

Literature Review

New Scientific Progress Perspective with Proposed Revision of Current Physics Fundamentals

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Abstract

Conversely to widespread popular belief, different elder and newly established theories, including quantum mechanics, the theory of relativity, and of quantum vacuum, are not satisfactory in giving an account for different experimentally observed physical effects. This is considering that the corresponding physical qualitative description of observed effects, has not to be confused with its Mathematical-Physics treatment, which provides some virtual hypothetical statements. To be mentioned in a first step, the solid-state material physics and the undetermined time/location of quantum states, concerning the interpretation of the Raman effect, of Superconductivity and Semiconducting properties and of some endothermal material phase transitions of better performing advanced carbon materials which can then be used for many more demanding solid-state optoelectronic and mechanical applications, including the determination of the carbon phase content of asteroid providing improved knowledge on their origin. With the next steps, we discuss the validity of the developed theories of relativity and of quantum vacuum energy, referring to identified anomalies concerning the fundamentals of the optical properties of light, the description of the particle/wave duality, and the interpretation of the Doppler effect, and about the deflection of a light beam by some celestial bodies. All these, coming out to the rejection of the theoretical mathematical concept of the Space/Time curvature, and to some rehabilitation of the absolute Aether with newly defined specific properties. Last one, suggested to give account for several observed physical effects to be better complete interpreted, and particularly concerning the entanglement of distant subatomic particles, the interference pattern of discontinuously emitted single particles through young slits and the propagation speed of the light and of gravity waves which is suggested to be not constant, and which are opening new perspectives for an improved knowledge of the Universe.

More Information

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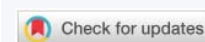
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1. Introduction

To show why some parts of established modern quantum mechanics and relativity theory have to be revised, we recall briefly how they have been developed in successive progress steps since the revolution of the classical Newtonian physics, and which have presented some insufficient description and interpretation of different observed phenomena [1-6]. With achieved progress in mathematics, could be define in more details the electromagnetic fields propagation, some structure and properties of atoms and materials and the corpuscular nature of photons coming to some revisited concepts of optics with the definition of elementary quanta of matter and electricity [7-11], and which could provide first coherent model for the photon and of the photoelectric effect [12,13].

It was then measured the relative motion of light was measured in dependence on the Earth's rotation [14] and

considered some relative motion of the earth within some aether [15,16], which has been rejected with some questionable arguments. Next steps, in coming back on the discovery of the deflection of light within the gravity field of a celestial body [17]. And with these results being associated with some new mathematical developments, it could be proposed by Poincaré and Einstein, some equivalence between mass and energy [18-20].

Considering new scientific reflections about some elementary scheme for the light emission [21], the wave/particle duality [22] with the corresponding wave mechanics and the description of particle diffraction and interference [23-26], it could be developed the concept of quantum mechanics with the definition of some abstract wave functions [27]. Those have been associated to the subatomic particle energy and probability of presence, in dependence of their potential



energy surrounding's and which are described, whenever to some limited extent, with the mathematical Schrödinger equations [27-31].

With the introduction of the Theory of Relativity [18-20] and its developments to the General Theory of Relativity [32-35] founded on a Space-Time concept with some abstract mathematical definitions of a space/time curvature, new models could be developed in order to find the physical elements which are causing the relative motion of the light [14-16] and of the discovered deflection of a light beam by a celestial body [17].

However, some mathematization problem of corresponding models [36], suggests questions about the complete validity of the current QM formalisms [37-40] and of the General Relativity Theory (GRT) [41-46] and about further theoretic subjects in relation with the new defined theory of the quantum vacuum energy (QVE) [47-49]. And altogether, we will discuss in next chapters with some examples of practical technologic and theoretic applications concerning for instance the better comprehensive characterization and mastering of more advanced solid-state deep tech carbon materials, which have been discovered in many celestial bodies and not only for their outstanding technical application interest. These questions concern other general fundamentals, with some revisited Field Theory, which are giving account for the entanglement of distant subatomic particles and of registered gravity waves, and providing new interpretation perspectives for observed universe astronomy phenomena.

For these achievements we will present some identified theoretical and experimental anomalies in different domains, which are rising questions about the complete validity of these modern theories and with some proposed new approach able to overcome those. We begin with some cases descriptions concerning the QM in § II, and about the GRT in § III, and with § IV we discuss other examples in relation with the theory of Quantum Vacuum Energy and with which in § V we propose some rehabilitation of the Aether theory with some new definition, before coming in § VI to the description of some of their new theoretical and practical possible applications and suggested to bring some improve knowledge and understanding of different observed astronomy phenomena.

II. Some observed anomalies with established QM

II.1. QM fundamentals and undetermined local/time and statistical description

Classical Newtonian physics describes the kinematics of macroscopic bodies with defined location and energy; however, it cannot be used for the complete description of electromagnetic waves and subatomic particle/wave dynamics. This statement was thought to be overcome with the association of some wave operators and functions with

the physical quantities [27]. This model could successfully provide the probability of some non-localized quantum energy state of corresponding subatomic particles. Without a physical meaning of the wave function [22-23]. However, this model could be pertinently used for rather simple cases, for which the mathematical formalism remains practicable [25-31].

