anomaly. According to the rule ML = Cte, the ΔM of the wrapping has reduced its Compton length. But according to the rule M/L = Cte, the reduction ΔL is not compensated by the ΔM, which is absent from the relation (29).

23-2. Planck mass: This mass, eponymous with Mrs Planck, respects (without saying so) the law $\Delta m.\Delta\ell$ = Cte, because $\ell_p\, m_p = \lambda\!\!\!^{-}_e\, m_e$ = Cte. However, this enormous corpuscular mass has never been measured: $m_p = m_e\, \xi^2$. It should be noted here that in the B.O.D.Y.S oscillator, the space ℓ, of $\Delta m.\Delta\ell$ = Cte, is the spatial potential linked to the mass of a pole, at the zero point. Its complement, $\Delta m/\Delta\ell$ = Cte, represents the covariance of *m* as a function of the position of the pole in the B.O.D.Y.S. Thus, the consistency of the DUO5 theory requires correcting the Planck corpuscular mass which is not ξ^2 times stronger than that of the electron but ξ^2 less strong. The original Planck mass corresponds to the sum of the masses $\sum m_o$ of the ξ^4 poles, present on the half circumference of the common zero point. It is therefore not a unit mass, but a sum.

$$\nexists\, m_P = m_e \xi^2 \;;\; \exists\, m_o = \frac{m_e}{\xi^2}, \qquad (54)$$

The "wave" component of the electron mo, is potentially everywhere in the BEC, because its spatial causality is at the scale of the BEC. The "*reduction of the wave packet*" places it back in its quantum causality, characterized by causality at speed v < c. In both scales, its intrinsic momentum, (not kinematic) is constant.

$$p_e = m_e c = m_o c_o, \qquad (55)$$

Summary

24. Physical structure of the photon

The standard model seeks experimentally to define the enigmatic physical structure of the photon [44] [45]. There is also the enigma of its mass. Some measurements seem to indicate a mass limit lower than $< 3\times10^{-51}$ kg [46]. According to the DUO5 theory, the mass of a photon of energy ħ ν (unperturbed), is zero by the same mechanism of the dipolar B.O.D.Y.S. At the limits, if its frequency reaches: $\nu = 1/t_e$, it extracts two subquantum poles to make an electron-positron pair emerge. This is not a "creation" but a subquantum → quantum transfer of the mass of a pair of poles. A photon is in the form of a quantum B.O.D.Y.S, but with a pair of superimposed frequencies, which is a subharmonic of the B.O.D.Y.S frequency. It is stable because it comes from two causally separated BODYS poles. Below is a representation of an unperturbed photon and therefore of zero mass.

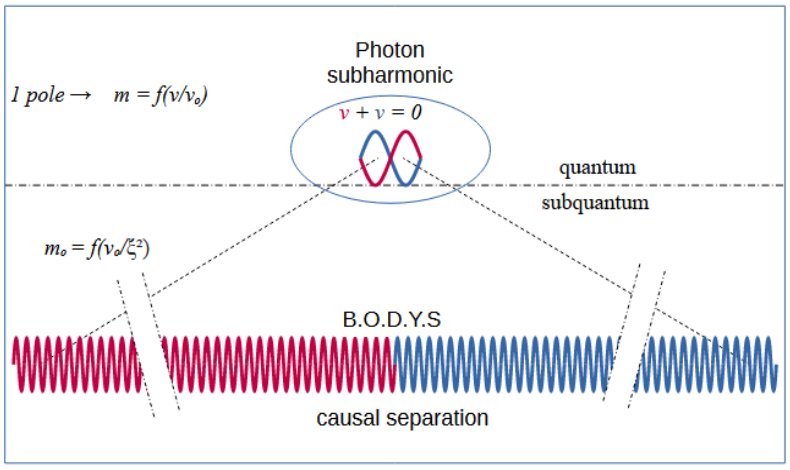

Fig 36 ; a photon is a pair of superimposed frequencies, subharmonic of the BODYS frequency. It is stable, because it comes from two causally separated BODYS poles. The inertia of a photon pole is that of a subquantum pole according to: $m(\nu) = f(\nu/\nu_0)$.

Any disturbance alters the Δℓ symmetry of the coupled B.O.D.Y.S, which results in a Δm extraction which makes the photon massive, during a shock or a disturbance.

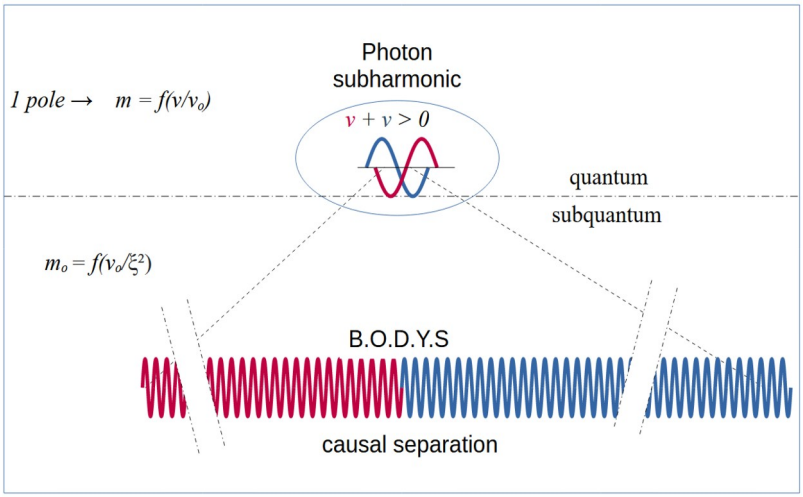

Fig 37 : a disturbance such as a shock, generates a spatial asymmetry Δℓ of the poles of B.O.D.Y.S. This shifts the sub-harmonics out of phase, which amounts to the extraction of an inertial mass Δm. This inertial mass is the physical cause of the momentum transfer for a solar sail.

The mass, in the "pole" frame of reference of the photon dipole of light (on average at 500 THz or 5×10^{14} s^{-1}), turns out to be 10^7 times less than the mass of an electron or 5×10^{-38} kg.

But it is perfectly cancelled in the photon frame of reference. Classically, we consider that the absorption of a photon by a target causes it to recoil, according to:

$$p = \frac{h\nu}{c} = \frac{h}{\lambda} = m\,\lambda t^{-1} = mc\,, \qquad (56)$$

The form of the first two terms hides the inertial aspect m. The form $h.v$ fits with the energy of a photon known to be massless. But there is In a solar sail, a photon with a wavelength of 0.5 µm generates an impulse at the target of: 10^{-27} kg m s^{-1}. But to generate a recoil, the action of an inertial mass is required, which also appears in the dimension of p. The inertia did not appear magically. It comes from the perturbation relative to the shock, which alters the spatial symmetry ΔL of the photon dipole, of the factor v/v_e, which reveals a differential Δm, during the shock. The mass of a photon perturbed by its coupling alone is $m_o = m_e / \xi^2 = 10^{-53}$ kg < 3×10^{-51} kg.

Summary

25. Physical structure of the neutrino

The standard model indicates that the mass of the neutrino is less than 0.8 eV and cannot be zero. According to the various measurements [47], it is difficult to differentiate the speed of the neutrino from that of the photon. This suggests that its (unperturbed) mass is zero. However, according to the DUO5 theory, the neutrino is a B.O.D.Y.S, reduced to the quantum scale. The W boson has extracted and relocated two non-local subquantum poles. Furthermore, the energy of certain cosmic neutrinos has been measured at an extremely high value, namely: 1.2×10^{17} eV(+110,–60) [48]. This is a neutrino where each electron or positron pole is separated. This is the same extraction process as indicated in relation (29). The extraction of the separated poles at speed c, reaches the relativistic threshold of ratio ξ, (chapter 25), according to:

$$w_{neutrino} = 2\xi m_e = 3{,}0918\times10^{11}\ ue = 1.60\times10^{17}\ eV\,, \qquad (57)$$

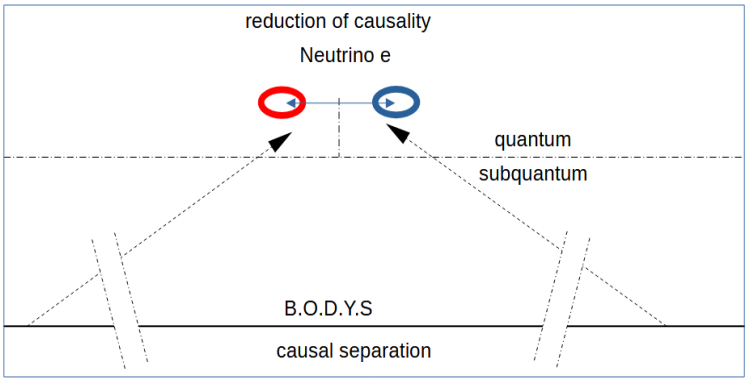

Fig 38; The electron neutrino is a quantum B.OD.Y.S with $m = 0$. The two opposite poles are represented by the electron-positron pair bound in opposition. This is the result of a causal separation. Under the effect of a perturbation, the electron neutrino can assemble other poles of B.OD.Y.S and mutate into a muon or tau neutrino.

Summary

26. Quantum decoherence

The reduction of the wave packet is not a consequence of the Schrödinger equation, but the consequence of the coupling {quantum ↔ subquantum}. The enigma of quantum decoherence is based on the laws resulting from the inertial paradox: $\Delta m.\Delta \ell = Cte$ and $\Delta m/\Delta \ell = Cte$. This is the physical cause of the Heisenberg uncertainty, of relation (1) and of all the phenomena discussed in this study. All microscopic observables arise from the functioning of the B.O.D.Y.S, characterized by the transfers of the couple $\chi = \Delta m.\Delta \ell$. But the inseparability of this couple disappears with the critical size of the mass m, that is to say when its uncertainty $\Delta \ell = f(\Delta m^{-1})$ remains confined within it. For the mass $m_o = m_e/\xi^2$, of a pole of B.O.D.Y.S, on the area of the common zero point ($r_{pz} = \Lambda/\xi^2$) of a BEC-son, its uncertainty is its spatial amplitude in the BEC-son, that is: $R_{BEC} = \xi^5\ \ell_p$. The electron, inherited from a separate pole of B.O.D.Y.S, has an internal momentum: $p = m_e\ c$, coupled with a subquantum pole. The unmeasured mass of an electron is that of a pole of B.O.D.Y.S, at the zero point. It is everywhere at once in the BEC, in the time interval t_e. But a measurement operation brings the uncertainty of the electron back into its quantum causality. It becomes increasingly difficult to observe interferences as the mass of the particles increases, because the fringe spacing varies as λ/a, where λ is the de Broglie wavelength and a the distance between the slits. Since $\lambda = h/mv$, where m and v are the mass and velocity of the molecules, then the fringe spacing decreases as the inverse of the mass. However, the mass criterion alone is not sufficient, because some massive molecules can have interferences depending on their interactions with the surrounding medium. According to the DUO5 theory, the coupling {quantum ↔ subquantum} continues to exist in the macroscopic scale. In the simple case of a macroscopic mass with a negligible level of environmental interference, the law $\Delta m.\Delta \ell = Cte$, relative to relation (1), explains the principle of quantum decoherence. Indeed, the radius of quantum particles like the proton is inversely proportional to the mass, as shown by relation (14). Example: we apply relation (14) to an iron ball of radius $r = 10^{-6}$ m and density 7840 kg/m³. Its mass m is 3×10^{-14} kg or $m_{ue} = 3.6\times10^{16}$ expressed in electron units. By applying relation (14), we obtain, in first analysis, its subquantum uncertainty according to:

$$\Delta_L = \frac{\lambda\!\!\!^{-}_e}{\xi^2 m_{ue}} = 2{,}6\times10^{-7} m < r \qquad (58)$$

Cette incertitude spatiale, inférieure à son rayon, n'apparaît plus.

