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A Cold Genesis Theory of Fields and Particles

"The discoveries must be published"

(Galileo Galilei, principle of science)

1.1 Introduction

The abandonment of the concept of ether in the explanation of the microphysics phenomena, through the postulate of the constant light speed in Einstein's special relativity, led to major paradoxes in the physical interpretation of the relativist relations, such as the so called "the twins paradox". Moreover, a series of experiments states the possibility of exceeding the light speed, [1]. These theoretical consequences are determined the recurrence to the classic concept of quanta having a non-null repose mass, (L. de Broglie, [2]). In 1974, J. P. Vigier argued the existence of experimental proofs in favor of this hypothesis, [3].

The hypothesis of a quantum medium existence also in the intergalactic space was reconsidered in the case of some "etheronic" theories explaining the fundamental fields and interactions and the Universe expansion, [4], [5], [6] which are compatible with a matter cold genesis mechanism which reconsiders the hypothesis of matter vortexial nature, (Kelvin 1873).

Also, the astrophysical researches regarding the graviton mass asserts the hypothesis of the etheronic nature of the gravitic fields, [7].

Thus, these theoretical drafts reconsidered also the need for some ideal pre-quantum models, based on the classical law of mechanics and the Galileian relativity, for explain the genesis, the fields and the evolution of the elementary particles. The link of these models with the quantum mechanics is made by the theoretical results of Böhm's and Vigier's researches [8] showing that – in adequate general conditions, the density of the particle' presence probability, p ($|\psi|^2$) – given by the quantum mechanics, associated to de Broglie wave, approximates the physical density ρ(r) of a non-viscous, uniform quantum fluid for which the equations of the ideal fluid can be applied. At the same time, these models can explain, through the "hidden thermodynamics" of the particles, [9], the constancy of charge and of magnetic moment and the spin characteristics of the particles, considering a negentropy of the sub-quantum medium transmitted to the particle by "quantum winds", [10]. These quantum winds generates a magnetic field around the electric charge by quantum vortices that are proper to a chiral quantum soliton structure of the electromagnetic field quanta [11] and of the elementary particles [12], particularly considered in a quantised soliton model [13].

The particle chiral quantum soliton model used by some etheronic theories for explain the wave-corpuscle dualism of the photons and of fermions complies with both the nonlinear causal interpretation in quantum mechanics (de Broglie, D. Bőhm, J. P. Vigier) and the Einstein's idea of unifying the fundamental fields by considering the particles as formed by field matter structures which comply with a nonlinear field equations [14].

Also, H. A. Mùnera considers the particles repose mass as being generated by the etherial fluid with a flow moment (vortex) along a perpendicular direction to the impulse [15].

The photon is considered as a semi-classic doublet: particle-antiparticle, which explain the frequency and the repose mass of a photon, the model deducing two spin values (±1) for the photon and the validity of the de Broglie's energy equation, [9].

Geoffrey Hunter and L. P. Wadlinger [16] proposed a solitonic model of photon corresponding to the Einstein's concept of photon considered as a localized and confined electromagnetic wave in a circular volume of an ellipsoid with the length along the propagation axe – equal to the associated wave-length, λ, and the photon diameter: $d_f=\lambda/\pi$. This model has been recently confirmed by experiments regarding photoelectric effect and the diffraction.

The wave constituting the chiral soliton vortex might be considered as being composed by two parts: a linear part – the evanescent component, and a non-linear part that might be identified with the ψ(r, t)-wave functionfrom the double solution theory of de Broglie-Bohm-Vigier, [17].

Donev Stoil has deduced by the photon energy Planck expression: E=hν, written in the form E·τ =h, (τ=1/ν), that the size $h=E_\tau$ represents the photon kinetic moment of spin (the polarization) and represents a real physical size associated to the solitonic photon [18].

It is important to observe that if the Múnera's model of photons is dimensioned like in the Hunter-Wadlinger model, considering the simple photon as a doublet of two vectorial photons with mutually anti-parallel spins S=ħ/2 and a diameter: $d_w=d_f=\lambda/\pi$and considering the hard-gamma quanta as a doublet: negatron-positron, $\gamma_c=(e^+-e^-)$, with opposed spins and the energy: $\varepsilon_\gamma=h\nu=2m_ec^2$, it results that the electron of γ_c-doublet may be assimilated with a vectorial (semi) photon, m^e_w, with a r_λ-radius which results equal to the Compton radius of a free electron:

$$r_\lambda = r_e = \frac{\lambda}{2\pi} = \frac{c}{2\pi\nu} = \frac{ch}{2\pi\cdot m_e c^2} = \frac{h}{2\pi\cdot m_e c} = 3{,}86x10^{-13}m \qquad (1)$$

This value of a electron Compton radius is found in the solitonic models of electron as representing the electron soliton radius [12].