Considering the evidence of the dual wave/particle nature of light quanta and of subatomic and atomic particles [21-26], it appeared that with the Heisenberg uncertainty principle, the space/time locality of an atomic effect, cannot be accurately determined with a measurement, whenever to be considered that the particles will have a "hidden" determined space/time state [27-28,50]. This is illustrated with the Schrödinger Cat model story, for which it is not known if he is dead or alive (although the cat will exactly know if he is alive and that he cannot be both dead and alive at same time) [51]. These aspects raised questions about the ability of QM to describe physical realities and whether the original QM theory is complete [37-40] and considering some observed strange aspects of the theory of Light and Matter [52]. And with another question, whether the QM description would remain undetermined [53], and a problem supposed to be overcome with some improved understanding of this, QM theory [54]. In order to find some better satisfactory response to this question, some new abstract mathematical approach has been proposed with the association of some hidden variables [55]. However, for which no physical representation can be established, and with other contributions which have presented some quantum collapse induced by gravity [56]. It was then stated that progress on physics fundamentals can be achieved without the necessity of better determined space/time locality, and what corresponds to the so-called Triumph of the Copenhagen interpretation [57], and often considered as firmly established up to now. However, we consider not satisfactory, considering further anomalies we present next and in order to try to clear them, with some proposed revision and with some new concepts.

II.2. Interferences of Photon and Electrons

Interference pattern of the Young slits optical experiment, and electron interference diffraction pattern show a distribution of well-localized stationary waves [58-61] with which leads to the conclusion that some of the emitted wave/particles will correspond to some well-defined time/space location, with their respective arrival on the interference area with corresponding same location and well-defined shifted time.

And this appears to be in contradiction with the Heisenberg uncertainty principle of the generated particles, for which it cannot be known their exact location with time.

Has to be noted here that the particle source is not an ideal geometric point, but corresponds in fact to a multiple source



of close neighbor decoherent emitting centers with which the emitted particles pass through the slits with different distances to the slit edges, and not all are generated at the same time. And therefore, not all of them are a priori able to interfere with some phase-shifted arrival time. This is however, shows that some well-space-time located wave particles will exist and be able to interfere on a well-defined spot, whenever, not predictable with QM [24-31].

Also, anticipating discussion about the validity of GTR, these interference experiments are showing some diffraction of particles passing close to the slit edges, which are subject to some path deflection with distance-dependent gravity. And for photons, this appears to be similar to the Soldner effect [17] we discuss next.

Considering some interference pattern obtained with single emitted particles of same particle/wave length (including either photons, or electrons or atoms), all these shows some determined space/time location [61,62] and further on, also, with some intrication at longer distances [63,64], we discuss in next chapter IV with some revisited quantum vacuum energy concept [47-49].

II.3. Solid-state material Hardness and density of cohesion energy

Considering the specific feature of nitrogen atoms, which has a smaller size than the carbon atom, having higher mass and a higher number of electrons, the Hardness of crystalline C_3N_4 materials had been erroneously predicted to be much harder than diamond of similar crystalline rhombohedral structure (face-centered cubic) with QM calculations [65]. The contrary is experimentally shown with the correspondence of hardness with the material density of enthalpy and with the amount of interatomic binding energy per unit volume, and is equivalent to a density of cohesion energy and which takes into account the local environment of the atoms [66]. Noteworthy is that within the crystalline structure of C_3N_4 , which has a higher atomic packing density than an ordered diamond crystal, the physico-chemical C-N binding energy (3,16 eV) is much lower than for C-C bonds (~7eV) [67-69]. Thus, explaining why with classical physics-chemistry fundamentals, the density of cohesion of C_3N_4 is lower than for diamond, in agreement with some technical measurements, which will again question the complete validity of the QM theory [40].

II.4. Material structure criteri for specific superconducting properties

The latest improved version of the Bardeen Cooper Schrieffer QM superconducting theory has not been able to predict the detailed atomic structure of newly discovered or synthesized high critical temperature Super Conducting Materials (SCM) [70-73]. And this, despite Mössbauer spectroscopy, which can display some hyperfine quantum states, and for which QM calculation could determine some

quite reduced phase transition gap in the meV range [74]. And only some reduced guidelines could be worked out up to now for the determination of some specific atomic structure of SCM with a higher critical temperature [75].

The electric conductivity of Solid-State materials is mainly defined by the recoil of the conduction band electrons on phonons, which depend on the material structure, on the interatomic bond energy and size, and on atomic masses, with which a channeling effect can be achieved for some specific structure [76-79].

No atomic structure phase modification has been reported for conducting materials being transformed to SCM, at a critical temperature [80]. This cannot be expected considering that the QM calculated quantum state transformation is in the meV range and much lower than for thermal and quantum electronic atomic rearrangements, and much lower than the electronic conduction band width, and therefore a reason to question the validity of the QM-based BCS theory.

Considering the strong interaction between conduction electrons and phonons, the electric resistivity will increase with temperature when the conducting electrons are more efficiently scattered by phonons of higher oscillating amplitude. An effect which is thought to be reduced to zero, when the local structure dependent phonons have some time/space located lattice resonance frequencies which are spatially synchronic with The displacement velocity of the conduction electrons, all the more, when the phonon vibration amplitudes, are reduced, with lower temperature.

With these assumptions, we developed a semi-classical/quantum superconductivity description, which explains, for instance, why some layered graphenic materials have better SCM properties than crystalline diamond [81,82].

II.5. Raman spectroscopy and material structure characterizing

Raman spectroscopy of massive homogeneous materials of well-defined ordered, quite defect-free crystalline single homogenous structure shows unique characteristics quite sharp Raman peaks (well shown with a ordered single crystal diamond and defect-free single layer graphene, for instance), and which can be calculated with QM [83-85]. And this is in contrast to disordered polyphasic structures, for which some superimposed Raman bands appear [86-95].