Summary

27. First black hole, galaxies, temperature cluster *f*(DM)

The first galaxies appeared a few hundred million years after the BIG BANG [49], faster than predicted by the standard model. Moreover, they have an unexpected mass. Chapters (13, 14, 17, 18, 19) indicate that the area of the fossil BEC contains ξ galaxies after annihilation with a ratio of α^2. The mass of the early universe (14) is: $\mathcal{M} = 2\xi^8/\alpha^2 = 3.16\times10^{55}$ kg (including DM), or ~30 times the total baryonic mass. According to the constraints of the DUO5 theory, the mass of a primordial galaxy is:

$$M_{Gal} = \frac{\mathcal{M}}{\xi} = 2\times10^{44}\ kg \qquad (59)$$

The figure below shows that in 1D, the circumference contains √ξ galaxies with intervals α times larger than their diameter. The surface density is such on the area of the fossil BEC that it forms black holes spontaneously. Figure (34) shows that it is after a distance of 550 Myl that the combined growth and mitosis factor τ allows the radius of a galaxy R_{Gal} to exceed its Schwarzschild radius and begin to become visible. Thus galactic black holes are formed from the beginning of mitosis-expansion.

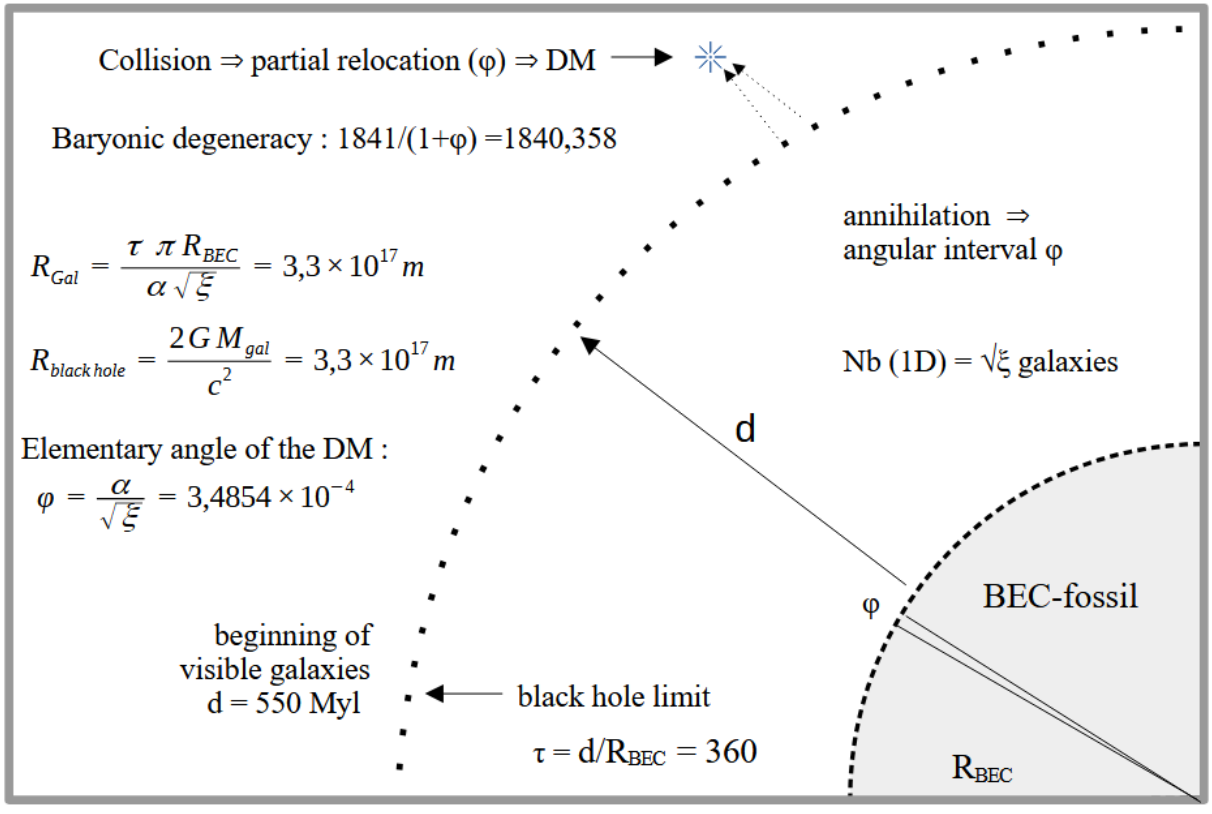

Fig. 39 : Around 700 million years ago, the growth factor increased by: τ1 = 700/550 = 1.272. The reduction in the size of the central black hole reveals a corona of stars whose mass is estimated at 1011 solar masses, or 2×10^{41} kg = M_{Gal} /1000. As M_{Gal} is equal to 662 solar masses, we find a plausible agreement with the estimate: 844 = 660×1.272. In accordance with the standard model, mass galaxies of population III are unstable and give way to less massive galaxies. The angle formed between two neighboring galaxies is the elementary relocation angle which partially annihilates the protons constituting matter. By losing their harmony, these protons become dark matter. The annihilation is not necessarily binary. The following figure shows the consequence of primordial (binary) annihilation.

According to figure (4) of chapter (4-3), the incompressible center of primordial black holes is limited to the radius of the common zero point, fixed at: $\ell_{zc} = \xi \lambda\!\!\!^{-}_{e} = 5.9$ cm. There is therefore no singularity, which would be endowed with infinite curvature.

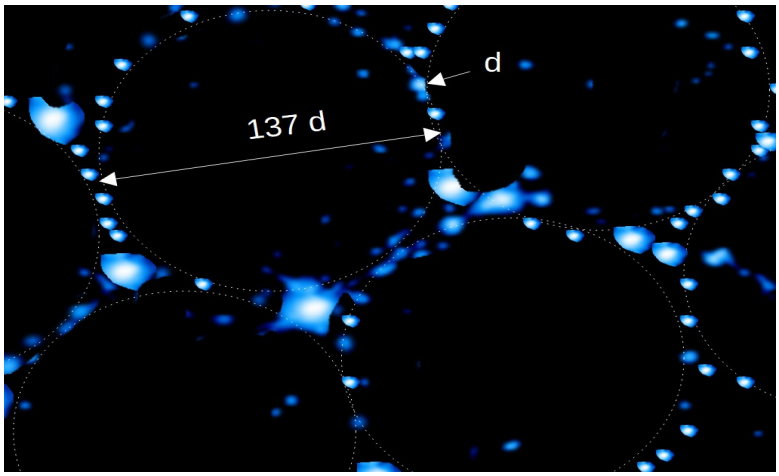

Fig. 40 : The image shows that primordial annihilation is observable. Before the deformations related to expansion with its multiple collisions, the hole/galaxy ratio = α = 137.0359. The clusters developed in the interstices of the 2D annihilation circles.

27-1 Temperature of galaxy clusters: Figure (35) shows that the clusters developed in the interstices of the annihilation circles. For example, the diameter of the Virgo cluster [50] [51] is given to be about: $D = 7\times10^{6}$ *yl*. Its internal temperature is measured at $T_v = 3\times10^{7}$ K. Located at 53 *Myl* from our Galaxy, we can consider that it is located approximately at the same distance from the fossil BEC, i.e. 7 Gyl, shown in chapter (28). Its mass is given to be $M = 1.2\times10^{15}$ MΘ. With the rule of Figure (35) we obtain in first analysis: $\varphi = D/d = 10^{-3}$. The temperature of the electron ($T_e = 5.92\times10^{9}$ K) would correspond to a collision of angle π. Considering that the tangent of the very small angle φ is very close to its angular expression. The Vigo temperature should correspond to a calculated diameter of: $Dc = T_v / T_e = 3.5\times10^{7}$ *yl* = 5.06 D. This implies that the Vigo cluster was originally wider by this factor. Then it contracted under gravitational force by a factor of 5.06. Constrained by the conservation of angular momentum, it began to rotate, which is indeed observed [52].

27-2 Dark matter: according to chapter (12), dark matter, which occurs at different scales, is a direct consequence of the inertial paradox. Indeed, relation (1) indicates that the only solution to this paradox lies in the absolute inseparability of the poles of B.O.D.Y.S: $\Delta m.\Delta\ell + \Delta m.\Delta\ell' = 0$. The term "absolute" is important, because the radial causal separation on the fossil BEC is compensated by the tangential relocation. Thus, gravitation is a consequence of the inertial paradox, because it acts to relocate on the tangential axis, the elements separated on the radial axis. Figure (13) of chapter (12) shows that the expansion in velocity layers favors galaxy collisions. These collisions are partial relocations at low angle. They produce DM by degenerating protons, which lose their emission at 21 cm. The total mass of the

universe at the origin, relative to this theory (§14), is given as: $\mathcal{M} = 3.16\times10^{55}$ kg. It is 30 times greater than the baryonic mass commonly estimated at $M = 10^{54}$ kg. This implies a dark (degenerate) mass, 31.6 times greater than the baryonic mass, or 6.25 times greater than the ratio commonly estimated at: $D_M / M_B = 5$. These estimates are mainly made from the rotation curves of galaxies. Furthermore, the following figure shows that the standard model takes into account the dark energy relative to the acceleration of the expansion. According to chapters (8, 28) this acceleration is strictly compensated by the deceleration beyond the average expansion speed set at 2.5 c. Now the square of this average speed (6.25 c^2) gives an energy which the following figure takes into account:

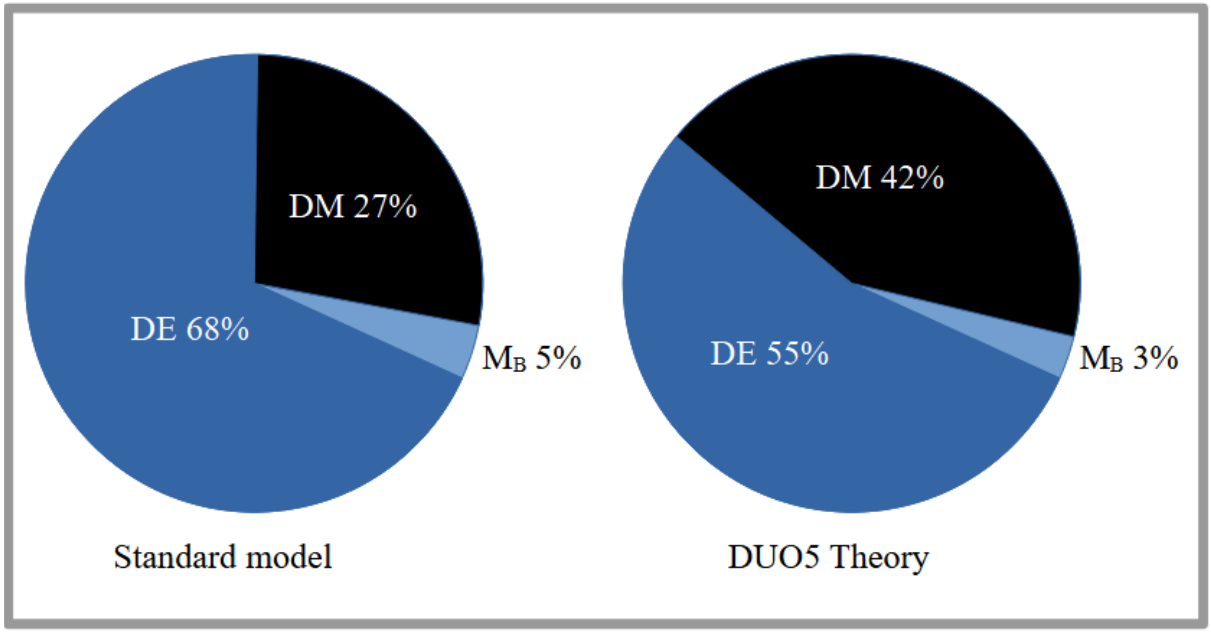

Fig. 41 :comparison of the ratios between dark energy, dark mass and baryonic mass. It is the ratio cited above (31.25), which fixes these percentages: $(D^M + D_E) / M_B$.

27-3 Mitosis of black holes in galaxies into stars : According to the DUO5 theory, the number of primordial stars of population III is fixed at $\xi^2 = 2.39\times10^{22}$, or 1.58×10^{25} MΘ. From 550 Myl, (fixing the Schwarzschild limit), the growth factor relative to expansion reduces the density and mitosis can continue its division. The first stars appear around 700 million years ago, because the growth factor has progressed by: $\tau_1 = 700/550 = 1.272$. Estimates a visible mass of 10^{11} MΘ or 2×10^{41} kg = M_{Gal} /1000. As MGal is 662 MΘ, we find a plausible agreement with the estimate: 844 = 660×1.272. The enigma of the precocity of galaxy formation is solved, because there is no need for a long process of gas accretion, since the required density was already present on the fossil BEC.

Summary

28. The non-absolute center of the universe

Starting from the observation and the invariance of Maxwell's equations, Minkowski imagined a mathematical being, justified by a Riemannian geometry. Standard space-time is a mathematical being without physical structure and which says nothing about the causes of its existence. Because of the "cosmological principle" which denies the duality of locality, the standard model concluded that the acceleration of the expansion is global. This is an absurd reasoning which has no chance of justifying the origin of this accelerating energy. It is contrary to the physical requirement of conservation of symmetry between the gravitational potential and the sum (mass energy + kinetic energy) of the expanding masses, justified at 7σ by relations (65 to 72). Figure 23 shows that the average value of the expansion at 2.5 c is slowing down. But for an observer on Earth, located in a lower expansion layer, the expansion accelerates towards the attractor of the middle layer, which is decelerating, under the effect of gravity. Chapter 21 shows how the 5th inter-BEC force exerts an attractive force between all intergalactic BEC-sons. Chapter 21 describes in detail the existence of this 5th force. Riemannian geometry is able to describe that any observer can see that everything around him is moving away. The velocity-layered variant of Euclidean geometry also allows this. But in addition, it explains the causes of its existence. The DUO5 theory gives the cause of the physical curvature, generated in an inertial frame. This cause is related to the particle ↔ B.O.D.Y.S coupling, with its dressing rate and the law $\Delta m.\Delta \ell$ = Cte. This coupling causes a perturbation $\Delta \ell$ in the symmetry of the subquantum B.O.D.Y.S. This is the cause of the spatial curvature around the disturbing mass. By reaction, the B.O.D.Y.S generates a Δm which covers the mass of the particle at rest. If the particle is animated by a speed, then the perturbation increases the Δm, which becomes relativistic. Figure 28 shows that the cause of the speed c is relative to the subquantum speed of the poles of B.O.D.Y.S. In accordance with general relativity, the Δm causes a reduction $\Delta \ell$ of the particle size in the axis of its progression. This $\Delta \ell$ in turn induces a Δm of the poles of B.O.D.Y.S. This increase in subquantum mass generates a slowing down of the time of a cycle of the B.O.D.Y.S oscillator. The time dilation Δt in the inertial frame m is given by:

$$\Delta t = \sqrt{\frac{\Delta m_o}{K_o}} \qquad (60)$$

Thus space-time is not a mathematical being but a physical being, strictly resulting from the consequences of the inertial or existential paradox. Not only does it perfectly match all observations, but it also explains the slight isotropy of the expansion and its (local) acceleration. The fossil BEC is the (non-absolute) center of the expanding universe state. This

center, materialized by the fossil BEC (visible from the side of Eridanus), is determined by the annihilation temperature of $2\xi^8 - \xi^8/\alpha^2 \sim 2\xi^8$ electron-positron pairs. The temperature of the diffuse background (CMB) is measured at 2.72548 K [53]. Its damping in $1/r^2$ gives the position in the radial axis of our Galaxy, according to:

$$D_T = R_{BEC}\sqrt{\frac{T_e}{2{,}72548}} = 6{,}65 \times 10^{25} m = 7{,}037\, Gyl \qquad (61)$$

This result is consistent with standard estimates that place the distance from the Galaxy's velocity layer to the unique cold spot of Eridanus at between 6 and 10 Gyl. This layer is downstream of the middle layer, whose radius is: 2.5 × 13.75 = 34.38 Gyl.

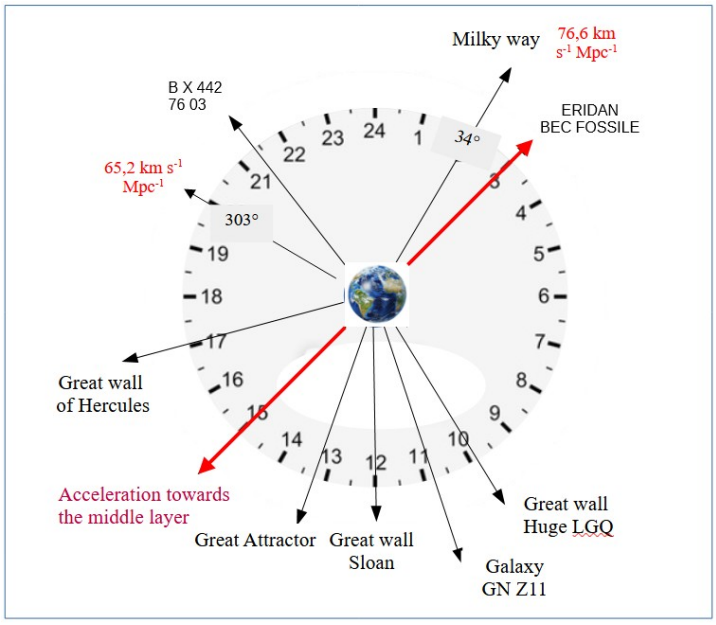

Fig 42; Location of the Earth according to the direction of Eridanus, which is the trace of the fossil BEC. This direction is opposite to that of the (local) acceleration of the expansion. Observations from the three space X-ray telescopes XMM-Newton (from ESA), Chandra (from NASA) and the German ROSAT X, indicate an anisotropy between the direction of Eridanus and about 90° from this axis. There is no mysterious "dark energy" but just the acceleration towards the attractor represented by the middle layer at 2.5 c. This is angularly close to the Great Attractor.

The local expansion speed of our Galaxy is given by:

$$v_T = \frac{D(T)}{13{,}75} = 0{,}51\, c \ll 2{,}5\, c \qquad (62)$$

Via the 5th force detailed in chapter (19), our current position in the velocity layer at 0.51 c, accelerates towards the attractor at 2.5 c, which itself slows down under the action of gravity. From the photon density, $\rho_{phot} = 4.1073 \times 10^8$ units /m³, [54], and the number of photons at the origin Nphoton = 4 ξ^8, we determine the current radius of the universe R(T) noted R_T:

$$R_T = \sqrt[3]{\frac{N_{photon}}{4\,\pi\,\rho_{phot}}} = 6{,}322 \times 10^{26} m = 66{,}87\, Gyl \qquad (63)$$

and the total primordial mass $\mathcal{M}$ (with DM):

$$\mathcal{M} = \frac{2\,\xi^8\, m_e}{\alpha^2} = 3{,}163155585944 \times 10^{55}\ kg\,, \qquad (64)$$

and:

$$\mathscr{L} = \frac{G\,\mathcal{M}}{c^2} = 2{,}34834961004 \times 10^{28}\ m \qquad (65)$$

we obtain this balance consistent with the principle of inseparability of the inertial paradox:

$$-\frac{2\,G\mathcal{M}^2}{\mathcal{L}} + \mathcal{M}c^2 + \mathcal{M}v^2 = 0 \qquad (66)$$

With v = c non-relativistic in the expansion framework. This relation shows that the symmetry broken by the elementary causal separation is globally compensated by gravitation.