By this result it is suggested the possibility of finding a pre-quantum model (conform to the classical mechanics applied to the quantum and sub-quantum fluid) of chiral soliton type, for the fermionic particles, by considering a prequantum substructure of photonic bosons vortexially confined "at cold", in a volume with magnetic moment of Compton radius: $r_\mu=\hbar/(m_\rho c)$ – according to eq. (1) extended for a simple or compound soliton-like particle.

This pre-quantum model of elementary particle corresponds to the Sidhart model of particle [19], which consider the elementary particles as being relativistic vortexes of a Compton radius from which the mass and the spin of the particles is obtained, with the circulation speed of the quantum fluid in the solitonic vortex space equal to the light speed, c, being admitted also the hypothesis of the existence of a super-light speed in the vortex, without contradiction to the conventional theories.

In accordance with this chiral pre-quantum model of particle, we may consider that the repose inertial mass of a fermion, m_p, is confined by a solitonic vortex with a stabilizing super-dense centroid and with: $\omega\cdot r = c$ for $r \leq r_\lambda$, (i.e.- generated by quantum and subquantum winds), in a volume of a r_p – radius representing the particle's quantum volume radius.

1.2 Considerations Concerning the Quantum and Subquantum Medium

Relative recent researches [7] based on astrophysical determinations relating to the graviton mass indicates as probable a mass of the gravitons in a very large range: from 10^{-67}kg, according to S. Choundhury, resulted from a "gravitational lens" effect, to 10^{-55}kg, according to L. S. Finn, resulted from studies of the binary pulsars.

This seeming contradiction can be solved-in a classical theory of fields, by the hypothesis that the mentioned values correspond to the mass of at least two categories of etheronic particles which can constitute a sub-quantum (etheronic) medium and which generates gravitic field.

Regarding to the quantum medium, accepting the Munera's vortexial model of photon and a chiral soliton model of electron, for explaining the fields and the difference between a positive and a negative electric charge by a vectorial type of electric field quanta, it is important to know which vectorial photons, of un-bounded chiral soliton type, (semiphoton), are the most stable vectorial leptons. Because that these vectorial photons are parts of the most widespread radiation quanta, as a Floreanini-Jackiw chiral antiparallel component particle of a scalar field quanta which can be splitted into its components [20], considering also the electron chiral soliton as a semiphoton of a hard-gamma quantum and excepting the neutrino, (which is very penetrant and have probably a very dense mass), we identify three vectorial leptons which are the most stables fermionic leptons in the Universe, in un-bonded state: the electron: $m_e=9.1\text{x}10^{-31}$kg; the semiphoton of the 3K-cosmic background radiation: $m_v = k_BT/2c^2 = 2.3\text{x}10^{-40}$kg, (named "vecton" in our model) and the h-quanta, named "quanton" in some theories [6], with the mass: $m_h=h\cdot 1/c^2=7.37\text{x}10^{-51}$Kg.

Considering these leptons as being quasistable vectorial leptons and the electron as being the 1-rank quasistable vectorial lepton, m_s^1, we observe that the masses of the considered quasistable leptons are in the relation:

$$m_s^1 \approx (K^v)^{-1}\cdot m_s^2;\ m_s^2 \approx (K^v)^{-1}\cdot m_s^3;\ \text{with:}$$
$$(K^v)^{-1} \in (10^9 \div 10^{11});\ (m_s^1=m_e;\ m_s^2=m_v;\ m_s^3=m_h).$$

In accordance with that, it results as plausible the hypothesis that the elementary particles genesis can occurs "at cold", in an Euclidean Protouniverse, ones from another, from the “dark energy” containing primordial un-structured subquantum particles, by confination of quasistable leptons of inferior mass, realised by a solitonic vortex with a stabilizing super-dense centroid, (“centrol”).

We deduce the possibility to characterize the process of soliton-particles genesis by a “vortices cascade” model, with the next specific axioms:

1. the natural cold genesis of particles is a fractalic “vortices cascade” process;

2. all fermions are simple or composite chiral solitons, formed by a particle-like central inertial mass giving its corpuscular properties and a spinorial mass which do not contribute to the inertial mass, the pairs of fermions with antiparallel chirality being bosons;

3. the particles of composite chiral soliton type having the mass of k-stability rank, with k=1 for $m^k = m_e$ and k=0 for $m^k > m_e$, are formed bythe confination of quasistable leptons with (k+1) rank mass, i.e.: m_s^{k+1}, by chiral solitons of quasistable photons or/and etherons with the mass: $m_s^l \leq m_s^{k+1}$, ($l \geq k+1$) formed around a centroid with chirality $\zeta = \pm 1$;

4. the masses of stable/quasistable free photons or etherons are in the relation:

$$m_s^k \approx (K^v)^{-1} \cdot m_s^{k+1}; \text{ with: } K^v \in (10^{-9} \div 10^{-11}); \; k \geq 1 \qquad (2)$$

and this (quasi) stable free photons or etherons can be field quanta or pseudoquanta or/and constituent quanta of elementary particles with bigger mass, as “frozen photons”.

