

Cosmic Medium and Leo Sapogin's Unitary Quantum Theory

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Abstract

The original unitary quantum theory suggested by Professor L. G. Sapogin "to describe the origin of matter and the Universe" involves cosmic medium as a full player in all natural interactions. The fact that the structure, the physical nature of the medium is little understood to date (the most promising analog superfluid $^3\text{He-B}$ relating condensed matter physics to cosmology) gives no reason to postpone physical-theoretical discourse on the subject (the *neo-ether*) [12].

Keywords

Quantum Packet, Virtual Particle, Quasi-Particle, Resonance, Energy, Potential Well, Oscillating Charge

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1. Introduction

L. G. Sapogin's Unitary Quantum Theory (UQT) [1] breaks fresh ground in the theory of microcosmos, restoring the figurativeness and common sense excluded from physics by the Bohr's antiquated complementarity principle. Significant advances in quantum mechanics (especially in stationary conditions) started from a prime relation between De Broglie wavelength and geometric properties of potentials. The particle was formally considered as a point in order to explain the wave function/probability amplitude. However, neither the point hypothesis, nor the complementarity principle proved useful in understanding the structure of elementary particles and elaborating the quantum field theory within the accepted paradigm. The standard model even lacks a mass spectrum calculation algorithm for elementary particles.

To reiterate key basic premises of our Unitary Quantum Theory (from the Introduction):

- According to standard quantum theory, any micro-particle is described by a wave function with a probabilistic interpretation that cannot be obtained from the mathematical formalism of non-relativistic quantum theory

but is instead only postulated.

- The particle is considered as a point, which is "the source of the field, but cannot be reduced to the field". Nothing can really be said about that micro-particle's actual "structure".
- According to UQT, such a particle is considered as a bunched field (cluster) or 32-component wave packet of partial waves with linear dispersion [1]. Dispersion can be chosen in such a way that the wave packet would be alternately disappear and reappear in movement. The envelope of this process coincides with the quantum mechanical wave function. Such concept helped to construct the relativistic – invariant model of UQT. Due to that theory the particle/wave packet, regarded as a function of 4-velocity, is described by partial differential equation in matrix form with 32x32 matrix or by equivalent partial differential system of 32 order. The probabilistic approach to wave function is not postulated, like it was earlier, but strictly results from mathematical formalism of the theory.
- Particle mass is replaced in the UQT equation system with the integral over the whole volume of the bilinear field combinations, yielding a system of 32 integral-differential equations. In the scalar case the authors were able to

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calculate with 0,3% accuracy the non-dimensional electric charge and the constant of thin structure.

- Electric charge quantization emerges as the result of a balance between dispersion and nonlinearity. Since the influence of dispersion is opposite to that of nonlinearity, for certain wave packet types the mutual compensation of these processes is possible. The moving wave packet periodically appears and disappears at the de Broglie wavelength, but retains its form.
- Micro-particle birth and disintegration mechanisms become readily understood as the reintegrating and splitting-up of partial wave packets. This approach regards all interactions and processes as being simply a result of the mutual diffraction and interference of such wave packets, due to nonlinearity.
- The tunneling effect completely loses within UQT its mysteriousness. When the particle approaches the potential barrier in such the phase that the amplitude of the wave packet is small, then all the equations become linear and the particle does not even “notice” the barrier, and if the phase corresponds to large packet’s amplitude, then nonlinear interaction begins and the particle can be reflected.

The most important results of our new Unitary Quantum Theory approach is the emergence of a general field basis for the whole of physical science, since the operational description of physical phenomena inherent in standard relativistic quantum theory is so wholly unsatisfying. Unitary quantum equations for the wave packet in motion may tell something for both Maxwell and Schrodinger equations and gravity, at some future date.