A disordered atomic structure has a distribution of interatomic bonding distances with different binding energies, which causes a distribution of corresponding resonance frequencies; meanwhile, well-defined, sharp peaks will only correspond to some well-ordered material structure [85,86]. Refined Raman microanalysis shows that Raman results depend on local, particular atomic bulk and edge structures [96,97]. And these effects cannot be predicted with current



statistical QM, conversely to some modified QM giving a better account for local photon/ electron/phonon interactions and in making use of classical mechanical phonon wave propagation, which can form local stationary waves [83]. Also, to consider that Raman spectroscopy spectra are showing a dependence on internal mechanical stress (either compressive with a spectral upshift, or tensile with a downshift), which can correspond to the superimposition of some specific bands. This can cause dramatic confusion in the interpretation of similar Raman spectra shapes, when the different sorts of stress have not been correctly identified [83-95].

II.6. Thermal and Quantum electronic activated phase transformation

Internal and externally applied stress are affecting the mechanical properties and the adhesion strength of thin film materials and which can be annealed with different means. However, the annealing processes can induce different sorts of atomic exothermal and endothermal rearrangements with material structure modification, which can be locally identified with Micro Raman spectroscopy [96,97]. It is known for a long time that chemical reactions can be either exothermal or endothermal, whenever not always predictable, and thermodynamically fully understood. They correspond to some differentiated material phase transition:

a) The atomic rearrangements towards some thermodynamic groundstate during temperature annealing with thermal activation energy (range $T=300K \sim 0.025eV$),

b) The endothermic atomic rearrangements, with much higher quantum energy activation ($\sim 1eV-10 eV$ and more), and which compete against the first one [98].

The last effect is clearly shown, with differentiated carbon material states [99] for which some phase transformation from graphenic materials to harder diamond-like materials can be observed (crystalline or tetrahedral amorphous diamond ta-C).

This is achieved with higher quantum activation energies. With UV ($\sim 3 eV$ up to $5 eV$) and other much harder radiations, or with the release of Electric Neutralization Energy, and with different Chemical Recombination Energy Release (CRER). For instance, with H atoms recombined to H_2 ($\sim 5 eV$), and N atoms to N_2 ($\sim 12 eV$) [99].

These effects cause some local modification of the corresponding material atomic packing density and of its cohesion energy which affect the material mechanical and opto-electronical properties (with local formation of corrosion and cracks and modification of their semicon and electric properties [97-99], and not predictable with QM and suggesting again, why some parts of QM need to be revised [37-40].

III. Anomalies of the generalized relativity theory

III.1. Questioning some GTR fundamentals

With the mathematical abstract GTR time/space curvature concept could be postulated that the higher light speed limit and it could be established some velocity-dependent mass, time, distance, and energy of a moving body [32,33]:

$$m = m^0 \sqrt{(1-v^2/c^2)}, t = t^0 \sqrt{(1-v^2/c^2)}, \Delta x = \Delta x^0 \sqrt{(1-v^2/c^2)}, \text{ and } E = mc^2 = E^0 \sqrt{(1-v^2/c^2)}.$$

Some paradoxical situations could be found with which the validity of the GTR theory has already been questioned and refuted. Whenever some of its aspects appear univoqual confirmed ($E = mc^2$), others will correspond to some collapsing abstract mathematical development, and for which we give some examples next.

a) The problem of a particle to be described with GTR was raised by Einstein, considering its wave/particle duality [41-43].

b) The twin paradox, with which one of them makes an intersideral travel before coming back with an age different from the other, anyway never been proved up to now and appears in conflict with common human sense [44].

c) The clock paradox revisited by Darwin [45], who observed that the velocity-dependent relativistic time is not necessarily in accordance with the time indicated by a clock with its modified geometric parameters due to its displacement velocity.

All suggesting to revisit the space-time concept that we propose in § III.2.6.

III.2. Different paradoxical optical effects

III.2.1. Wave packet and soliton model description of the photon emission: The photon particle used to be described in the form of a wave packet, considering the discontinuous photon flux of the light, and to give account for the Maxwell electromagnetic wave propagation rules [7,31,100]. However, this concept reveals some strange aspects of the theory of light for which QM and GRT do not give an account [52]. The defined time/space single decay of some activated electronic quantum state, within the atom emitting the photon, suggests that it is generated in the form of a soliton [101,102], in agreement with identified Light-Matter interaction effects [103], and confirmed with the detection of a single photon with modern ultra-fast semi-conducting Quantum dot devices [104].

III.2.2. Virtual or Real mass of a photon:

a) A gravitational lens effect was observed by Söldner in 1809 [17] with a photon trajectories being modified when passing near massive bodies (like the moon), and which later

on has been confirmed and generalized with other bodies of different geometries [105,106]. An effect which can be described with the quite abstract GRT [17-20, 32-35,107] and which appears similar to the trajectory deflection of bodies with a Newtonian gravity mass [1,2]. Thus, raising the question of whether photons have a mass [108] in contrast to elder established belief [6,100].

With the evidence of equivalence between mass and Energy [18-20], and considering the specific energy and impulse of photons [22-23].

$$E = mc^2 \text{ with } E = h.f = (h/2\pi) \omega = h.c/\lambda. \text{ and } p = h.\lambda = hc/f$$

it can be at least defined as a frequency dependent virtual phonon mass

$$m^* = h.f/c^2.$$

(b) Light radiation pressure and photon momentum:

Considering that a light flux with the impulse (momentum of the photons $p = h.\lambda = hc/f$) is exerting a mechanical radiation pressure on a material body surface [109], this suggests that the photon has actually a mass which can be calculated with the considered photon energy and frequency. Thus, a photon deflection effect to be much easier described with the classical more figurative Newtonian physical gravity, than with the more abstract and complex GTR [32,33] and for which is to be questioned its pertinence.