It deduces logically that the etherons, having the most little mass, are quanta of a gravitational type field, in accordance also with the results of the generalized relativity and with the classic model of gravitation (LeSage's model).

According to a4 – axiom we will consider that the sub-quantum medium, (A_c), containing etherons, b_s, having the mass $m_s << m_h = h/c^2$, (h-Plank constant), is compound of two categories of field quanta, named as follow:

1. s-etherons or "sinergons"-with the mass:

$$m_s = K^v \cdot m_h \in (10^{-9} \div 10^{-11}) \cdot m_h \in (10^{-59} \div 10^{-61})\text{kg};$$

2. g-etherons or "gravitons" – $m_G = K^v \cdot m_s \in (10^{-9} \div 10^{-11}) \cdot m_s \in (10^{-68} \div 10^{-72}) \cdot \text{kg}$;

This last result of a4 -axiom is in accordance with the upper limit of the graviton mass: $m_g \leq 1.6 \text{x} 10^{-69}$ kg, found by the relativistic theory of gravitation and experimental data concerning the "dark energy" density, [5], so the generalization of relation (2) also for the (A_c) – subquantum medium is justified.

To this sub-quantum medium, (A_c), regarded as an ideal fluid, as for the quantum medium, (B_c), the Bernoulli's law for ideal fluids can be applied, in the reduced form: $P_s + P_d = P_s^M$, (P_s; P_d; P_s^M – the static, the dynamic and the maximum quantum pressure).

The mass: $m_h = h/c^2$ which corresponds to the chiral soliton named "quanton" in our theory, delimits the (A_c) sub-quantum medium particles from (B_c) quantum medium particles.

Also, we shall consider a density: $\rho^M > 2 \cdot 10^{19}$ Kg/m^3, bigger than the density of a black hole, for all unstructured particles of the (A_c) sub-quantum medium and for the centroids of (B_c) – quantum medium leptons, (named "centrols" in our theory).

For the fundamental particles, we shall consider a solitonic, pre-quantum spin, **S***, depending on the existence of an$\boldsymbol{\Gamma}_p$ -intrinsic vortex of quanta, distinct from the quantum spin, **S,** but which shall be identified with it for the leptonic fermions. This $\boldsymbol{\Gamma}_p$-vortex must be in causal link with a $\boldsymbol{\mu}_p$magnetic or pseudo-magnetic moment of particle, according to eq.:

$$\mathbf{S}_p^{*}= K_S\cdot\boldsymbol{\Gamma}_p = \tfrac{1}{2}\hbar\cdot\zeta_p.;\ \boldsymbol{\mu}_p = (q^*/m_p)\cdot\mathbf{S}^*_p = \tfrac{1}{2}(q^*\cdot c\cdot r_\mu),\ \text{with:} \qquad (3)$$

$$\zeta_p=\pm1;\ \Gamma_p=\oint dl\cdot v = 2\pi r_p c;$$

where: r_p; r_μ – the fermion mean radius and the Compton radius – defined as the superior limit of the vortex: $\Gamma_s(\omega_s\cdot r = c)$; q*-the particle charge or pseudocharge, and: $\zeta_p = \pm1$ – the “intrinsic chirality”, considered as an absolute value.

The considered pre-quantum dimension: “intrinsic chirality”: $\zeta = (\pm1;\ 0)$, differs from the quantum helicity representing the spin projection on the impulse direction and it characterize the sense of the formed vortex around the centroid (the centrol) of the fermion in a homogenous quantum or subquantum wind.

In consequence, in our model the “intrinsic chirality” is a dimension which characterizes the particle core, the particle spin depending on the hypothetical spiral shape of its centroid, i.e.: on the intrinsic chirality: $\zeta=\pm1$ for levogyre or dextrogyre spiral core and $\zeta=0$ for non-spiral core, (without vortex). The image in mirror of $+\zeta$, is: $P(\zeta) = -\zeta$, so the spatial parity P operator change the chiral spin.

Because that the chiral soliton model of electron is of spatial-extended (lorentzian) type, the electromagnetic nature of the inertial m_e – mass is done - according to the a3 – and a4 – axioms, by n_v – component vectorial photons with bigger mass than the vecton mass, which will be named “vexons” in our theory, corresponding to the “zero point energy” photon: $E_w^0=½h\nu$ and which may explain also the photonic emission of the accelerated electron or proton.