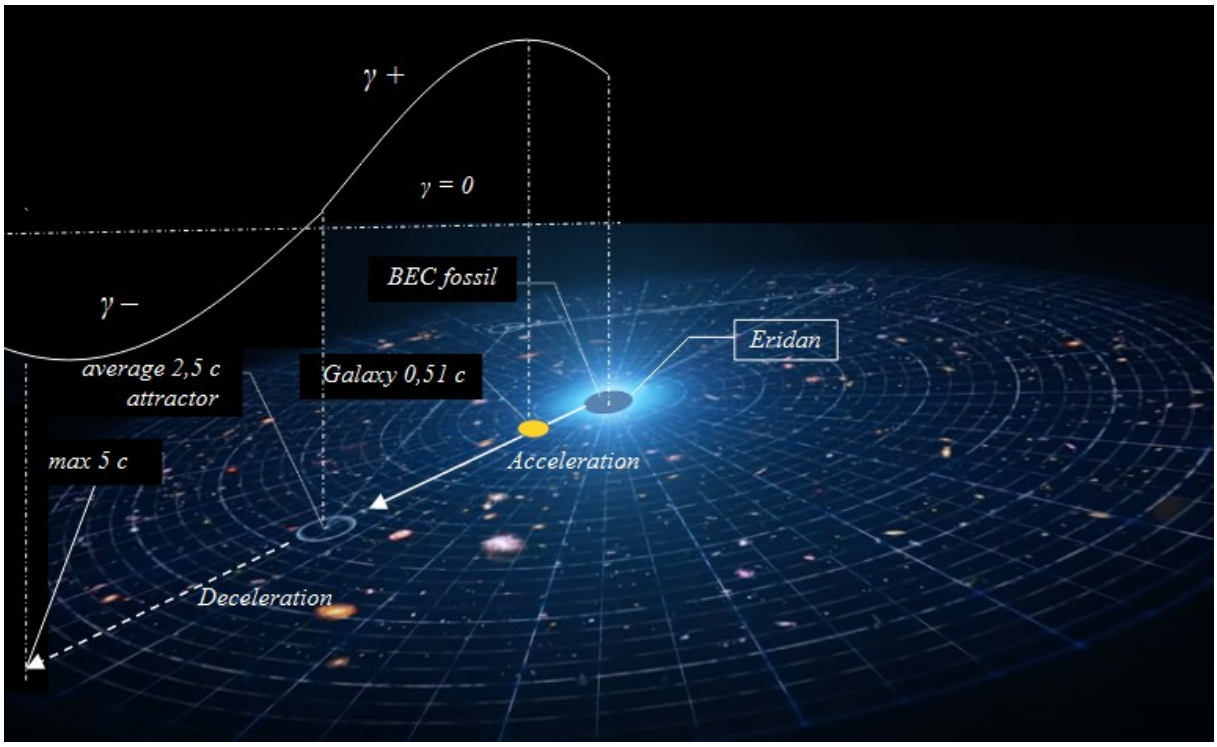

Fig 43 ; Our Galaxy is accelerating toward the 2.5 c attractor, which is decelerating slightly due to gravitational potential. This acceleration is offset by the deceleration of the layers beyond the middle layer. The acceleration is slower at the beginning of the expansion, consistent with observations from the JWST space telescope. By analogy, this is the starting effect of the last car of a train whose locomotive is the 2.5 c attractor. It begins to accelerate slightly, then accelerates more sharply.

Summary

29. Relativity, locality and the future of the universe

29-1. Special relativity :By declining all the consequences of the constant speed c in the "vacuum", Albert Einstein's mathematical model perfectly describes reality. However, it remains a model that does not explain the cause of the phenomena of special relativity. It states that the experience in one inertial frame will be identical in another inertial frame. The Lorentz equations that result from it indicate that the length of a moving body shortens, while its mass increases, and that time slows down in this moving frame. The quantity of movement and kinetic energy remain invariant in a Lorentz transformation. Minkowski proposed a mathematical being consistent with these effects, such as a 4-dimensional space-time. However, all these descriptive advances do not explain anything about the physical cause that

regulates the speed c, nor the cause of the curvature of space-time in an inertial frame of reference. The curvature of space-time is classically represented according to:

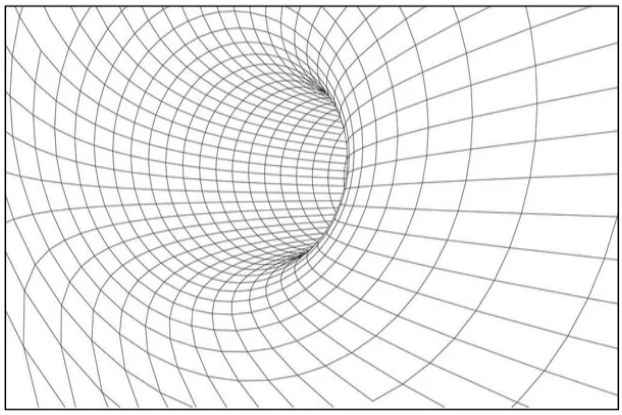

Fig 44: In an inertial frame, the symmetry of the local poles of the B.O.D.Y.S. strings is altered.
The reduction of the elementary intervals of the B.O.D.Y.S. strings around an inertial frame is well represented by this figure.

29-2. Physical cause of the local curvature of space-time: Still with the common thread of the inertial paradox and in accordance with the reasoning of chapter 16, the physical cause of the local curvature depends on: $\Delta m.\Delta \ell = Cte$. A moving inertial body receives a transfer $+\Delta m$ from the subquantum scale. This transfer $+\Delta m$ reduces its length according to: $-\Delta \ell$. The debit $-\Delta m$ of a local subquantum pole is compensated by a credit $+\Delta \ell$ which violates the spatial symmetry of the B.O.D.Y.S. The lengthening of the amplitude logically dilates the time of the inertial frame. Limited by the size of the BEC, the spatial lengthening of the B.O.D.Y.S forces it to curve. This spatial asymmetry amounts to shifting the star centered in the BEC, in the opposite direction of the inertial frame concerned. This shift generates a recentering force, which acts on the subquantum structure of the BEC. This is the cause of the slowdown of the Pioneer probes. Below is a simplified view of the spatial deformation of the B.O.D.Y.S "strings", generated by a moving inertial frame of reference.

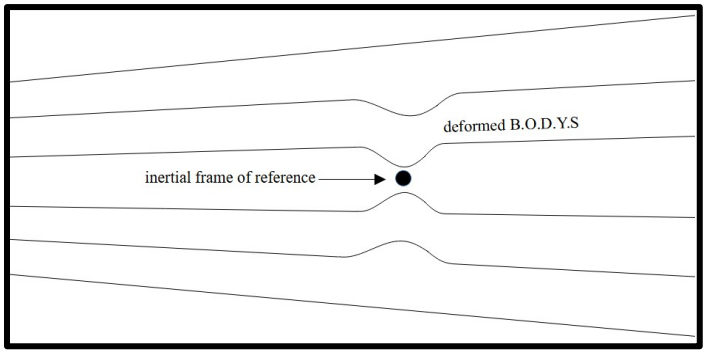

Fig 45; Simplified view of the B.O.D.Y.S lines being deformed by a moving inertial frame. This is the 5th force acting on Pioneer discussed in chapter (21).

29-3. Lorentz relation : This entire study clearly shows that everything is governed by the consequence of the inertial paradox: $\Delta m.\Delta \ell = Cte$, which applies between the B.O.D.Y.S scale and the quantum scale of particles. Thus the relativistic Δm contribution translates into a length contraction $\Delta \ell$. This Δm contribution comes from the coupling between the particles

and the BODYS of space-time. The rate of this coupling increases with the kinetic energy. This is the cause of the Lorentz relation:

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} \tag{67}$$

with β = v/c. However, in accordance with the inertial paradox, the absolute zero and infinity of mathematics are not compatible with physics. According to relation (31), concerning the upper limit of cosmic rays, there is a given upper limit for any mass composed of n electrons:

$$\gamma = \frac{1}{\sqrt{1-\beta^2+n^2\,\xi^2}} \leq n\,\xi \tag{68}$$

The coupling rate with a subquantum pole increases with the sum of kinetic energy and mass energy. The coupling {quantum ↔ subquantum} is the physical cause of the wrapping of particles at rest, of the relativistic effect, of the emergence of gauge bosons.

29-4. Time dilatation: Chapter (31), indicates that the origin of time is a function of the oscillation length, i.e. $\Delta t = f(\Delta\ell)$. The increase in the momentum of a quantum particle generates a transfer between the local pole of B.O.D.Y.S: {–Δm → +Δm}, towards the particle. The subquantum flow {–Δm → +Δℓ} assigned to the spatial amplitude of the local subquantum pole. This increase in spatial amplitude results in a dilation of local time, according to $\Delta t = f(\Delta\ell)$. This is the physical cause of the dilation of time in the inertial frame concerned. What is missing from Einstein's theory is the explanation of the physical causes of these effects, although they are perfectly described. This lack does not allow us to determine certain constants such as ξ, or certain aspects of the universe, such as its evolution and the cause of its existence. Limiting oneself to describing effects does not allow one to unite general relativity and quantum physics, which is itself built on effects alone. Thanks to the "*unreasonable efficiency of mathematics*" this theory has developed a coherent mathematical being, but based solely on effects. Einstein's tensor,

$$R_{gij}R = \chi\,T_{ij} \tag{69}$$

The Einstein tensor allowed consistency between the mathematical description and the measured effects. According to the DUO5 theory, fractal mitosis was preceded by the inflation of the poles. This inflation (of the fossil BEC) separated the poles becoming matter, thus revealing their mass in the form of electron-positron pairs. Relation (66) shows that the gravitational potential exactly compensates for the sum of the mass and kinetic energies of the matter of the expanding universe. Indeed, the mass $\mathcal{M}$ of the $2\xi^8/\alpha^2$ units distributed in 2D over the area of the fossil BEC corresponds to the ξ^4/α in 1D of figure (fig. 23). This amounts to saying that gravitation is a Coulomb force whose intensity is ξ^4 times weaker. The final

Schwarzschild radius at the limit of the “black hole” universe given by relation (65), without the intervention of the factor ξ, is confirmed below with a precision of 7σ.

$$\mathscr{L} = \frac{2\,\hbar^2}{\alpha^2 G m_e^3} = 2{,}34834861004 \times 10^{28}\ m, \tag{70}$$

$$\mathscr{L} = \frac{2\,R_{BEC}\,\xi}{\alpha^2} = \frac{2\,\lambda\!\!\!^{-}_e\,\xi^4}{\alpha^2} = 2{,}34834861004 \times 10^{28}\ m \tag{71}$$

This correlates with the volume equivalence between a Bodys string of Planck thickness and length $\mathscr{L}$:

$$\lambda\!\!\!^{-3}_e = \frac{(\alpha\ \ell_p)^2\,\mathscr{L}}{2}, \tag{72}$$

From which we derive the radius of the fossil BEC and therefore of the son BECs (150 k.y.l).

$$R_{BEC} = \frac{\alpha^2\,\mathscr{L}}{2\xi} = \xi^3\,\lambda\!\!\!^{-}_e = 1{,}426405651268 \times 10^{21}\ m \tag{73}$$

An unlikely observer from outside the bubble universe would see nothing, in accordance with the first "black hole" relation of this chapter.

$$\rho = \frac{3\,\mathscr{M}}{4\pi R_T^3} = 9{,}11790962627 \times 10^{-27}\,kg/m^3, \tag{74}$$