III.2.3. Optical Doppler effect and its lack of energy and momentum conservation: Considering the displacement velocity difference between a wave emitting source S and a receiver R observing the corresponding propagating wave with a velocity c in a reference space, an optical Doppler effect could be evidenced by Doppler [110] in observing a wave frequency shift Δf . An effect which appears similar to the mechanical waves Doppler effect, in fluids and elastic solids different from vacuum, including acoustical waves in air [111] and in elastic materials [112-119] and which is concerning electromagnetic waves as well [7,120]. With

$$\Delta f = (\Delta v/c). f_0 \text{ and } f = (c+vr) / (c+v_s)$$

the difference of the generated frequency at the moving source and received frequencies of a photon (with source displacement velocity v), corresponds to differences of Energies and Impulses,

$$E_0 = h.f_0 \text{ at its source } (f_0 \sim f_s) \text{ and } E_r = hf_r \text{ and}$$

$$p_0 = h\lambda_0 = hc/f_0 \text{ and } p_r = hc/f_r$$

And showing that the principle of energy and impulse conservation is not respected.

The question is then what is causing the ΔE and Δp differences.

This cannot be explained with the electronic band

transition mechanism which is generating the photon if considered that the energy band levels are independent from the atom velocity. Whenever explaining the origin of the different modes of longitudinal, transversal and helicoidal light polarization, considering the geometric 3D distribution of the electron displacement around the atom core [46,121].

With Figures 1,2 we give a schematic representation of a photon emitted from a moving atom and which shows how the original frequency will appear modified with the relative displacement velocity of the emitter and/or of the receivers.

The gained or dissipated energy must obviously have been produced and associated to this above-described frequency shift mechanism. However, which cannot be conceived without some existing medium, in analogy to what is known to exist with the mechanical wave transmission Doppler effect of sounds [111-119].

Considering the angular Momentum in QM applicable to the electrons of an atom [121], the optical Doppler effect appears modified for transverse light polarization [122,123]. In such case, the apparent source displacement velocity relative to the emitted photon direction is reduced and the Doppler frequency accordingly.

Noteworthy, is that no doppler effect is observed for Γ rays [124] being emitted from a source moving perpendicular to the light emission direction on a circular trajectory to the observer. In such a case the apparent source displacement

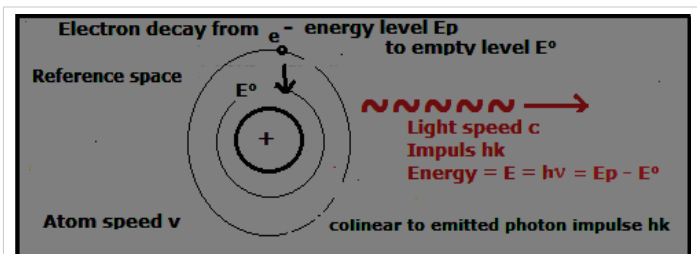


Figure 1: Schematic representation of a photon emitted by an atom, with some oriented electronic decays giving account for different sorts of polarized photon emission in form of progressing polarized wave soliton.

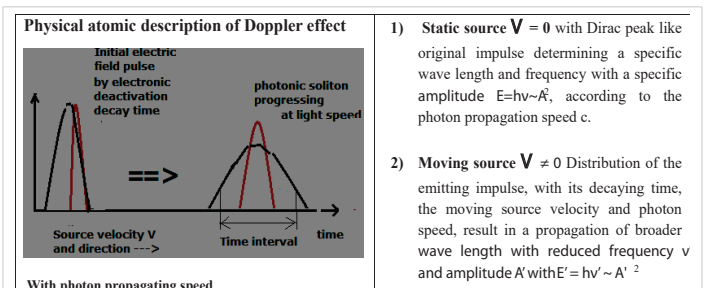


Figure 2: Schematic representation of optical Doppler effect with some time delayed emission of a photon for which the original impulse is distributed according to the photon propagation speed and which affect its soliton wave length and corresponding frequency with its reduced amplitude. corresponding to observed Doppler frequency modification with A the soliton wave amplitude) with $E \sim A^2 = h\nu$ and $E' = h\nu'$ depending on source velocity V.



velocity relative to the photon direction is zero and why no Doppler effect can be registered. All these raising the question about the existence of an Aether and therefore, about the validity of corresponding GTR saying that this Aether would not exist [32,33,125-127]. And consequently, to raise the question about the validity of the geometric distances and time dependence on the displacement velocity of a referred space.

III.2.4. The invariance of the light speed and the optical doppler effect: The Michelson & Morley experiment, is showing some invariance of the light speed propagating direction to the earth surface displacement [14] and in agreement with other experiments, showing the invariance of light speed in vacuum [128].

A corresponding optical Doppler effect is then expected, however, which cannot be observed when the velocity of the emitted light source is negligible in comparison to the light speed, however, which is suggested to be possibly registered with modern and faster more performing devices [61,103,104,129,130].

With this fundamental experiment, it was quite hastily concluded the non-existence of the Aether [125,126], and what appears likely to be the opposite, considering that within a defined isothrope wave propagating medium, the wave propagating speed is always constant for any direction. This is against the GTR foundation [32-35], however, a question for which some response can be provided with the proposed a Quantum Vacuum Energy theory [47-49], we discuss in next § IV.