In this case, the vecton, m_v, may be identified with the quantum of the electrostatic field, **E**, and the next quantum of inferior order: the quanton, m_h, may be identified with the quantum of the magnetic field, **H**, in the sense that the Γ_c – quantonic vortex generates the μ_e – magnetic moment of electron, in accordance also with eq. (3).

The vectorial quantum of stability rank k =1 resulted in accordance with the a4 – axiom: the hard-gamma semiphoton, which will be named: “semigammon” in our theory, having the electron mass, m_e, may be identified in this case with the pseudoquanta of the strong nuclear field in the sense that the proton result as being a compound chiral soliton formed by the confination of gammonic pairs of degenerate electrons resulted as bounded “semigammons”, which attracts another nucleons by its own degenerate quantum vortex.

Resuming, it results-according to the a1-a4 axioms, that the sub-quantum and the quantum medium have the following composition of field quanta and pseudoquanta:

(A_c)-sub-quantum medium; ($m_s<<m_h=h/c^2$; $S_s^* \cong 0$), characterizing gravitic fields (which is similar to Aristotle’s concept of aether):

1. gravitons; (g-etherons): $m_g=(10^{-68}\div10^{-72})$ kg, acting as gravitic field quanta and having contribution to the genesis of gravitomagnetic quantum-vortices by etheronic winds forming;

2. sinergons; (s-etherons): $m_s=(10^{-59}\div10^{-61})$ kg, acting mainly as sinergonic quanta of vortices of gravitomagnetic chiral solitons but also as quanta of gravitostatic field;

(B_c) – quantum medium, $m_b \geq m_h = h/c^2$, characterizing the magneto-electric fields and other fields:

3. quantons: $m_h = h/c^2 = 7.37 \times 10^{-51}$ Kg; $S_h^* << ½\hbar$, acting as quanta of the **B**-magnetic field and forming the $\boldsymbol{\mu}_p$ magnetic moment of fermion; similarly, the pseudo-magnetic moment of quanton: $\boldsymbol{\mu}_h$ results by eq. (3) as a sinergonic vortex formed around a quantonic superdense centrol having the mass: $m_h^c = m_h$, the quanton being-in our theory, the smallest hard-core fermion. – vectons (vectorial photons): $m_v = 3 \times 10^{10} m_h = 2.2 \times 10^{-40}$ kg; $S_v = S_v^* = ½\hbar$; acting as electrostatic field quanta, resulted as hard-core semiphotons of the cosmic 3K – background radiation;

4. vexons; $m_w \geq 10 m_v$; $S_w = S_w^* = ½\hbar$; structured as CF-chiral soliton of vectons, acting as constituents of elementary particles quantum volume (as “frozen photons”) and of luxons;

5. pseudoscalar photons, (particularly-luxons): $m_f = n \cdot \nu \cdot m_h = 2n \cdot m_w$, $S_l = 1\hbar$; acting as electromagnetic radiation pseudoscalar quanta, formed by ‘n’ pairs of vectorial photons: $m_f = n\,(m_w - \overline{m}_w)$ which changes sign at a parity inversion: $P(+\zeta-\zeta)=(-\zeta+\zeta)$, i.e. an “inversed” photon is an antiphoton $\overline{m}_f$, with opposed sign phase, $-\varphi$:

$$P(m_f)\varphi = P(\zeta m_w - \zeta \overline{m}_w) = (\zeta \overline{m}_w - \zeta m_w) = -(\zeta m_w - \zeta \overline{m}_w) \;=\; (\overline{m}_f)\_\varphi$$

In accordance with the Munera’s model of photon, the multiphoton with energy: $\in_f = n \cdot h\nu$, represents a row of ‘n’ pairs of coupled vexons having antiparallel spins, the vexon being considered in our theory with the diameter dimensioned conform with the Hunter-Wadlinger’s model of photon, ($d_w = \lambda/\pi$), and being identifiable as “photino” in the supersymmetric theories.

The possibility of representing quantum particles as composed of chiral soliton fronts of planar vortices having reciprocally opposed orientations, formed in a Madelung-type fluid as solutions of a nonlinear equation, is theoretically confirmed [21]. Also, in 1972, Hasimoto showed that the work of daRios (1906) of vortex filaments is closely related to the non-linear Schrödinger equation.

In the soliton theory, these photon pairs corresponds to Falaco-type pairs of planar vortices, [22], that could be long-life states and arise usually in areas having minimal surface defects when the energy density $\in_r = \rho_r c^2$ of the generating vortex soliton field is double, at least, comparing to the mass/energy density $\in_w = \rho_w c^2$ of the generated sub-solitons: $\in_r = 2\in_w$.