The radius R(T) noted R_T, of the universe, integrating the slowing down of the upper layer, is given by:

$$R_T = \sqrt[3]{\frac{N_{photon}}{4\pi\,\rho_{phot}}} = 6{,}32 \times 10^{26} m = 66{,}87\,Gyl \tag{75}$$

It is normally lower than that relating to the maximum expansion speed at 5 c, according to:

$$R'_T = 5\,R_{Hubbles} = 67{,}19\,Gyl \tag{76}$$

The difference comes from the slowing down of the leading layers, according to:

$$\Delta R_T = 5c - \frac{\gamma_{\exp}\,T_{Hub}^2}{2} = R'_T - R_T = 3{,}18\,Gyl \tag{77}$$

with γ_{exp} the slowing gamma given by relation (47). To verify the global curvature of the universe, we have the critical density with the Friedmann Lemaître equation:

$$\left(H^2 + \frac{K c^2}{\alpha^2}\right) = \frac{8\pi G}{3c^2}\rho, \tag{78}$$

with ρ from (74) and $K = R_T^{-2}$, as positive spatial curvature, we obtain H^2 according to:

$$H^2 = = \frac{8\pi G}{3c^2}\rho - \frac{R_T^{-2}\,c^2}{\alpha^2} = 5{,}568626881836 \times 10^{-36}\,s^{-2}, \tag{79}$$

The relation (79) gives: H = 72.734 km s^{-1} Mpc^{-1} or $2.3597926021\times10^{-18}$ s^{-2} and 13.44 Gy. These results are compatible with the WMAP measurements, i.e.: H_o = 73±3 km s^{-1} or $(2.35\pm0.10)\times10^{-18}$ s^{-1} and 13.77 Gy. Thus the critical density can be calculated according to:

$$\rho_c = \frac{3H^2c^2}{8\pi G} = 8{,}953370713\times10^{-10}\,J/m^3, \qquad (80)$$

The mass density ρ translated into Joules/m^3 = ρ_j = ρ c^2 = $8.953389966\times10^{-10}$ J/m^3, is compared to the critical density according to:

$$\frac{\rho_j}{\rho_c} = \Omega_m = 1+2{,}15037\times10^{-6} \qquad (81)$$

The curvature is positive because it is constrained by gravitation, consistent with the inseparability requirement of the inertial paradox.

29-5 Future of the observable universe: Constrained by the inertial paradox, and by the requirement of inseparability imposed by the obligation to provide an inertial zero, relation (81) indicates that gravitation is calibrated to eventually relocate all causally separated elements. By folding back on itself, the universe will be subject to a strong accentuation of galaxy collisions. This will go as far as the terminal collapse, the BIG CRUNCH. point where all masses will be relocated and therefore totally canceled. It is possible that radiative pressure will restart an expansion in a De Sitter-type universe state. The mass-space-time continuum (BECs) would then be diluted and in the permanent Omniverse. Everything will be able to start again with a near improbability of synchronizing strictly under the same conditions. The different universes that will succeed (or that preceded), subject to the laws of chance, will mostly have sterile ratios, to produce an expanding universe in which complexity can develop. But since time does not flow in this state devoid of mass-space-time continuum, the number of random trials becoming almost infinite, this probability will therefore not be zero to start again indefinitely.

29-6 Artist's impression of a galaxy surrounded by its halos:

We find the number 5 relative to mitosis, which characterizes the scales: 1) the central black hole which is the remnant of the original black hole galaxy on the fossil BEC; 2) the galaxy; 3) the halo of the black hole with a maximum BEC entanglement rate; 4) the halo of the galaxy with a high entanglement rate; 5) the intergalactic BEC-daughters with a low entanglement rate, to form the expanding space-time.

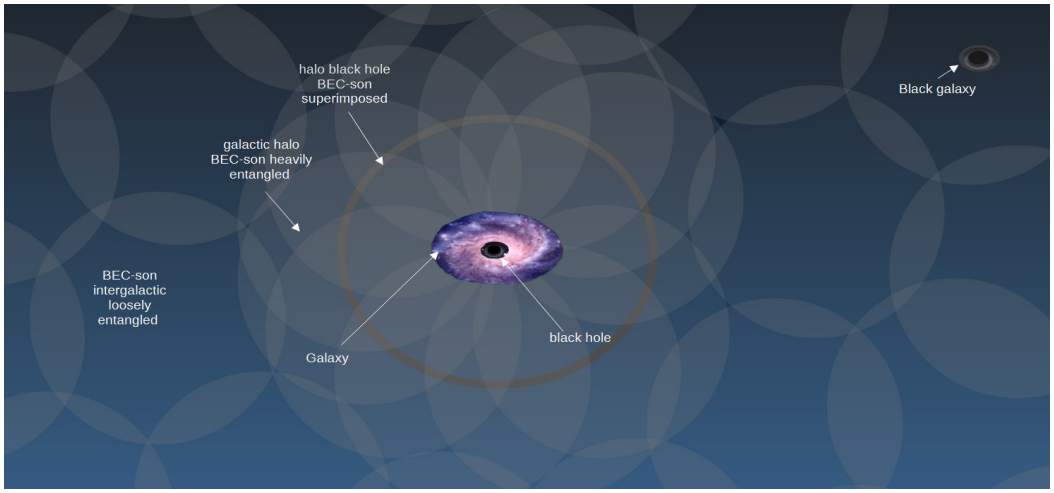

Fig. 46: Artist's drawing showing the 5 scales of galaxies. Consistent with chapter (21) there is a 5th constant force (gravitational component), which controls the size of the halo depending on the size of the galaxy. This is confirmed by recent observations [55].

29-8 Maximum expansion of the observable universe: This view, on a logarithmic scale, shows the daughter BECs having reached their nominal expansion. The trace of the fossil BEC is not real because it will have grown to the size of the final radius. Relations (70, 71) indicate that this maximum radius is ξ/α^2 times larger than the radius of the fossil BEC.

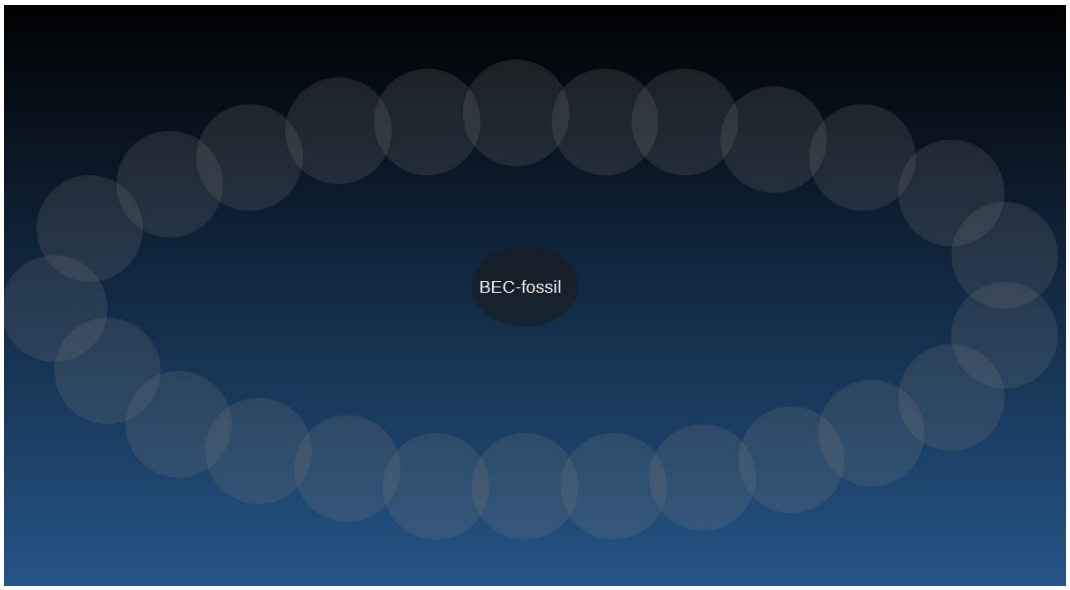

Fig. 47: artist's drawing showing the BEC-sons at the end of expansion.

30. The 5 universal ratios and the 11 powers of ξ

Einstein's notion of mass-space-time continuum originates here as a consequence of the inertial paradox. We have seen that this paradox is naturally resolved by the notion of symmetry, in the form of B.O.D.Y.S. dipolar oscillators. This is the only way to obtain, in

each element, a zero of a symmetrical nature, failing the almost impossible absolute zero. The oscillatory form reveals the 5 intrinsic components of the notion of inertia:

inertia	space	time	charge	grave
m	ℓ	t^2	q^2	g^2
	$f(1/m)$	$f(m.\ell)$	$f(m.\ell)$	$f(m.\ell)/\xi^4$

Tab. 48 ; At the quantum or subquantum scale, the inertial entity comprises 5 transdimensional components. According to relation (32), the parameter g is the gradient of the elementary electric charge $g^2 = \alpha e^2/\xi 4$. The particular and original causal separations (inflation), on the radial axis, have been compensated by the common relocation, on the tangential axis (Fig. 18).

The only entity common to all physical parameters is of inertial nature m. The inertial paradox is resolved by the symmetric zero in each B.O.D.Y.S, according to:

$$m\ell + m\ell' = 0 \qquad (82)$$

The inertial paradox imposes the obligation of algebraic zero and therefore the inseparability of the poles of B.O.D.Y.S and therefore a cohesive force of the type: $F = \chi.\chi' = m\ell.m.\ell'$. Obtaining the zero physical parameter is the only determinism of Nature. This determinism of the expectation of zero is in fact an anti-determinism.