III.2.5. Maximum speed of Light and of transportation: With the measured light speed constancy in astronomy and with observed independency of the light frequency, it has been postulated some maximum light speed and considered a physical standard reality [131,132]. However, this was stated, without knowing if some higher light speed can be elsewhere registered. With the mass of a solid body particle being higher than photons, and taking into account the wave/particle duality [22-26], the Wave-Frequency/Energy and Energy/Mass equivalence [18-20], it was concluded that the speed of a particle cannot be faster than light [32,33]. However, it could be measured some higher speed of particles than light, in contrast to these QM/GTR statements, i.e; the superluminal emitted nuclear particles of the Tcherenko effect (blue light emission in water) [133], and also, with the apparent higher velocity of galaxies and of faster tunneling transportation than light [134-136].

Well-known is the reduced light speed in a transparent material, all the more the material has a higher atomic packing density (i.e. diamond), in consequence of an increased number of Photon/Phonon scattering with different photon reemitted direction [137] which is increasing the photon path and its transport time and finally decreases the apparent photon

speed. It can however be observed that this apparent light speed is less reduced when the temperature is getting higher, when some higher impulse is transmitted to the reemitted photon [138].

A Doppler frequency shift can be observed, with the atomic oscillating speed variations and used for the measurements of corresponding thermodynamical parameters, and with some light speed dependence on frequency [139]. In analogy to the light for which some superluminal speed exists, supersonic speeds of solid bodies moving in different sorts of fluids [111-119] are also, well-known to exist, and for which some wave propagation speed variations on the fluid properties have been reported and which are dependent on the mechanical wave frequency [140].

This suggests, in analogy to medium fluids where mechanical waves are propagating, that the vacuum where the light is propagating might have either, some specific properties and which is not only concerning transparent materials. This was leading to the proposal of an abstract concept of Quantum Vacuum with variable density of Energy. This is supposed to clear some of the paradoxical aspect of the light transport, what we discuss in next §IV and with which will be suggested the rehabilitation of the absolute Aether concept.

III.2.6. Definition of time and its relative displacement velocity dependency: The GTR with its definition of some abstract space/time concept, is predicting the time to be dependent on the relative velocity of some moving object where the time is defined and measured in some defined reference space with $t = t^0 \sqrt{1 - v^2/c^2}$ [32-34]. The time is defined with what a clock is indicating and for which the most accurate way to do it, is to use optical and electromagnetic waves of higher frequencies [141]. However, considering the optical Doppler effect we have discussed in § III.2.3, the received frequency is modified with the relative speed of the emitting light source. And this appears to be the consequence of some Dirac peak like electric pulse which is generated with some electronic energy level transition (decay), in the vacuum space of the considered atom between its subatomic particles. This original impulse is thought to generate a soliton wave with its specific energy and wave frequency. And, assuming that the light speed c is constant (at least in the space of the experiment) it will be predicted a shift of the corresponding wave length, (Figures 1,2). Some symmetric inverted process is then occurring on a moving observer position, where the soliton wave is activating in a photon detector an electronic transition. Thus, why the relative speed between emitter and receiver is to be applied.

Considering that the time is measured with some photon frequency and wave length, the time measured with some defined photon frequency will appear velocity dependent, although corresponding only to some optical Doppler effect and with which, basing on mathematical foundation, is providing only a virtual existence of the Lorentz factor



$\sqrt{(1 - v^2/c^2)}$ [15] and a time velocity dependance which correspond in fact to the time measurements achieved with different clocks working on the basis of different scale frequencies.

A model which appears compatible with the above other mentioned refutation arguments [43-45] which is respecting the principle of energy and momentum conservation during a Doppler experiment, and in considering some Photon/Quantum-Vacuum interaction within the atomic core where the photon is generated or received [47-49]. And another reason to refute the GTR [40-42].

IV. Limits of the Quantum Vacuum Energy concept

IV.1. Quantum field theory and Quantum Vacuum Energy

In order to explain why with the Doppler-effect the energy and momentum conservation rule is apparently not respected, it is suggested to find some interaction within the vacuum environment of the emitting atom. For this achievement, has been proposed a Quantum Theory of Fields [142], which consider that a particle free vacuum, is not necessarily free from electromagnetic waves content with specific quantum energy and density and corresponding to a quantum vacuum energy concept [46-49]. The ground state of this quantum system is supposed to be not necessarily corresponding to a total absence of an internal energy and which is then defined as a zero-point energy [14,143]. This Quantum Vacuum with its electromagnetic wave content, can consider some Energy and Momentum exchanges with the subatomic particle with its dual wave/mass description [16,23-26].

It appears that this Quantum Vacuum with the associated Theory of Fields is likely corresponding to some new Aether definition which is compatible with some modified QM and GTR, considering that with established original content, no absolute reference space and time is supposed to exist [14-15,52,125-127]. In order to clear this question, we come back on some more recent experimental results.

IV.2. Newly discovered Quantum Vacuum effects

IV.2.1. The Casimir effect: With the definition of a Quantum Vacuum, could be identified some particular attraction between two perfectly conducting plates which suggest some induced modification of the gravity field between these plates and which can validate some equivalence between quantum vacuum energy and its mass [144-146] and explaining the modification of the gravity attraction between these plates and what cannot be described with classical theory foundations [129].

IV.2.2. The Scharnhorst Effect: Faster and modified light velocity than usual light speed limit in a vacuum could be measured in the vacuum between close neighboring plates

and parallel mirrors in considering that the quantum vacuum field can be modified with some photon irradiation and which is changing the corresponding Quantum Vacuum Energy [147-149].

IV.2.3. The Unruh Effect: Basing on the optical Doppler effect described with GTR, and with the supposed existence of a Quantum Vacuum containing energy in form of electromagnetic waves, an Unruh effect was mathematically predicted with which a relative to a solid-state source moving observer will detect some black body radiation, and which is not detected, when no relative speed difference exists [150].