As chiral constituent of the electron mass – given by paired component vexons (frozen photons) according to a4 – axiom, the m_v-vecton has as correspondent – in supersymmetric theories, a particularly fermionic superpartner of the axion-particle, called "axino" and having the rest-mass: $10^{-6} \div 10^{-2}$ eV/c^2, predicted to change into and resulting from a microwave photon in the presence of a strong magnetic field, explaining in this way the non-baryonic dark matter.

The existence of vectorial photons as electromagnetic field quanta is considered also by L. S. Mayants, [23], which argued the possibility to explain the electromagnetic field by a gas of particles, called "emons", having a tiny but non-zero rest mass ($m < 10^{-50}$ kg).

According to the model, the structure of particles contained by the quantum medium, (B_c), is consistent with the quantum soliton theory which shows that the quantified soliton-particles are solutions of the Schrodinger nonlinear equation – solutions that are similar to those which describes wave bundles whose centers moves as particles that can interact elastically, [13].

We will argue in the theory that all elementary particles can be described by a "cascade vortices" cold forming process. The basic particle model of cold genesis, used for explain the particles basic properties, represents – in the theory, an ideal, undisturbed and non-relativist model of chiral pre-quantum soliton, generated at cold, ($T \to 0K$), as a quantized vortex in a sub-quantum or/and quantum medium, with a Madelung type representation of the sub-quantum fluid [24], according also to the Bohm-Vigier interpretation of Ψ-wave function.

1.3 The Photon

Considering that the simple photon with energy $\in_f = h\nu$ represents a pair of coupled vectons or vexons – in accordance also with Munera model of photon, [15], the known wave-corpuscle dualism of photon is explained in the theory considering that the wave properties of photon is given by a vortexial evanescent part of its vectons/vexons formed around theirs inertial mass $m_{v(w)}$ which gives the corpuscular character of the photon.

The fact that for a photon of an electromagnetic wave the value of electric **E**-field energy is equal to the value of the magnetic **B**-field energy by the relation: $E = c \cdot B$, it results according to the theory, from the equality between the value of the electric field energy: $w_E^f = ½ \cdot \varepsilon_0 E^2 \sim ½ m_S c^2$, given bythe translation energy of a spinorial Γ_S vortexof quantons, which do not contribute to the vecton/vexon inertial mass $m_{v(w)}$ – given by a vectonic/vexonic core, and the value of the magnetic moment vortexial energy: $w_\mu^f = ½ \mu_0 H^2 \sim ½ m_S(\omega_h r)^2$ of the photonic vecton/vexon, given by the vortexial energy of the Γ_S-vortex containing a m_S-mass of quantons in the volume of Compton radius, (fig. 1), i.e.:

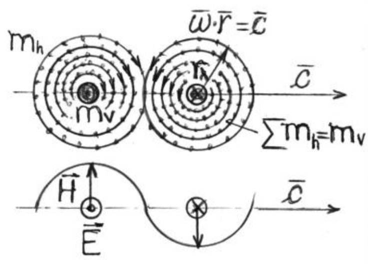


Fig. 1. *Pseudoscalar photon.*

$$E_E^c = E_\mu^c \Rightarrow \frac{\sum m_h \cdot c^2}{2} = \frac{m_S'(\omega \bullet r)^2}{2} = \frac{h\nu}{4} = \frac{m_\nu c^2}{2}; \quad \omega \bullet r = c \qquad (4a)$$

because that inside the vexonic chiral soliton with $r_\mu = r_\lambda = h/2\pi m_f c$, the Γ_S -vortex satisfy the condition: $(\omega_c \cdot r) = c$. So, even a row of quantons with antiparallel pseudomagnetic moment (vortex) may form a wave, according CGT.

From (4a) it result also that: $m_S = \sum m_h = m_{v(w)}$, so the spinorial mass of the vecton/vexon spinorial vortex is equal with the inertial mass of the photonic vecton/vexon, in accordance with the equality between the corpuscular energy and the ondulatory (electromagnetic) energy of photon, according to the theory.

In accordance with the general character of a1-a4 axioms of the theory, this result may be generalised for all chiral soliton particles in the sense that the intrinsic chirality: $\zeta = \pm 1$ of the particle superdense centroid, induces a (sub) quantum Γ_υ-vortex formation to a particle having the v_p -speed in the presence of a (sub) quantum medium as in the case of the action of a (sub) quantum wind having the same velocity, according to the relation:

$$w_\mu = \in_k; \Rightarrow \tfrac{1}{2}\sum m_h(\omega_h \cdot r)^2 = \tfrac{1}{2} m_p v^2 \qquad (4b)$$

which suggests a phenomenological reason for the relativist hypothesis of the particle speed-depending mass variation, by the vortex pair forming condition [22], (i.e.: $m = m_0 + \Delta m(v) \sim\Gamma_\upsilon$).