L. Sapogin’s Unitary Quantum Theory describes elementary particles as clots (wave packets) of a real-world field to be "identified with the medium (ether)." The presence or non-presence of the cosmic medium as a physical substance proper is here irrelevant. Of course, the UQT admits of energy exchange with the cosmic medium comprising an agglomeration of random oscillations, but not as a prerequisite for energy generation. L. Sapogin explains abnormal energy release by unrestricted energy growth in particles oscillating in a potential well, according to UQT differential equations for an oscillating charge, describing single micro-particles in motion. "The UQT suggests that conservation laws are only applicable over the averaged ensemble of particles and never to single ones. On the other hand, energy generation is governed by the nature of particle motion equations, whether oscillating in vacuum or in medium." [1].

L. Sapogin draws parallel between Schrodinger equation and equation with oscillating charges. It is known that in the case of charged particle movement in plane condenser with the

constant tension to be applied classical uniformly accelerated motion $x = at^2$ appears. For the equation with oscillating charge such analytical solution exists. Let show that Schroedinger equation has physically similar solution also. Viz., let potential in Schroedinger equation be equal $U(x) = rx$. Then complete Schroedinger equation is as follows:

$$\frac{\hbar^2}{2m} \frac{d^2\Psi(x,t)}{dx^2} - rx\Psi(x,t) + i\hbar \frac{d\Psi(x,t)}{dt} = 0 \quad (1)$$

We will seek the solution in rather unusual form:

$$\Psi(x,t) = b \exp\left(i \frac{m\alpha^2 t^3}{2\hbar} - i \frac{m\alpha t x}{\hbar}\right) \quad (2)$$

Bu substituting (2) in (1) we get (after reducing):

$$-2m\alpha^2 t^2 + (m\alpha - r)x = 0$$

This relation will be fulfilled if

$$x = \frac{2m\alpha^2}{m\alpha - r} t^2 \quad (3)$$

If in (3) impose the requirement $r \rightarrow 0$ (potential vanishes), then absolutely strange particular solution appears where the particle is able to move with constant acceleration and to generate energy no of an unknowns where origin (!!!). That effect remains valid even if we put $r \rightarrow 0$ directly in equation (1). Curious, but we have similar situation in classical electrodynamics. If during acceleration of a charge one takes into account force acting on a charge itself, then the braking due to radiation arises. In different works this effect is called in different way: Lorenz frictional force or Plank’s radiant friction. That force is proportional to third derivative of coordinate x relative to time and was experimentally proved many years ago. If we write the equations of motion for the charge moving in space free from external fields impact and if the only force acting on the charge is the “Plank radiant friction”, then we would obtain following equation:

$$m \frac{d^2x}{dt^2} = \frac{2e^2}{3c^3} \frac{d^3x}{dt^3} \quad (4)$$

It is evident that equation in addition to trivial particular solution $v=dx/dt=Const$ has general solution where particle acceleration is equal:

$$\alpha = \frac{d^2x}{dt^2} = C \exp\left[\frac{3mc^3 t}{2e^2}\right] \quad (5)$$

i.e. is not only unequal to zero, but more over it unrestrictedly exponentially increases in time for no reason whatever!!! L. Landau and E. Lifshits in their classical work “Theory of the field” wrote apropos of this: “A question may arise how electrodynamics satisfying energy conservation law is able to give rise to such an absurd result in accordance to which a particle was able to unrestrictedly increase its energy. The background of that trouble is, actually, in infinite electromagnetic “eigen mass” of elementary particles.

2. Experiments

L. Sapogin's indifferent view of the space medium (ether) is acceptable but for some points requiring further investigation:

First, the wave-particle dualism apparently obviated in the UQT contradicts some recent experimental evidence (quantum teleportation of individual particle properties and wave-particle dualism of quasi-particles). An approach regarding a particle as a wave packet of a single field is referred to as unitary, hence the designation of the new wave theory [12]. However, while quantum teleportation of particles with the wave packet appearing and disappearing in turns is well explained by the Sapogin theory, the case is far of teleportation and transfer of individual properties to other particles is far more complicated [3]. It is even more difficult to explain the wave-particle dualism of quasi-particles with a single electron/quasi-particle interaction following the electron/particle pattern and the electron gaining discrete energy increase of $E = \pm n\hbar\omega$ [4];