30-1. Origin of Time: By definition, inertia opposes any type of variation of space over time. In the frame of reference of a B.O.D.Y.S pole, acceleration is inversely proportional to the variation of inertia, according to:

$$\frac{\Delta\ell}{\Delta t^2} = \frac{1}{\Delta m} \qquad (83)$$

Or:

$$\Delta t^2 = \Delta m \Delta \ell \qquad (84)$$

As the electron is an ex-synchronized pole, it comes in the form:

$$t_e^2 = \mathscr{B}\, m_e \lambda\!\!\!^{-}_e \qquad (85)$$

With $\mathscr{B}$ is the numerical and transdimensional adjustment parameter that should be set at the macroscopic scale. At this scale, dimensional analysis proceeds with a dichotomy between physical parameters, which allows coherence between the phenomena studied (§26). But this dichotomy disappears at the quantum scale to be replaced by coherence between the 5 components (fig. 48). This is the physical cause of decoherence at the macroscopic scale (§26). According to this study, the electron is the only elementary reference for any system of units. Thus the general form: $\chi = m.\lambda\!\!\!^{-}_e$ becomes: $\chi_e = m_e.\lambda\!\!\!^{-}_e = Cte$, is reducible to a single unit. It is the intensity of χ that fixes the notion of time of a cycle of the oscillation of the electron:

$$t_e^2 = \frac{3k}{2\pi} m_e \lambda\!\!\!^{-}_e \qquad (86)$$

avec le coefficient k = 1,000909769 de dimension s²/kg/m,

$$k = 1 + \frac{1}{8\alpha} - \frac{1}{\delta\alpha^2} - \frac{5}{\delta\alpha^3} \qquad (87)$$

we obtain $t_e = 1.288088666444\times10^{-21}$ seconds, with a numerical occurrence at 7σ with relation (88).

$$t_e = \frac{\lambda\!\!\!^{-}_e}{c} \qquad (88)$$

From the epistemological point of view, the relation (2): $e^2 = m_e.\lambda\!\!\!^{-}_e$ /Cte, had been written by realizing that the square of the elementary charge, is a component of the elementary moment of inertia χe. The internal and elementary force of the electron: F = e²/Cte, is therefore inherited from the B.O.D.Y.S according to: $F = f(m_e.\lambda\!\!\!^{-}_e \times m_e.\lambda\!\!\!^{-}_e)$. The general coherence of this theory, added to the numerous ultra-precise occurrences, indicate that the electron-positron pair (ex-separated poles) is the one and only elementary pair. The radius of the proton is given by expressing it in the relation (14) with the electron unit. Similarly relations (24, 25) explain the origin of its mass in the framework of fractal mitosis.

30-2. The 5 scales of the universe: Below are the 5 scales of the 2 states of the universe:

Stochastic	Synchronized			
Omniverse	Universe	RBEC	electron	Planck
undetermined	$\xi^6 \ell_P$	$\xi^5 \ell_P$	$\xi^2 \ell_P$	ℓ_P

Tab 49: The 5 scales of the 2 states universe.

30-3. The 5 evolutions of the inertial paradox:

Symmetry	Stochastic	Synchronization	Saturation	Separation

Tab. 50 ; The 5 evolutions summarized and represented by the 5 meanings of the "S" in the acronym B.O.D.Y.S. Symmetry is the only solution to resolve the inertial paradox. In reference to the 5+1 of the original fractal mitosis, we can add a sixth "S" for Stability. However, with a reservation on this term, because non-determinism implies that nothing is fixed forever. The Stochastic aspect is the consequence of non-determinism. The random probability of Synchronization in a BEC is unitary since time does not pass. Saturation comes from the reduction of the tangential elementary interval to a critical point, which allows the fusion between neighboring but previously causally separated poles. Separation is not absolute but only concerns the radial axis. It is strictly compensated by the gravitation born on the tangential axis.

30-4. The 5 scale ratios of a BEC:

ℓ_p	$\lambda\!\!\!^{-}_e$	ℓ_{pz}	∧	R_{BEC}
1	ξ^2	ξ^3	ξ^4	ξ^5
intervalle	electron	zero point	pole route	BEC radius

Tab 51 ; The 5 quantum scales of the BEC-son, which are the entangled elements, forming space-time.

30-5. The 12 ratios ξ:

ξ^n	settings
$\sqrt{\xi}$	W boson coupling ratio: quantum / subquantum
ξ	BEC-fossil : 1D ratio intervals: tangential / radial ; limit of the relativistic effect (cosmic rays)
ξ^2	BEC-fossil : 2D ratio elementary interval: radial / tangential ; number of stars ; fractal mitosis ratio
ξ^3	BEC-fossil : number of layers of oscillating poles
ξ^4	BEC-fossil : number of poles on the circumference ; force ratio: coulomb / gravitational
ξ^5	Ratio: R_{BEC} / (B.O.D.Y.S thickness)
ξ^6	BEC-son : number of poles per layer ; mass of the first stars expressed in electron units
ξ^7	primordial galaxy mass expressed in electron units
ξ^8	BEC-fossil : number of poles per layer ; primordial universe mass expressed in electron units
ξ^9	Number of B.O.D.Y.S forming star halo
ξ^{10}	Number of B.O.D.Y.S forming galaxy halo
ξ^{11}	Number of B.O.D.Y.S forming universe

Tab 52 : The 12 powers of the factor ξ, whose intensity is born by chance during synchronization.

30-6. The 11 ratios √ξ:

Quarks	*Mesure (MeV)*	*Sources (unité e)*	*coef χ*	*Résultats (unité e)*	*Résultats (MeV)*
u	*2,01 (0,14)*	$\chi\sqrt{\xi}/\alpha^2$	*3 / 2⁴*	*3,925648*	*2,006002*
d	*4,79 (0,16)*	$\chi\sqrt{\xi}/\alpha^2$	*5 / 11*	*9,5116*	*4,8630*
s	*105 (25)*	$\chi\sqrt{\xi}/\alpha^2$	*1*	*209,367*	*106,98*
c	*1250 (100)*	$\chi\sqrt{\xi}/\alpha$	*2×3 / 5*	*2390,091*	*1221,75*
b	*4250 (150)*	$\chi\sqrt{\xi}/\alpha$	*3*	*8391,02*	*4185,60*
t	*173 340 (7,6.10⁴)*	$\chi\sqrt{\xi}/\alpha$	*5!*	*344 291,26*	*175 932,24*
Bosons					
B	*200 909*	$\chi\sqrt{\xi}$	*1*	*393 169,1479483*	*200 909,0200847*
W	*80 403(29)*	$\chi\sqrt{\xi}\,k_5$	*2 / 5*	*157 356,9544*	*80 404,128066*
H°	*125 350 (150)*	$\chi\sqrt{\xi}/\tau_p$	*5 / 8*	*245 083,71198*	*125 237,519504*
Z	*91 187,6(210)*	$\chi\sqrt{(1+1/\alpha\,\pi)}\sqrt{\xi}/\tau_p$	*5 / 11*	*178 449,59109*	*91 187,555011*
X17	*17*	$\chi\,\tau_p\sqrt{\xi}/\alpha^2$	*π / 2*	*32,974*	*16,8498088*
Paramètres de la mitose en 5 étapes de Fibonacci : 1 ; 2 ; 3 ; 5 ; 8 ; $\tau_p = 1841 / 1836{,}15$					

Tab 53: The ratio √ξ comes from the coupling: B.O.D.Y.S (1D) → Composite particle (2D).

Summary

31. Helium, X17, Z and Fibonacci sequence

31-1 Hélium radius: By spectroscopy and muon ions, the mean radius of the helium nucleus was measured to be 1.67824(83)×10^{-16} m [55]. This measurement constrains theories beyond the standard model, to solve the enigma of the proton radius. From the relation (14) which gives its radius in relation to the Compton length of the electron with $\chi_e = m_e.\lambda\!\!\!^{-}_e$, the following relation gives the radius of the helium nucleus.

$$r_{He} = k_H \frac{2 r_P}{\sigma_P} = 1{,}678239499 \times 10^{16}\, m \qquad (89)$$

With the proton dressing rate (§ 6, 9) $\sigma_P = 1841/\,P = 1.0026399365$

$$k_H = 1 + \frac{2}{\alpha^2} + \frac{5}{\delta\,\alpha^2} = 1{,}0001180791 \qquad (90)$$

and $\delta = 23$ given in chapter 7.

31-2. Particle X17: This particle is measured at: 16.880±0.05 MeV [56] or 32.974 times the mass of an electron.

$$m_{X17} = \sigma_P \frac{\pi\sqrt{\xi}}{2\,\alpha^2} = 32{,}97425\, ue = 16{,}8498\, MeV \qquad (91)$$

The mass of X17, expressed in whole electron units, 34 *ue*, is consistent with:

$$3480 \equiv \frac{3}{2}(6 \times 34 + 276 + 1840) \qquad (92)$$

The table below shows that the entire bare mass of X17 = 34 corresponds to the 8th rank of the Fibonacci sequence. Starting from 5, it is in the 5th rank.

1	2	3	4	5	6	7	8
1	2	3	5	8	13	21	34
8 Fibonacci sequence							

Tab. 54: The fusion of two protons forms a deuteron with a neutron that has more mass than a proton. This comes from a subquantum contribution of two pairs, one of which is intended for the neutron and the other for the emission of a Majorana neutrino.

After the first 5 and 8 rows of the mitosis-expansion of the Fibonacci sequence, mitosis continues within the framework of complexity and evolution leading to the Golden Ratio and biological cells. Within the framework of the growth of disorder entropy and the laws of chance, complexity generates biological order, just as the informational entropy of the Omniverse produced the synchronization of the fossil BEC. Like all things, entropy presents a duality that contrasts with absolute values.

31-3. Z boson: This relation is in agreement with the measurement of the boson Z = 91.1872(26) MeV with coefficient 11 in table (9) (§7) and relation (31) relating to cosmic rays.

$$Z = \frac{5}{11}\sqrt{1+\frac{1}{\alpha\,\pi}}\;\frac{\sqrt{\xi}}{\sigma_P} = 1{,}78449\times 10^5\,ue = 91{,}1875\,MeV \qquad (93)$$

31-4. Abnormal neutron decay: Below is a diagram that shows a possible violation of the conservation of the baryon number [57]. K+, measured at 497.7 MeV, expressed in free electron units, is given at 966.1467 *ue*. But by expressing its neutral part in whole and bare electron units, we obtain: Kn+ = 972 *ue*. In accordance with table (8) (§6), this meson is forced to divide into 3 groups, each forming an even number. These three groups form two polarized intervals generating two quarks, as it should be. We actually verify: $K_n+/3 = K_{n3}+ =$ 324 *ue*. However, according to table (8) of chapter (6), the neutral part of the tauon is given at τ_n = 3480 *ue*. We find here a complement to chapter (7) with this exact relation with N = 1842 eu, the mass of the neutron expressed in whole and bare electron units:

$$\frac{\tau_n}{4} \equiv N - K_n^+ \Rightarrow \frac{3480}{4} \equiv 1842-972 \qquad (93)$$

By respecting the consistency of table (8) we obtain consistency with the new relationships of chapter (7):

$$\frac{\tau_n - N_n}{8} + 1 \equiv \mu_n \;\Rightarrow\; \frac{3480-1840}{8}+1 \equiv 206 \qquad (94)$$

And a link between: $K_{n3}^+ = 324$ and $\pi^o = 270$ *ue*.

$$K_{n3}^+ \equiv \frac{6}{5}\,\pi^o \;\Rightarrow\; 324 \equiv \frac{6}{5}\,270 \qquad (95)$$

This is consistent with a common origin for all particles, developed in Chapter 7. The dichotomy between particles, established solely on the basis of local experimentation, is unfounded.