1.4 The Fermionic Spin

The semi-whole spin: $S_v=\frac{1}{2}\hbar$, $(\hbar=h/2\pi)$ of the vectorial photon considered as spatially extended chiral soliton with a spinorial Γ_S -vortex of r-radius equal to the Compton radius: $r_\lambda = d_\lambda/2=\lambda/2\pi$, [16], result in theory as a real size representing the rotation kinetic moment in classical sense, i.e. – "pre-quantum spin", S_v^*, by approximating the vectorial photon with a vortex-tube in a barrel form (pseudo-cylindrical), in prequantum model, which becomes pseudo-spherical by spin precession, in a quantum model, with a (3D) radial-symmetric distribution of the component quantons, with the quantonic density, $\rho_c(r)$, varying according to the relation: $4\pi r^2\rho(r) = 4\pi r_a^2\rho(r_a)$ =constant, characteristic to the evanescent part of the photon wave ($\rho(r) \sim|\psi|^2 \sim r^{-2}$; $r > r_a$) which contains the m_S -spinorial mass of its vectons or vexons, i.e. – excepting the quantum volume mass of a r_a – radius, containing the $m_{v(w)}$ inertial mass, which is characterized by an exponential wave function of Schrödinger-Bohm-Vigier type, ($\rho'(r) \sim |\psi'|^2 \sim e^{-\gamma\cdot r}$; $r\leq r_a$).

Considering a spin precession movement of vecton or vexon, we can approximate that the kinetic moment of a vortexed quanton of its spinorial vortex, Γ_S, has the value: $i_h=m_h c.r$, (r – the distance from the soliton centre) in all solitonic volume, thus having – for any pair of vortexed quantons equally placed at a δ distance from a surface of radius $r^*_\lambda=r_\lambda/2$, the relation:

$$m_h c\cdot(r^*_\lambda+\delta)+m_h c\cdot(r^*_\lambda-\delta)=2m_h c.r^*_\lambda.$$

Therefore, integrating for all photonic volume of r_λ -radius and with mass: $m_S = \nu_v \cdot m_h$, ($\nu_v = m_s c^2/h$ – the equivalent frequency of the vectorial photon), the vectorial photon spin result of value: $S_v^* = m_v \cdot c \cdot r_\lambda/2 = \frac{1}{2}\hbar$, if the spinorial mass of fermionic soliton evanescent part is equal with the particle-like part mass: $m_S = m_{v(w)}$ – condition fulfilled also in the case of the vexon, according to the relation (4b) of the theory, so – in concordance with the quantum mechanics.

The same result is obtained, for a vectorial photon with spin precession, also by the integral:

$$S_v^* = \int_{r_a}^{r_v} r \cdot c \cdot dm \cong 4\pi r_a^2 \rho(r_a) \cdot c \cdot \frac{r_v^2}{2} \cong m_s \cdot c \cdot \frac{r_v}{2} = m_s c \cdot \frac{\lambda}{4\pi} = m_s \cdot c \cdot \frac{h}{4\pi \cdot m_v c} = \frac{1}{2}\hbar \quad (5)$$

with: $\rho(r)/\rho(r_a) = r_a^2/r^2 = |\psi|^2$, neglecting the spin: $l_s(r_a) \approx \frac{1}{2}\, m_v c \cdot r_a^2$ of the inertial $m_{v(w)}$ – mass.

An identical result is obtained similarily also for a vectorial photon without spin precession, approximated as being pseudo-cylindrical (barrel-like), with the lenght: $l_a = 2r_a$ and with a density:

$$\rho(r) \sim |\psi|^2 \sim r^{-1}, \text{ i.e.: } \rho(r)/\rho(r_a) = r_a/r.$$

By this it is explained also the equality between the pre-quantum and the quantum spin of the leptonic fermions. The equation (5) by which the S_v^*-spin value of vectorial photon is equal to the value of quantum spin, S_l, by the equality: $m_s = m_{v(w)}$, may be generalised also in the case of another leptonic fermion: the electron.

It results also that the S_p^*-prequantum spin is null for the (pseudo) scalar photon of 2n or 4n vectons ($m_f = 2n \cdot m_v$, $T \to 3K$), being given by the $\Gamma_s = \Gamma_\mu$

quantonic vortex of vecton magnetic moment, and $S_p^* = S_l = 1$ for photons with mass $m_f = (m_w + \bar{m}_w)$ if Γ_s is given by a vortex of vectons: $\Gamma_s = \Gamma_v = \pm\Gamma_\mu$.