Second, particle production in a potential well is accompanied by a prominent energy gain. The UQT holds that the quantum package becomes classical with increased mass, i.e. with a great many superimposed wave packets [1]. Meanwhile, abnormal increase of energy is physically similar to overlapping resonance in dynamic stochasticity mode accompanying the virtual/real particle transformation [8];

Third, according to L. Sapogin, "in deriving a scalar unitary quantum equation of telegraphy one has to assume terminal imaginary wire resistance and leakance, which is not quite clear physically." [1]. One practical solution is accepting the medium as an equal player in any physical interaction process [5]. Charged particle (wave packet) motion in a dipole system is accompanied by polarization (strain) and consequent resistance to charge motion. The term "true conductivity" was coined by Nikola Tesla in a conversation with Lord Kelvin concerning the wireless transmission of energy in near-Earth space. In reply to Kelvin asking, "Do you mean ignoring Hertz waves?" Tesla said, "No, of course not, they are radiated. No energy transference is economical with this kind of radiation. My method uses true conductivity acting loss-free through any distance." The conversation took place in the summer of 1897 when Kelvin was visiting Tesla's laboratory in Long Island. So what Tesla actually meant by his "true conductivity" has remained something of an enigma for science since late 1800s and well into the 21st century. Tesla appears to supply the answer in an interview given in 1932, saying that: "A wireless transmitter generates in the near-Earth electrical medium the longitudinal waves behaving much like sonic waves do in the air, except that the infinite elasticity and extra-low density of the medium (ether) are responsible for their speed of light"[6]. UQT equations apply both in solving subatomic energy

generation problems and theorizing the near-Earth transmission of currents for wireless energy transfer. Moreover, the "imaginary wire resistance and leakance" assumed for scalar UQT equations obtain quite real physical values in reference to the medium (ether) where the wave packets are transmitted [13].

2.1. Wave-Particle Dualism of Elementary Particles

Recent publications [2] report experiments in quantum teleportation (state transmission) of one or even two degrees of freedom of quantum particles (Science and Technology University in Hefei, China) [3] and observations of wave and corpuscular properties of quasi-particles (Federal Polytechnic School of Lausanne, Switzerland) [4]. Researchers in the Science and Technology

University first performed simultaneous quantum teleportation with two degrees of freedom of a single photon, namely of spin state and orbital angular momentum. The experiment involved three photon pairs in quantum-entangled state. One was hyper-entangled, i.e. tangled both in polarization and photon orbital angular momentum states, acting as a quantum teleportation channel, and the two remaining were used to measure and prepare the quantum state. Measures for the initial photon (in state teleportation) together with state measures for one in the hyper-entangled couple were transmitted to the recipient through the classical channel. Using the data, the recipient could take the hyper-entangled second photon pairs to the quantum state of the initial photon, thus accomplishing teleportation. The quantum fidelity far above the classical level indicated complete teleportation [3]. In Lausanne, they examined surface polaritons (SPs) in metal nanowire. The SPs are charge-oscillative surface electromagnetic waves. Like ordinary particles, those quasi-particles exhibit the wave-particle dualism. The nanowire was illuminated with a laser beam generating scattering SPs. Returning from the ends of the nanowire, the SPs produced a standing longitudinal wave, its structure easily observed in the dissipated electron beam. Also, each individual electron/SP interaction followed the electron/particle pattern, the electron having additional discrete energy gain $\Delta E = \pm n\hbar\omega$. The scattered electron current therefore carried both information of SPs spatial wave structure, and electrons with discrete energy gains depending on SPs corpuscular properties [4].