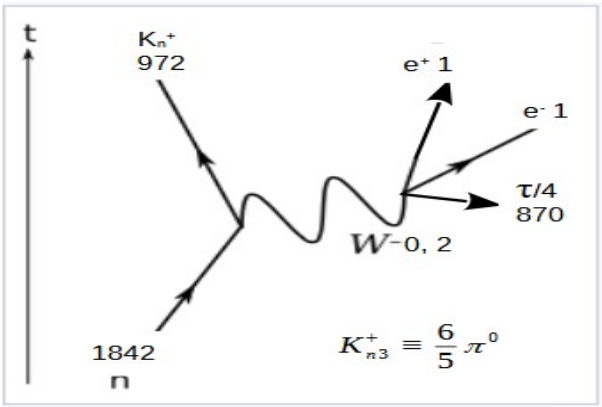

Fig 55 : A theoretical example of the possibility of neutron decay into a πo meson and the neutral part of a kaon.

This electron-positron pair is unstable because its extraction from the subquantum scale, via the W boson, is local, i.e., without causal separation.

31-5. Mitosis Fibonacci sequence and golden ratio: The link between mitosis and the Fibonacci sequence [58] at the prebiotic level is also observed for the growth of a population. Chapter (8-1) shows, with a numerical occurrence at 7σ, how the progressive fusion of electron-positron pairs in 5 phases of mitosis (1, 2, 3, 5, 8), forms the neutral part of the protons (1840 units). One can wonder where this determinism comes from, which, with the precise numerical values (ξ and 5), has the fine parameters that allow its existence, as observed. Once again, one must be aware of what can be achieved by a number of trials that tends towards infinity, purely random. Beyond the binary reasoning that takes us from "nothing" to perfection, there is the intense random mixing of the stochastic B.O.D.Y.S. of the Omniverse, which creates an incalculable number of sterile universes. Since at this point, time does not pass, the probability that one of these random trials can have the required fine parameters is unitary. However, if the parameters are sufficiently fine, they are not absolutely perfect, since chapter (8) indicates that the error coefficient $k_5 = 1.000504205$ (§8) remains. The following relation shows that if the links between: 5, π, φ, are strictly exact, the link with the mitosis factor ξ^2, presents an inevitable error coefficient. This coefficient k_5 is specific to the universe that we can observe.

$$5 \equiv (2\,\phi - 1)^2 \equiv \frac{\pi}{acos(\phi/2)} \;;\; \log_5(\xi^2) \equiv 2^5 k_5 \qquad (96)$$

Summary

32. Conclusion

To find the cause of the existence of the Universe, it is first necessary to identify and face up to the 72 enigmas of the standard model. This (unpublished) inventory contains common points that must be analyzed to discover their common origin. This implies an interdependence, because "everything is in everything." This interdependence does not allow for the structuring of independent articles by a dichotomy of the compartments of physics. It forces us to write a long article in which everything is linked. The analysis of this interdependence leads to the inertial paradox summarized by the relation (1):

$$\nexists\,(m > \varnothing)\;;\; \nexists\,(m \equiv \varnothing) \;\Rightarrow\; \exists\,(\Delta m.\Delta\ell + \Delta m.\Delta\ell' = 0_{\oplus}) \Rightarrow \begin{cases} \Delta m.\Delta\ell = \text{Cte} \\ \Delta m/\Delta\ell = \text{Cte} \\ F = f(m.\ell \times m.\ell') \\ t^2 = f(m.\ell) \\ \Delta\lambda\!\!\!^{-}_{e} = f(\Delta\ell) = f(\Delta m^{-1}) \end{cases}$$

The 31 chapters of this study refer to it. The direct consequence of the inertial paradox: $m.\ell = \text{Cte}$, $m/\ell = \text{Cte}$, is found in several known relations (§4, 5, 6, 10, 13, 14, 17, 26, 29, 30, 37). There is notably the relation (37) which solves the enigma of the anomalous magnetic moment of the electron. This relation confirms the ASPECT experiment, which stipulates that the spin of the electron has a non-local character. This relation clearly indicates that its

coupling with a pole of B.O.D.Y.S, gives the spin access to the non-locality of the BEC. The search for the common origin of the 72 enigmas allowed their resolutions. By definition, this common origin cannot be described and explained case by case, since it is part of a general mutual coherence. The overall link between the inter-causality of phenomena constrains the length of this article. The resolution also relies on specific occurrences with measurements and observations. The common thread of the inertial paradox is present directly or indirectly in each chapter. On a philosophical level, nothing prevents us from placing a divine origin upstream of the inertial paradox, which would carry the determinism of seeking absolute zero. But this approach cannot be mixed with a scientific approach. Einstein's phrase "*God does not play dice*" is both inappropriate and false. Indeed, anti-determinism, which is attached to the inertial paradox, clearly indicates that everything is random. The informative entropy of the Omniverse generates such a mixing, that it opens the way to a decrease of this entropy by synchronizing a part of the stochastic B.O.D.Y.S. The duality of locality [42] [59] [60] is the second key of the DUO5 theory. It is a variety of Bohm's theory on the subquantum scale [61] [62]. The common cause is consistent with the assertion that Nature prefers symmetry and simplicity [63]. The entropy in the sense of Shannon which reigns in the Omniverse, presents a duality [64] [65] with that which reigns in the observable universe. The DUO5 theory, answers the question "*why is there something rather than nothing?* » [66], specifying that "nothing" is a naive and binary view of the impossible absolute zero. There is no theory "*at all*" if it is limited to linking relativity and quantum theory [67]. The DUO5 theory refutes hypotheses of a mystical nature, such as the "*singularity*" which modestly hides the term "*creation*". Like Lavoisier, it is based on a process of transformation from the state of the eternal universe [68], [69], which is justified by the inertial paradox and all its actually measurable consequences. Historically, the fact that the local emergence of an electron-positron pair is unstable, pushed the physicists of the Copenhagen school to reject the idea that the electron-positron pair could be the element of all composite particles. The ξ factor is the third key to the theory. It arises from chance, after an incalculable number of random trials, until reaching the fertility criteria allowing a universe close to the observable universe. The fertility criterion relates to the ability to develop complexity. This underlies an incalculable number of aborted universes. However, the notion of fertility is not absolute. The theory shows that even after a number of shuffles that tends towards infinity, indeterminacy is inevitable. The degree of complexity is a function of the rank of the Fibonacci sequence and its proximity to the Golden Ratio, φ.

We note that DUO5 refers precisely to the couple 2 and 5, inherited from fractal mitosis and which appears in many relationships. In each of the B.O.D.Y.S forming the Omniverse, time does not flow. Without the flow of time, the immense entropy of informative type, opens a unitary probability of fertility. Below is the summary table of resolution of the 72 enigmas listed. The unprecedented inventory of these enigmas is a way of facing the problems head on. It differs from the case-by-case approach.

enigmas	chapters	enigmas	chapters	enigmas	chapters
01.acceleration expansion	19, 21, 28	25.galaxy halo	14, 15	49.particle causality (entangled)	3, 9, 28
02.alternative to creation	3	26.Higgs, W boson (origin)	8, 9	50.PPK particle	6, 7, 8
03.anisotropy expansion	19, 28	27.inflation (origin)	10, 17, 22	51.quark (origin)	17
04.anomaly moment magnetic	16	28.indeterminacy (quantum)	4	52.radius (classic electron)	15
05.anomaly age the first galaxies	27	29.inertia origin	3, 4	53.star structure (origin)	20, 27
06.anomaly deceleration Pioneer	21	30.locality (duality)	3, 18	54.strong force (origin)	19, 21, 29
07.antimatter origin	3	31.muon mass (origin)	6, 7, 10	55.space-time and curvature	4, 8
08.asymmetry matter	3	32.mitosis (origin)	8, 19	56.subquantum scale	4-2
09.boson fermion dichotomy	3	33.neutrino (structure)	10, 25	57.cluster (origin)	18, 27
10.cold hole Eridan	28	34.neutron-proton (structure)	6, 7	58.temperature halo	6, 7, 8, 12, 29
11.Coulomb force origin	5, 21	35.origin 5th force	21	59.time origin.	10
12.cosmic rays origin	11	36.origin early black hole	27	60.temperature cluster	27
13.constant speed c	8, 22	37.origin cosmos constants	8, 22	61.taon desintegration	8
14.dark matter (origin)	12, 27	38.origin gamma-ray burst	8	62.tunnel effect	8
15.decoherence quantum	26	39.origin universe	4, 8	63.universe (5 large structures)	30
16.electron-positron origin	10	40.pion particle	6, 7, 10	64.universe (mass)	28
17.elementary electric charge	5	41.photon structure	10, 24	65.universe, radius(t)	29
18.excess positrons cosmic rays	4, 11	42.Planck mass (origin)	23	66.universe (lifespan)	29
19.expansion universe (origin)	8, 19	43.Planck length	14, 17, 23	67.virtual particle	23
20.fine adjustment universe	8, 29	44.Planck time	29	68.wave packet reduction	28
21.fine structure constant	8, 18, 29	45.Planck constant	4	69.weak force	9
22.fractal aspect universe	8	46.proton radius	6	70.X17 particle	31
23.gravitation (origin)	8, 13, 14, 21	47.proton mass (origin)	6, 7, 8, 10	71.Zitterbewegung	23
24.galaxy (origin)	8, 14, 15, 27	48.preon particle	4, 17	72. Omniverse	4-1

Tab. 56: The relevant chapter numbers are placed opposite each enigma.

The local extraction of an electron-positron pair amounts to relocalizing the two poles of a Body. This relocalization makes the pair unstable. This operation is different from that relating to delocalization (radial causal separation) followed by a tangential relocalization of poles from different B.O.D.Y.S. In the specific context of a spherical composite particle, the W boson can extract a pair of poles from different B.O.D.Y.S. In this case, the pair behaves like the two opposite poles of a B.O.D.Y.S, but at the quantum scale. It is an electron neutrino. It is worth recalling the 5 fundamental forms of matter:

1) Local extraction by energy injection ħ ν (calibrated ν) ⇒ an unstable pair. 2) Local extraction by partial energy injection ħ ν/k ⇒ n EM frequencies.

3) Local extraction via the W boson ⇒ a stable pair in opposition: neutrino.

4) Local extraction via a black hole ⇒ an unstable pair: cosmic rays.

5) Causal separation and relocation between poles of neighboring B.O.D.Y.S ⇒ stable matter.

The fifth form results from a fusion that combines pairs into 2D layers. It has an unstable variant via the decay of cosmic rays into showers of diverse particles.

The fine parameters of a fertile universe are obtained by an incalculable number of random

trials. The small error rate of relation (23) indicates that absolute finesse is as impossible as absolute zero. Bell rightly pointed out that hidden variables could only be non-local and non-hidden. The notion of "*vacuum*" is too vague to describe the physics of space-time.