1.5 The Charge Model

In accordance also with the charge model of quantum mechanics, the q_e charge of a particle result as being given by a spheric-symmetric distribution of charge quanta around a particle having the radius $r_a = a$, i.e.: $\rho_a \cdot r^2 = \rho_a^0 \cdot a^2$, with a variation of the quanta impulse density having the form:

$$p_c = \rho_c(r) \cdot \mathrm{v_c} = \rho_a^0 \frac{a^2}{r^2} \cdot \mathrm{v_c}; \quad \rho_\mathrm{a}^0 = \rho_c(a); \ \mathrm{v_c} = c; \tag{6}$$

We shall consider as real charge: $Q(p_c)$, the charge for which the quanta impulse density, p_c, is parallel to the radius direction: ($p_c \uparrow\uparrow r$) and as virtual charge: $q_i(i \cdot p_c)$, ($i=\sqrt{-1}$), the charge for which the quanta impulse density p_c is anti-parallel to the radius direction, ($p_c \downarrow\uparrow r$).

A charge for which the intrinsic chirality and the field quanta chirality is: $\zeta_c = 0$, is exclusively a repulsive of "static" type charge if it is real charge and exclusively attractive of "static" type charge if it is virtual charge, according to the model, (figure 2).

For the elementary electric charge 'e', the charge sign depends on its intrinsic chirality ζ_e correlated with the electric field quanta chirality:

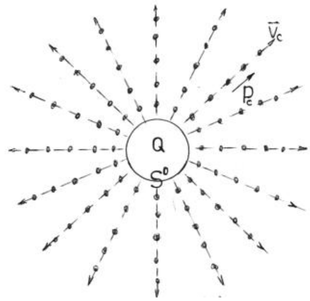


Fig. 2. *Static type charge.*

ζ_v, in accordance also with the combined CP parity, the fact that: $P(\zeta_v) = -\zeta_v$ being the cause of the charge sign inversion: $C(e) = -e$.

The vectons chirality $\zeta_v = \pm 1$ express also the fact that for ultra-relativistic particles, the spin lies in the direction of the motion, parallel or anti-parallel with the particle impulse.

This charge model is complying partially with the Whittaker's principle (1903) according to which any scalar potential is a result of the energy of an "electromagnetic wind" [25], in a general sense, considering the quanta flux as a quantum/sub-quantum wind which gives the negentropy of the quantum vacuum.

1.5.1 The (Electro) Static Type Interaction between Charges

In a classical way, the interaction force F_e of an electrostatic type field, generated by a charge Q(M) on a pseudo-charge $q(m_0)$, is given by the impulse density variation:

$\Delta p_c = p_c(r) - p_c(-r) = 2n \cdot m_c v_c$, $(n=n_0\Delta r)$ of the Q(M)-charge quanta – which interacts elastically on the x direction at the semi-surface level: $S^x = S^0/2 = 2\pi r_0^2$ of the m_0 interaction particle, for which its "pseudo-charge" is proportional with its surface: $q_s(m_0) = S^0/k_1$.

The electric type field of the Q-charge has the intensity $E_s(r)$ depending on the interaction force $F_e(r)$, which classically has – in consequence, the expression:

$$F(r) = S^x \cdot \frac{\Delta(p_c)_r}{\Delta t} = S^x \cdot \frac{\Delta(n.m_c \cdot \mathrm{v}_c)_r}{\Delta t} = S^0 \cdot \rho_{\mathrm{v}}(r) \cdot \mathrm{v}_c^2 = q_s \cdot E(r); \quad n.m_c = n_0 \Delta r.m_c = \rho_{\mathrm{v}} \Delta \mathrm{r} \qquad (7)$$

where: $\Delta p_c/\Delta t = 2(n_0 m_c v_c^2)_r = 2\rho_v(r)v_c^2$; (elastic interaction).

By the constant k_1 and the expression: $q_s(m_0) = S^0/k_1$ of the pseudo-charge, the expression of the intensity $E_s(r)$ of the pseudo-electric field results from the eq. (7), in the form [26]:

$$F(r) = S^x \cdot \frac{\Delta(p_c)_r}{\Delta t} = S^x \cdot \frac{\Delta(n.m_c \cdot \mathrm{v}_c)_r}{\Delta t} = S^0 \cdot \rho_{\mathrm{v}}(r) \cdot \mathrm{v}_c^2 = q_s \cdot E(r); \quad n.m_c = n_0 \Delta r.m_c = \rho_{\mathrm{v}} \Delta \mathrm{r} \qquad (8a)$$

For extending the equations (6) ÷ (8) to the electron having: q_s=e; r_0=a, replacing these values in the expression of the pseudo-charge: q_s, it result the expression of the proportionality constant: $k_1 = S_e^0/e = 4\pi a^2/e$, gauged by the electron.