The foregoing experimental evidence leads one to extrapolate the common phrase of a bumpy ride due to an uneven road on charged particles moving in dipolar cosmic medium (³He-B analogue) [11]. Because of the polarized and longitudinally and transversely strained medium, particle motion in cosmic medium is accompanied by electrostatic longitudinal and

transverse electromagnetic oscillations and waves.

A. Rykov in the Ether Theory defined the basic parameters of the structure of the space environment. [5] It consists of a dipole of virtual electrons and positrons. When a size of a structural element of the ether is $r = 1.3988 \cdot 10^{-15}$ m, the ultimate deformation of the dipole (a destruction limit) would be $dr_{\text{effects}} = 1.0207 \cdot 10^{-17}$ m. At that, the distance between virtual charges r of the electron and positron, forming the dipole, is 2,0145 times less than a classical electron radius. Dipole destruction occurs only when deformation is 1/137 of its integer value that says of extraordinary stability of the ether. Deformation in the ether, which is below this value, should have an electro elastic nature. A force of the elastic deformation of the ether has an enormous value $F_{\text{def}} = 1.1550 \cdot 10^{19}$ n.

The photon with energy $W_{\text{phot}} \geq 1 \text{ Mev} = 1.6493 \cdot 10^{-13}$ joule turns into a pair of elementary particles – an electron and a positron. This means that under an influence of the photon a dipole of the ether gets destroyed.

$$W_{\text{phot}} = h \nu = W_{\text{def}} = e_0 E dr \quad (6)$$

where h - Planck's Constant

ν - Photon frequency

e_0 – Dipole charge

E - Electric field

The dipole arm (r) and the deformation of the dipole (dr) are connected with the ratio $dr = \alpha \cdot r$, where $\alpha = 0.0072975$ is a value called the ether fine structure constant. Through the ether fine structure constant the relationship is established between ether a stability limit and the distance in the dipole. Its physical meaning is that the ratio of the energy of the ether dipole connection Δw ($1.1949 \cdot 10^{-15}$ joule) to the energy of the electron and positron pair at rest $w_{\text{ep}} = 2m_0c^2$ ($1.6371 \cdot 10^{-13}$ j) is equal to the fine structure constant- α .

Structural elements of the ether (r , dr), including the dipole charge e_0 , as well as electromagnetic parameters of the ether - ϵ_0 , μ_0 , environment that in full depends on the environment allow us to determine Planck's Constant- h :

$$h = 2\pi e_0 \frac{r}{dr} \sqrt{\frac{\mu_0}{\epsilon_0}} \quad (7)$$

where μ_0 - magnetic permeability

ϵ_0 - dielectric constant

Planck's Constant $h = 6.6260 \cdot 10^{-34}$ (joule·s) completely depends on the characteristics of ether.

This implies that the de Broglie formula that sets a connection between the wavelength (λ) of any particle and its momentum (mv)

$$\lambda = \frac{h}{mv} \quad (8)$$

where h is Planck's constant

m is a particle mass

v is a particle speed

also depends on the features of the environment and the momentum of the particle. The momentum belongs to the particle, while transverse oscillations (electro elastic deformation of bound charges) appear in the environment when the particle moves with speed V – this is a trace of the particle in the environment. A screw type sinuous oscillatory motion of particles is so-called uncertainty of particles' trajectories according to Heisenberg. [5]

The wave-corpuscule dualism of elementary particles indicates the existence of a structured cosmic medium also confirmed by experiments with quasi-particles in SPs [4]. The UQT may encompass, in addition to particles and quasi-particles, the study of particle tracks in the cosmic medium.

It seems likely that all previous views of a particle as a wave packet started from the mistaken assumption of a De Broglie wave packet. An UQT packet consists of partial waves, the De Broglie wave appearing as a co-product in the movement and evolution of the partial wave packet.

Inertia of micro-particles may be associated with gyroscopic properties of vortex cores developed in the medium, i.e. inherent in their wave properties. The mechanism of quantum teleportation spin state and orbital angular momentum in Hefei University experiments could be governed to spin/spin interactions of micro- and quasi-particles in disturbed medium ($^3\text{He-B}$ analogue) [11].