Summary

Conflicts of Interest

The author declares that this paper is not subject to any conflict of interest. John Wheeler

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References

[1] Risto Raitio; Stringy phenomenology with preon models; arXiv:2310.01463 (2 Oct 2023)

[2] Jennifer L. Nielsen; Is Bit It ? On the Theme of Wheeler's It From Bit; arXiv:1910.13280 (28 Oct 2019).

[3] Saul A, Kripke; Theorem and Direct Self-reference; arXiv:2010.11979, (7 Jun 2021).

[4] Nikolaos Dimitriadis and al; Pareto Low-rank Adapters: Efficient Multi-Task Learning with preference; arXiv:2407.08056; (26 Feb 2025).

[5] Lars Nelson; Mathematical Infinity and Equality Violate the Laws of Physics; ReaserchGate (2023/02/03).

[6] Pedro F. Gonzalez-Diaz; Sub-Quantum Dark Energy; arXiv: astro-ph/0311244,(4Mar 2004).

[7] Dominique Mareau; The Expanding Universe is Derived from the permanent Omniverse Justified by the Existential Paradox; viXra:2501.0150 (2025-01-28).

[8] Leizhen Chen et al; Observation of quantum nonlocality in Greenberger-Horme-Seilinger entanglement on a silicon chip; arXiv:2311.16745 (19 Apr 2024).

[9] Ricardo Gallego, Torrome ; On emergent origin of the inertial mass ; arXiv:2206.10582 ; (2022).

[10] Noemie Globus and Roger D. Blandford ; The Chiral of Life; The astrophysical Journal Letters; DOI10,3847-8213/ab8dc6,(2020 May 20).

[11]. Noemie Globus and Roger D. Blandford; Cosmic Rays and the Chiral Puzzle of Life; arXiv:1911.02525,(30 Oct 2019).

[12] Carl E. Carlson; The Proton Radius Puzzle; arXiv:1502.05314, (18 Feb 2015).
[13] N. G. Kelkar; F. Garcia Daza, M. Nowakowski; Determining size of the proton; arXiv:1203.0581,(2 Aug 2012).
[14] Dominique Mareau, Improving the Accuracy of Yoshio's Formula Koide, Journal of Physical Mathematics ; (2 Feb 2016).
[15] Alejandro Rivero Andre Gsponer; The strange formula of Dr. KOIDE ; arXiv:hep-ph:0505220, (25 May 2025).
[16] Vladimir Pletser; Fibonacci Numbers and the Golden Ratio in Biology, Physics, Astrophysics, Chemistry and Technology: A Non-Exhaustive Review; arXiv:1801.01369, (29 Dec 2017).
[17] Babatunde Sanni, Abiola Oyetoro ; The Golden Ratio and Fibonacci Sequence in Nature; ResearchGate; DOI: 10.13140/RG.2.2.24213.09447, (Feb 2024)
[18] Pasquale Di Bari ; On the origin of matter in the universe; arXiv:2107.13750, (27 Sep 2021).
[19] Fabian Heiße and al, High-precision measurement of the proton's atomic mass; arXiv:1706.06780, (21 Jun 2017).
[20] Charles T. Sebens ; How Anomalous is the Electron's Magnetic Moment?; arXiv:2504.21179, (29 Apr 2025).
[21] F. Terranova, G.M. Tino ; Testing the α_μ anomaly in the electron sector through a precise measurement of *h/M*; arXiv:1312.2346, (29 Apr 2014).
[22] Citation: K. Nakamura et al ; Muon Mass (Particle Data Group), JP G 37, 075021 (2012).
[23] CMS Collaboration ; High-precision measurement of the W boson mass with the CMS experiment at the LHC; arXiv:2412.13872, (18 Dec 2024).
[24] Guillaume Unal ; Higgs boson measurements at the LHC; arXiv:1811.10215, (26 Nov 2018).
[25] Ting-Hang-Pei ; The Superluminal Transmission Between Two Quantum Entangled Particles Based on the Micro Super-gravitational Sources; ResearchGate: DOI:10.13140/RG.2.2.27305.47206 (Jan 2023).
[26] Ruo Peng Wang ; Superluminal telecommunication: an observable contradiction between quantum entanglement and relativistic causality; arXiv:quant-ph/0505204, (31 May 2005).
[27] Marco Pettini ; Quantum Entanglement without non-local causation in (3,2)-dimensional spacetime; arXiv:2311.17070, (1 Feb 2025).
[28] Pavel Fileviez Perez ; New Paradigm for Baryon and Lepton Number Violation; arXiv:1501.01886, (17 Aug 2015).

[29] Rafael Alves Batista; The Quest the Origins of Ultra-High-Energy Cosmic Rays; arXiv:2412.17201,(2 Apr 2025).
[30] Souvik Bose and al, On the million-degree signature of spicules; arXiv:2503.08887, (11 Mar 2025).
[31] A. N. Wallbank and al ; A Systematic Comparison of Galaxy Cluster Temperatures Measured with NuSTAR and Chandra; arXiv:2211.00672, (1 Nov 2022).
[32] Ellen L. Sirks and al, Hydrodynamical simulations of merging galaxy clusters: giant dark matter particle colliders, powered by gravity; arXiv:2405.00140, (30 Apr 2024). ,
[33] S. Degl'Innoncenti and al, Time-Variation of Newton's Constant and the Age Globular Clusters; arXiv:astro-ph/9509090, (18 Sep 1995).
[34] Jonathan Taborda Hernández ; El experimento de Cavendish ; arXiv:2002.04082, (5 Feb 2020).
[35] Laszlo B. Kish ; "Gravitational mass" of information?; arXiv:0711.1197, (18 Jan 2008).
[36] Sauria Das, R. K. Bhaduri ; Bose-Einstein condensate in cosmology, Physics arXiv:1808. 10505 (23 Oct 2018).
[37] Takeshi Fukuyama et all; Cosmic structure via Bose Einstein Condensation and its collapse; arXiv:0705.3091, (22 May 2007). arXiv:0905.0173 (2 May 2009).
[38] Fukuyama Takeshi et all; Stagflation - - Bose-Einstein condensation in the early universe
[39] Mohamed Rameez; Anisotropy acceleration inferred from supernovae; arXiv:2111.14758, (19 Dec 2024).
[40] Eugene Wigner ; The Unreasonable Effectiveness of Mathematics in the Natural Sciences; COMMUNICATIONS ON PURE AND APPLIED MATHEMATICS, VOL. XIII, 001-14 (1960).
[41] John Anderson and al, Study of the anomalous acceleration of Pioneer 10 and 11; arXiv:gr-qc/0104064, (10 Mar 2001).
[42] Arend Niehaus; Zitterbewegung and the Electron; arXiv:1701.02998, (4 Jan 2017).
[43] W. A. Rodrigues and al, About Zitterbewegung and electron structure; arXiv:quant-ph/9803037, (14 Mar 1998).
[44] Stefan Soldner-Rembold; Photon Structure; arXiv:hep-ex/0009025, (8 Sep 2000).
[45] J. Turnau; Photon Stucture; arXiv:hep-ex/0102019, (9 Feb 2001).
[46] Huimei Wang, Xueli Miao, Lijing Shao; Bounding the photon mass with cosmological propagation of fast radio bursts; arXiv:2103.15299, (18 Aug 2021).
[47] M. Dracos; Measurement of the Neutrino velocity in OPERA experiment; ScienceDirect; DOI:2013.04.023, (Mar 2013).

[48] The KM3NeT Collaboration; Observation of an ultrahigh-energy cosmic neutrino with KM3NeT; Nature, (12 Feb 2025).
[49] Volker Bromm, Naoki Yoshida; The First Galaxies; arXiv:1102.4638, (22 Feb 2011).
[50] R. Shibata and al; Temperature Map of the Virgo Cluster og Galaxies Observed with ASCA; arXiv:astro-ph/0010380, (19 Oct 2000).
[51] Y Su and al ; Extended X-ray study of M49: the frontier of the Virgo Cluster; arXiv:1904.11899, (22 May 2019).
[52] E. Toloba and al; Stellar Kinematics and Structural Properties of Virgo Cluster Dwarf Early-Type Galaxies from the SMAKCED Project III. Rotation versus Pressure Support; arXiv:1410.1552, (6 Oct 2014).
[53] D. J. Fixsen ; The temperature of the cosmic microwave background; The Astrophysical Journal: DOI 10.1088/0004-637X/707/2/916 , (30 Nov 2009).
[54] 2. Astrophysical Constants and Parameters; PDG, (2023).
[55] Julian J. Krauth ; Measuring the α-particle charge radius with muonic helium-4 ions; Nature 589.527.531, (27 Jan 2021).
[56] Fernando Arias-Aragón and al, Combined Evidence for the X17 Boson After PADME Results on Resonant Production in Positron Annihilation, arXiv:2504.11439, (15 apr 2025).
[57] K. S. Babu and al, Baryon Number Violation; arXiv:1311.5285, (21 Nov 2013).
[58] William E. Butler, T. Bernard Kinane ;Ring shape Golden Ratio Multicellular Structures are Algebraically consistent with a Synergism between Asymmetric Mitosis and one to one cell Adhesion; DOI:0.1101/450528, (29 Oct 2018).
[59] Sarma N. Gullapalli ; A new perspective on causality, locality, and duality in entangled quantum nano systems; SPIE digital library (1 Feb 2019).
[60] Jeff Murugan et al; On complexity and Duality; arXiv:2411.02546 (4 Nov 2024).
[61] Antony Valentiny; Signal-Locality and Subquantum Information in Deterministic Hidden-Variables Theories, arXiv:qaunt-ph/0112151, (23 Dec 2001).
[62] Christophe Dewney ; Rekindling of de Broglie-Bohm Pilot Wave Theory in the Late Twentieth Century: Personal Account; Springer Nature Link, Volume 53, article number 24, (02 January 2023).
[63] Nature prefers symmetry and simplicity; University Oxford, (2022).
[64] Mark D. Reid, Rafael M. Frongillo, Robert C. Williamson; Generalized Mixability via Entropic Duality ; arXiv 1406 6130; (24 Jun 2014).
[65] Alexey E. Rastegin; Estimating the Shannon entropy and (un)certainy relations for designe-structured POVMs; arXiv:2009.13187 (28 Jun 2022)

[66] Peter Lynds ; Why something rater than nothing: The finite, infinite and eternal; arXiv:1205.2720 (10 Jan 2012).
[67] Marco Marmone-Capria; On the Incompatibility of Special Relativity and Quantum Mechanics; arXiv:1704.02587 ((5 Sep 2018).
[68] Damien A. Easson, Joseph E. Lenefsky; Eternal Universe; arXiv:2404.03016 (3 Apr 2024).
[69] A. Schlatter, RE Kastner ; A Note on the Origin of Inertia ; arXiv:2402.09365 (14 Feb 2024).