However, an effect which could not be observed up to now and representing a quite challenging task, considering that its principle appears to be confirmed with the registered broadening of a Doppler effect of light emitted by the atoms of a thermal agitation (currently used in thermometry). The question will then be, for which relative velocity and with which sensitivity, and for which range of non-visible black-body radiation a Doppler effect can be registered [152].

IV.3. Gravity waves

The gravity is known since Newton, to correspond to some attraction between neutral massive bodies [1-5]. This gravity field is supposed to be transmitted across a quantum vacuum with the speed of light [154-156].

It is then to be considered the generation of gravity waves within a Quantum Vacuum Medium with a Mass Strike (Dirac peak like transient variation of the mass of a localized body), in accordance to experimental registration [157,158] and which is suggesting some similarity with different other sorts of wave propagation.

a) The propagation of acoustical waves within some fluids or some solid-state medium) being generated by a mechanical pulse [111-114].

b) The propagation of an electromagnetic wave within a Quantum Vacuum which is generated by an electric field strike [7].

With some corresponding expected Doppler effect being transposed to gravity waves, a conceptual problem appears for the gravity physics, considering the difference between an electromagnetic wave which is propagating in a Quantum Vacuum for which the optical Doppler concept is to be applied and a mechanical wave which is propagating in a medium with associated mass [159] and for which acoustical propagation speed is to be considered, meanwhile the experimental gravity wave are registered with the light speed [160,161].

The conceptual problem is to be solved in considering some equivalence between Energy (of the quantum vacuum) and mass (of a material) [162] and for which the Einstein equivalence $E = mc^2$ [19,20] is proposed to be used (§IV.5).

IV. 4. Quantum Entanglement between particles

IV.4.1. Space-Time determined states and Violation of the Bell inequality

The analysis of single photon self-interference in the Young's double slit experiment confirms the existence of longer distance interaction for these particles [163] and different experiments operated with modern faster and more accurate detection devices and at different scales, have shown that intricately emitted particles, can stay coupled when separated after longer diverging travel and for which the coupling effect transmission is quasi-instantaneous [63,64]. This corresponds to the so-called "Violation of Bell Inequalities" [164-166] which is postulating that a particle has either a determined location (without some determined time) or with a determined time (without some determined location) and never both together and what is contradicted with these entanglement experiments.

IV.4.2. Non complete theory of Q V E and Refutation of GTR

GTR theory supporting the Bell inequality, appears to be not complete and again to be questioned, when not able to give account for the entanglement effect observed for longer distances with instantaneous coupling. Further-on, GTR considers that with the measured light-speed constancy, that no absolute space-time references can exist [125-127], meanwhile the new experiments show the contrary.

And the theory of the Quantum Vacuum Energy appears either non-complete for this instantaneous entanglement coupling effect, for which its zero-point energy definition with its electromagnetic waves content, only give account for a possible signal transmission delay. Altogether, in accordance with former refutation arguments [46-49] and above-mentioned anomalies, and leading to another refutation of the GTR [166,167]. Meanwhile some aspects of the QM [38,39,46,52,83] and of the original GTR with the Energy Mass equivalence ($E = mc^2$) [19,20] appear still valid. And with which is suggesting the rehabilitation of an Aether concept with revised definition, we describe next.

IV.5. A proposed rehabilitation of the Aether theory with new definition

The observed apparent invariant light speed with the Michelson and Morley experiments [14,15], with our reasoning point of view, is suggested - in contrast to established statement- to prove the existence of some Aether [125-128]. This, in considering some analogy with the mechanical wave propagation mechanism in fluids, for which the propagation speed of wave generated by an original impulse is not depending on the source velocity and constant for any direction (Figures 2,3).

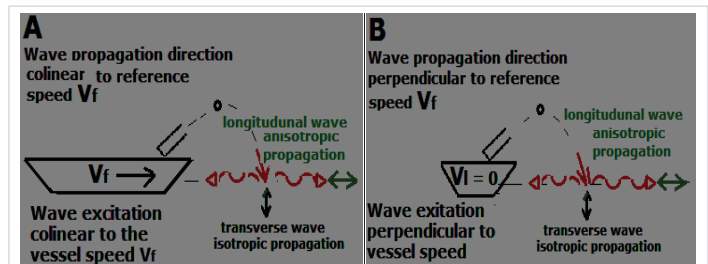


Figure 3: Example of wave propagation speed independent from displacement direction and speed. Only depending on the propagating medium properties, suggesting contrary to Michelson-Moley light speed experiment, that an Aether with specific properties exists

Basing on different reported preceding effects in relation with a Quantum Vacuum and its Quantum Vacuum Energy, and with the Theory of Fields [47-49,142], we define an Aether with specific properties with principle of equivalence of Mass/Energy $E = mc^2$ (being not questioned because experimentally confirmed) [19,20]. What we apply for the Quantum vacuum concept (QVE), which is then to be considered as a fluid, with distribution of specific masses and of some specific subatomic particle interactions.

In postulating, that same sorts of fluid mechanics equations than for incompressible fluids, can be applied, and we have proposed for a new approach of a Unity Field Theory, described elsewhere [168]. With some analogy to the Vorticity and the Vortex of dynamics in fluids [169] and considering several specific quantum Mechanics aspects, we suggest that subatomic wave particles can be represented with different sorts of Vortex. This, in making use of different sorts of QM angular momentum with fundamentals of electricity and magnetism [121,170]. And in analogy to what exists with Ball lightning and Ball and Toroidal magnetically self-confined plasmoids [171,172], this Aether model is suggested to provide some physical description of subatomic particles and of their interactions [168,173-175].