2.2. The Mechanism of Resonance Interaction of Particles in Large-Scale Poincare Systems (LPS)

Tesla's theory of global resonance [6], subsequently elaborated by Nobel Prize winners I. Prigozhin [7], A. Rykov [5] and D. Trubetskov [8], allows us to see how virtual electrons in the cosmic medium (ether) change to real material particles, and to add the superposition mechanism suggested by Prof. L. Sapogin's UQT [1].

The space environment is a global field of oscillators' super-positions with the continuum of frequencies. In contrast to the field, a particle oscillates with the same fixed frequency. In front of us, there is an example of the non-integrable Poincare system. Resonances will occur whenever the frequency of the field and the particle are several-fold. The evolution of dynamical systems (field-particle) up to the self-organized matter depends on available resonances between degrees of freedom. This was a

conclusion by I. Prigogine and I. Stengers in their monograph *the Time, Chaos, Quantum* [7]. They revived an idea by N. Tesla on a theory of global resonance. Nevertheless, if the Tesla's resonance theory of the matter birth in the Aether had been based on an intuition of the ingenious experimenter, then in case of I. Prigogine, this theory acquired rigorous mathematical view. Proved by Poincare non-integrable dynamical systems and the theory of resonant trajectories by Kolmogorov-Arnold-Moser allowed Prigogine to conclude that the mechanism of resonance interaction of particles in large-scale Poincare systems (LPS) was "essentially" probable, i.e. binding. With increasing communication parameters, there is an increase in likelihood of resonance outcomes. It is such LPS dynamic systems, to which systems of particle interaction with the space environment and with each other belong. I. Prigogine wrote, "Should the systems be integrable, then for coherence and self-actualisation there would be simply no place as all dynamic movements would essentially be isomorphic movements of free (non-interacting) particles. Fortunately, the LPS in nature prevail over other systems." [7]

The role of resonances in the occurrence of fluctuations and the birth of elementary particles in the space environment is undeniable. This is confirmed by A. Rykov [5] in his studies associated with the photoelectric effect in the cosmic ether.

A resonant behavior of the photoelectric effect phenomenon in the ether results from an analysis of dipole deformation dependence (a structural element of the cosmic ether) on frequency of a photon, which strikes the ether. The photon energy in 1 MeV, sufficient to destroy the dipole and give birth to an electron-positron pair is a photoelectric threshold. We obtain the photon frequency corresponding to this energy (ν_K) from the equation as follows:

$$\nu_K = \frac{W}{h} \quad \nu_K = 2.4891 \cdot 10^{20} \text{ Hz} \quad (9)$$

For photons with their frequency lower than the $\nu_K < \nu_{\max} < \nu_K'$ value, the photoelectric effect has not been observed. However, the photoelectric effect has neither been observed for gamma radiation. A decrease in the photoelectric effect frequency dependence within an area of photons' high frequencies and an available photoelectric effect peak at the frequency ν_K says of a fact of the resonant interaction between photons and the cosmic ether and available own oscillations in the dipole. The frequency of dipole own oscillations provides a solution to a challenge of stability in structural elements of the cosmic ether from the same classical perspective as stability in atomic structures based on nuclei and electrons. Electron "does not strike" a nucleus because of Pauli's quantum exclusions. The last mentioned are connected with the integer for de Broglie wavelengths that fit into a length of a stable orbit. The ether dipole is not destroyed due to the integer of its wavelengths

that are put into an orbital trajectory of dipole rotation. In his ether theory [5], A. Rykov identified the frequency and wavelength for the dipole as follows:

$$\nu_d = 4.6911 \cdot 10^{24} \text{ Hz}, \quad \lambda_d = 6.3907 \cdot 10^{-17} \text{ m}$$

The length of a circular orbit for the dipole is

$$L_d = 2\pi r, \quad L_d = 8.7890 \cdot 10^{-15} \text{ m} \quad (10)$$

where r is a size of a dipole structural element equal to a distance between virtual particles, i.e. electrons and positrons in the dipole.