V. Perspectives of new applications for astrophysics

V.1. Mastering of advanced Carbon material applications

Considering the revision of some QM fundamentals being used for the better differentiated characterizing of more advanced carbon material species with superior combined mechanical, thermal and optoelectronic properties, this is not only opening some route for the mastering of many new more demanding technologic applications (including Mechanical, Tribological, Opto-electronical, Optical, Medical, Transportation systems and more efficient and cheaper Nuclear, Renewable and Green Hydrogen Energies), being discussed elsewhere [83-99,176].

It concerns also, the improved knowledge of Biology and Astronomy fundamentals basing on astrophysical history and on observed astrophysical effect [177,178]. Notwithstanding

that carbon materials are essential elements of organic chemistry and tracer of astrophysical and geologic origin and development, for which it will be important to have their possible phase transformations well understood and correctly characterized with some avoided loopholes of current QM and GTR theories.

Considering that their implementation is confronted to the selection of the right species and properties and to some problems concerning in example their possible internal stress dependent adherence, and which can be driven with appropriate spectroscopic tools and especially with the Raman spectroscopy [83,98,99] (Figures 4,5).

It is then expected the possible achievement of different goals such as:

a) Optimization of different devices in relation with more efficient and cheaper electricity production, concerning up

to ten times more performing green energy devices, than presently homologated ones, in using mastered combined higher properties of specific carbon materials with tunable optoelectronic and other adjustable mechanical and thermal and optical properties [99,176].

b) Feasibility of some low energy BETHE-WEIZSÄCKER nuclear fusion reactor, basing on the observed C-N-O fusion processes in red stars [177] and where protons can have a nuclear interaction with carbon atoms with high enough cross section, when the carbon material has an amorphous dense structure (corresponding to amorphous tetrahedral carbon (ta-C). The thermal degradation to less dense graphitic materials, is then expected to be rearranged the denser ta-C, with the H₂ recombination energy release able to generate electronic quantum energy activation.

c) Origin of astro-physical bodies with identified selective carbon structure [178].

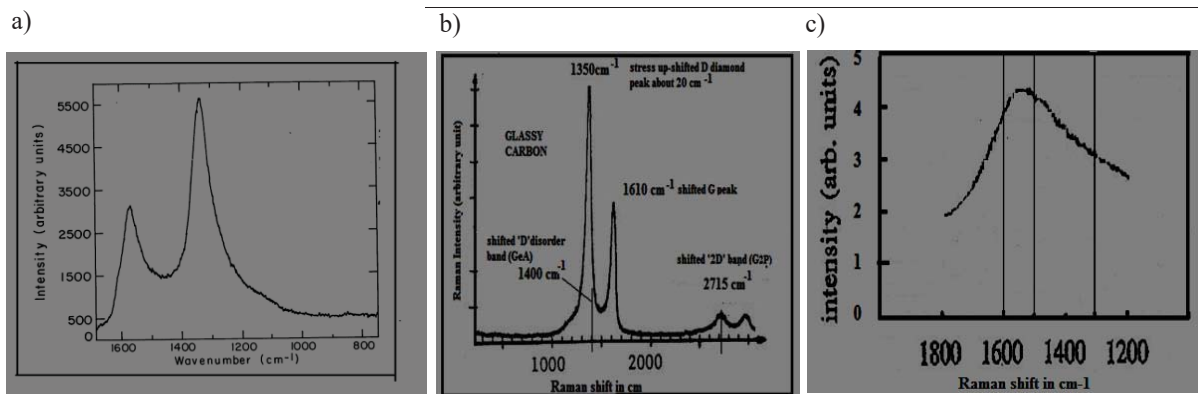


Figure 4: Raman spectroscopy of different carbon materials. a) polycrystalline [90] b) monocrystalline & disordered diamond [95], c) amorphous tetrahedral carbon [94]. Confusion on assignment of Figure 5. c) with annealed ta-C is avoided in considering stress shift, different sorts of atomic rearrangements and superimposition of neighbor bands specific to local Raman effects not predictable with current elder QM theory with spectra.