$$r = 1.3988 \cdot 10^{-15} \text{ m}$$

A ratio of the dipole orbit length L_d to the dipole own wavelength λ_d is equal to 137.5335. This approximate integer value of wavelengths' halves fits into the orbit length and is a quantum condition for stability in the dipole structure of the cosmic ether. Number 137.5335 agrees well with the experimentally obtained value for a magnitude of the fine structure $\alpha=1/137.0355$ of elementary particles. This fact underlines a deep connection between a structure of the structural unit within the cosmic ether (dipole) and a structure of elementary particles.

The region of ultra-ray energy and, of course, frequencies (including resonant), generating electrons in cosmic medium, according to A. Rykov (1 MeV - 200GeV), has been extended recently with the energy range of ultra-rays generating positrons in cosmic medium (30 GeV - 200GeV) [9]. Using the ISS AMS detector, it was first found that the share of positrons in cosmic media grows no longer with the energy over 200GeV. Increasing contribution of electrons to total positron-electron flow, starting from 30 GeV, was demonstrated before with the PAMELA, Fermi, and some other detectors. Moreover, recent AMS measurements indicate an increasingly harder positron spectrum with the electron spectrum little affected.

According to L. Sapogin's UQT, the electron as a real-world field wave packet is governed by the structure function, and can be expanded into the Fourier series as a plain sin (partial)-wave form. The structure is here represented as a harmonic amplitude/frequency function (spectral representation). The quantum package becomes classical with increased mass, and mass quantization in a delicate balance between dispersion and non-linearity. The particle moves according to classical laws of motion, while each packet is governed by quantum laws. [1].

To quote K.A. Danilov's "Nonlinearity" [10]: "A feature of linear theories, nonexistent at the nonlinear cognitive stage, is the superposition principle, enabling a physicist to devise any solution with a series of particular solutions".

In the general case, unusual virtual/real particle changes are possible in a nonlinear oscillator even with sinusoidal external force applied. The system behavior can be very irregular and almost sporadic to the extent of dynamic stochasticity. The average motion with isolated nonlinear resonance is similar to electron behavior in a potential well. Multiple resonances correspond to multiple potential wells. Overlapping resonance is indicative of a convergence of adjacent wells with the system moving back and forth or, under certain conditions, leaving the wells. In this case, nonlinear systems will exhibit a new instability type, the stochastic instability [8]. Let us take a second look at the mechanism. In the case of a linear oscillator, one can manage with the first term of the expression $\omega^2(x) = \omega^2_0 + \alpha x + \beta x^2 \dots$ for square natural frequency of the power series in oscillation amplitude, and the only fundamental effect observed when external force is applied is linear response. In this case, the smaller the oscillator loss, the sharper and higher the resonances curve. What happens if the oscillation frequency depends on the amplitude? Assume that the stress frequency is as great as the rotation frequency in one off-center phase path. The system will then draw energy from the outside and the initial low oscillations will grow. The particle will therefore gradually move to higher-energy phase paths but the frequency will be higher there as the oscillator is non-isochronous. As a result, the system runs out of resonance to the point where the oscillator ceases to respond to external force. This is due to nonlinear shift $\omega = \omega(x)$. Consider now the case of a nonlinear oscillator. In a linear oscillator, resonance only occurs at a frequency close intrinsic, i.e. $\Omega = \omega_0 \pm \epsilon$, where ϵ is a small addition. A nonlinear oscillator also exhibits harmonic resonance; e.g. quadratic nonlinearity activates spectral components $2\Omega, 4\Omega$, etc. (anharmonicity of vibrations). So with e.g. $2\Omega = \omega_0$, the system will respond to harmonic external force and develop a dynamic stochasticity. Whereas particle behavior in an oscillator is generally interpreted as fully deterministic, with its past and future explicitly determined by equations of motion in initial conditions, stochasticity is associated with randomness and ambiguity. Could a strictly deterministic process also appear as random? L.Sapogin in his UQT answers in the affirmative. His physical and mathematical investigations demonstrate that it is possible and, in some cases, inevitable.

For the mechanics of a particle with an oscillating charge there are three possible modes of behavior, which, as it was found out, do not depend on the type of the potential well; it must only be finite and have equal sides:

1. A particle at small initial velocity and having certain initial phase can roll into the well and start oscillating there for a long time with damping, its charge will be constantly reduced, and finally this particle turns into "a phantom". From point of view of our theory, the wave packet

representing this particle is spread all over the Universe. Moreover, there appears to be a certain threshold for the energy. If the energy is below this threshold, the particle will not roll out of the well at all. The value of the energy threshold depends on the type of potential. Oscillations without loss of energy and charge are also possible. ("crematorium")

2. A particle can roll into the well and roll out at a speed higher, equal or lower than the initial speed. In other words, a particle passing the well can either increase or reduce its energy. The energy conservation law for a single particle is not always valid.
3. A particle rolls into the well and starts oscillating there, and its energy will increase until it rolls out of the well with a much higher energy. It can even roll out in the direction opposite to the initial movement (reflection).

The autonomous movement equation in the case of a potential well in the shape of hyperbolic secant

$$U(x) = -U_0 \operatorname{sech}(x^2) \tag{11}$$

will look as follows:

$$m \frac{d^2x}{dt^2} + 4U_0Qx \frac{\cos^2\left(mx \frac{dx}{dt} + \varphi_0\right) \sinh(x^2)}{\cosh^2(x^2)} = 0 \tag{12}$$

Where t, m, Q, φ are mass, charge and initial phase of a particle respectively.

The resulting modes of the particle's behavior under equal conditions greatly depend on the initial phase, and its variations result in a very rich behavior.

Notice that non-isochronism is essential for dynamic stochastic systems without dissipation. Indeed the increase or decrease in fluctuation energy due to perturbation is phase-dependent. The phase, in turn, depends on the frequency changing in disturbed conditions because of the isochronism. As discussed above, the system can get out of a single resonance.

With multiple (more than one) resonances, however, the system behavior pattern is complicated by their interactions. So, depending on the disturbance phase, the system can either proceed to the next resonance region, eventually leaving the well, or turn back. This state is referred to as the "overlapping resonances" [8].

3. Conclusion

Elaboration of the theory of super-fluid media allows to deal with phase transitions in simulated physical vacuum in the same way as in superfluid $^3\text{He-B}$. Prof. L. Boldyreva has significantly extended analogies between $^3\text{He-B}$ properties

and the cosmic medium (dark matter and energy), mainly by accounting for the eddy properties and medium spin polarization in vortex, inertial vortex properties, and super-fluid spin cross-currents [11]. The fact that dark energy does not emit, absorb or reflect light is explicable assuming that it is a luminous medium, i.e. favoring vortex-wave propagation. Maxwell conjectured properties much similar to super-fluid $^3\text{He-B}$ in luminous media with eddy electric fields and currents of displacement required for his celebrated equations of electrodynamics [13].

A parallel needs to be drawn between Maxwell- and Sapogin equations. Maxwell equations separated from the original luminous medium model were immediately deprived of their physical essence, with no chance of subsequent corroboration, revision or elaboration. The medium model is likewise essential for Leo Sapogin's Unitary Quantum Theory to obtain the real values of resistance wire and leakage, and to describe gravity and all natural interaction types.

For the final decision on the role of the environment in the UQT, it is advisable to conduct a pilot test of the birth of electrons in a vacuum, to implement the mechanism of quantum super positions of Leo Sapogin packages, and compare it with the resonance curves of birth electrons and positrons of the virtual particles forming the dipole space environment (analogue $^3\text{He-B}$) during its bombardment of photons with an energy of 1 MeV to 200 GeV.

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