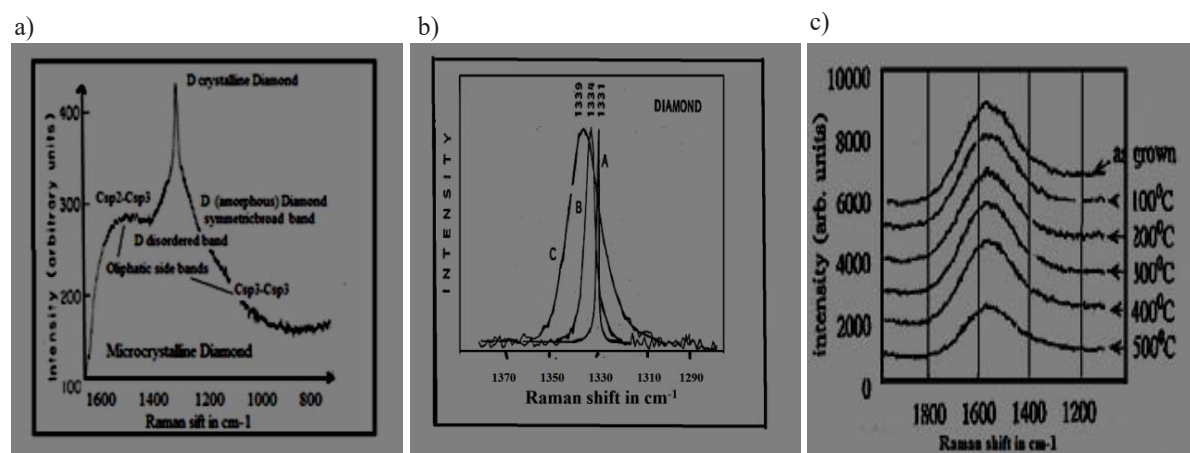


Figure 5: a) D Diamond like carbon peak (diamond) at ~1330 cm⁻¹ imbedded in disordered graphitic sp² clusters G peak at ~1580 cm⁻¹ and disordered sp² cluster edges breathing modes at ~1350 cm⁻¹ [90, 95]. b) 25 cm⁻¹ upshifted Raman spectrum of H6 diamond peak ~1350 cm⁻¹ (different from previous disordered sp² cluster edges in a). And weak disordered sp² cluster edge band (formerly so-called D disorder peak/band) up-shifted to ~1400 cm⁻¹ breathing mode. G graphite peak upshifted to ~1605 cm⁻¹ and with 2D overmodes [91]. c) Confusion of non-stress-shifted soft amorphous graphitic carbon spectrum of Figure 4. c) With similar spectra obtained with annealed ta-C annealing (reducing to some limited extent the stress and the corresponding stress shift) [89].



d) New mechanisms of early earth life appearance, in contrast to popularized belief of their celestial body origin where amino-acid have been detected [179].

e) With revisited fundamentals about correlation and coupling between conducting electrons and material structure dependent phonons, the perspective of achievement of carbon based supra-conducting materials with higher T_c [81,82].

f) The comprehensive mastering of close located trapped ions coupling and Ion/photon interactions for the reliable and reproductive achievement of faster optical low energy gates for new high-capacity quantum calculation computers [180,181].

V.2. Definition of subatomic particles and universe phenomena

V.2.1. The essence of subatomic and nuclear particles:

With particles being assimilated to 3D wave packets evolving in some Aether Quantum Vacuum fluid [47-49] where the density of energy is equivalent to the density of mass, subatomic particles are postulated to correspond to some specific 3D Vortex species [169] in analogy to what can be observed in liquids and in the atmosphere and especially with the ball lightning [170,172]. Observing that orthogonal waves do not present any interferences, we suggest that the different species can be described in terms of stationary orthogonal vibrations modes being distributed with 3D spherical and ovoid geometries in analogy to what is considered for phonon vibration modes of bucky balls and carbon nanotubes [173-175].

V.2.2. Expansion of the Universe: With the different Doppler light frequency shift of stars which can be observed from the earth (or in its spatial vicinity) it has been determined some expansion of the Universe [182,183]. However, considering in an Aether Quantum Vacuum the equivalence between density of energy and mass, the light speed is expected to be dependent from their variations, in analogy to mechanical waves in fluid materials.

Therefore, corresponding statements about intersidereal distances being estimated with a fixed light speed will have to be revisited, all the more when the foundations of the space-time theories and concerning the space-time curvature of the General Theory of Relativity have been questioned [42-46,131-167].

V.2.3. Black Hole Evaporation: Black holes are known to attract any photons with gravity [184] and for which the model of a generalized Aether with local fluctuation of a Quantum Vacuum density of mass/energy can be applied, and suggested to contain all sorts of interacting quantum particles with which different sorts of nuclear reaction can be produced.

Considering that a striking variation of the mass of a celestial body is able to generate some gravity waves, corresponding to

some loss of their internal energy and mass and is suggested to explain some black hole evaporation processes.

In agreement with the theoretically predicted black Hole disappearance by Unruh [185], and likely confirming the existence of some gravitons, in analogy to phonons in form of energy particles, and supposed to have been recently evidenced in fractional quantum Hall Liquid [186,187].

VI. Conclusion

Meanwhile, some aspects of established modern Quantum Mechanic's theory and of the General Relativity Theory are still well confirmed for the determination of atomic and electronic and subatomic particles quantum states and with the equivalence principle between Mass and Energy $E=mc^2$, they could nevertheless not give satisfactory description of many observed physical effects, in consequence of their abstract mathematical undetermined space-time description. The refutation of their complete validity, is suggested to be confirmed, with the results of their improved fundamentals, with the definition of some quantum space energy, and in revisiting in more details some observed effects which are concerning different important new technologic and deeper theoretic applications. Among them, the reliable mastering of the coupling between different quantum states of the quantum calculation, the Raman spectroscopy of differentiated more advanced carbon materials, which because of their specific superior combined properties, can be accurately characterized and mastered for many important applications of different domains of prime technologic importance including mechanical, optoelectronic, medical, nuclear and green energy production and transportation systems.

However, also, concerning scientific practical and theoretic aspects of astronomy, and the origin of meteorites and celestial bodies and of the terrestrial origin of biological life, and unlike to have a cosmic origin as we could show elsewhere, despite the detected amino acids and organic content of some celestial bodies.

With the revisited observed effects leading to the GTR refutation, (the optical Doppler effects, the particle interference phenomena, the evidenced photon mass, the newly discovered superluminal transportation phenomena, and with the evidenced space-time determined entanglement of longer distant subatomic particles, we came to the proposal of an extension of the concept of quantum space energy, and of a revised Aether theory with some newly defined liquid material properties.

They are suggested to give some clearer insight of the coupling of quantum states of quantum calculation new devices, and to open the routes for new interpretation perspectives of observed universe phenomena in relation with the propagating gravity waves, with the dynamical behaviour of black holes and with the observed universe expansion, and



in considering that the light speed is not necessarily absolute and might be dependent from local specific fluctuating Aether properties.

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