When the E_s field is generated by a virtual Q – charge, we have:

$$E_s(M_r) = k_1 \cdot \rho(r) \cdot \mathrm{v}_c^2 = \frac{1}{2} k_1 \cdot \frac{\Delta p_c}{\Delta t}; \quad (\mathrm{v}_c \approx c); \quad k_1 = \frac{4\pi \cdot r_0^2}{q_s(m_0)} \qquad (8b)$$

Considering the electron e-charge as being of space-extended (Lorentzian) type and the electron a-radius as given by the equality between the intrinsic energy of the electron and the electrostatic field energy, used by some electron models [32] of the classic electrodynamics:

$$\in_E^o = \int_a^\infty 4\pi \cdot r^2 \Phi(r) dr = \frac{e^2}{8\pi\varepsilon_0 a} = m_e c^2; \quad \Phi(\mathrm{r}) = \varepsilon_0 \frac{E^2(r)}{2} = \frac{\varepsilon_0}{2}\left(\frac{e}{4\pi\varepsilon_0 r^2}\right)^2 \qquad (9)$$

it results that: $a=1.41\times10^{-15}$m =1.41fm, (with the e-charge in surface), and $k_1=1.56\times10^{-10}\,[m^2/C]_{si}$.

For the general expression of the Q charge generating an E(r)-field, we shall also consider the electric charge gaussian expression, given by the electric flux:

$$Q=\varepsilon_0\int E\cdot dS=4\pi\,\varepsilon_o.r_0^2\cdot E(r_0)=4\pi\,k_1.\varepsilon_o.r_0^2\cdot\rho(r_0).v_c^2;\quad v_c=c\quad(10a)$$

where, if: $Q = e$; $v_c = c$ and $r_0 = a$, it results that:

$$\rho(a)=\rho^0_a=1/(k_1^2\varepsilon_0c^2)=\mu_0/k_1^2=5.17\times10^{13}\text{kg/m}^3.$$

Also, if Q – charge is a virtual charge, we have:

$$Q=\varepsilon_0\int E\cdot dS=4\pi\,\varepsilon_o.r_0^2\cdot E(r_0)=4\pi\,k_1.\varepsilon_o.r_0^2\cdot\rho(r_0)\cdot(\mathrm{i}\cdot v_c)^2=-|Q|\;;\;\; \mathrm{i}=\sqrt{-1}\quad(10b)$$

The density of the electrostatic energy at the e-charge surface, (r =a), is equal with the kinetic energy of the field quanta in the volume unity, according to the equation:

$$\Phi^o(r)=\frac{\varepsilon_o}{2}\cdot\left(\frac{e}{4\pi.\varepsilon_o\cdot a^2}\right)^2\cdot\frac{a^4}{r^4}=\frac{1}{2}\cdot\frac{\mu_o\cdot c^2}{k_1^2}\frac{a^4}{r^4}=\frac{1}{2}\cdot\rho_a^o.c^2\cdot\frac{a^4}{r^4}=\frac{1}{2}\cdot\rho(r).c^2\cdot\frac{a^2}{r^2};\quad \rho_a^o=\rho(a)\quad(11)$$

From eq. (9) it results also the dependence: $2\pi a^3\cdot\rho^0_a = m_e$.

1.5.2 The Interaction between Charges through Magnetic Type Field

In the case of a m_p-particle, having a q_s-pseudo-charge and a r_0-radius which crosses a quantum fluid (quantum wind) with the speed $v_0 = v_p\sin(\mathbf{v_p};\ \mathbf{v_c})$ perpendicular on the quantum wind considered as an ideal fluid having the v_c – speed,($v_0\perp v_c$), according to the impulse theorem for ideal fluids derived from a Gauss-Ostrogranski relation, on the m_p-particle surface, S, acts a pressure force given by the impulse density: $p_i = \rho_c v_c$, that is:

$$F_i = m_p \cdot a_i = -\frac{d}{dt}\int_s \rho_c \cdot \mathrm{v}_c \cdot d\tau = \int \Pi_{ik} \cdot dS_k \tag{12}$$

where Π_{ik} represents the impulse flow density tensor:

$$\begin{gathered}\Pi_{ik} = P_c \cdot \delta_{ik} + \rho_c(\mathrm{v_i} \cdot \mathrm{v_k}); \quad \text{with: } \delta_{ik} = (\mathrm{n_i n_k}) = \mathrm{n_j}; \quad |\mathrm{n_i}| = |\mathrm{n_k}| = 1; \quad \mathrm{dS_k} = n_k dS \\ (\mathrm{n_i};\mathrm{n_k} \text{ - unit vectors}); \quad \mathrm{P_c} = \rho_c \cdot \mathrm{v_c^2} \;\; ; \; \mathrm{v_i} = \mathrm{v_c} \cdot n_i; \;\; \mathrm{v_k} = \mathrm{v_0} \cdot n_k;\end{gathered} \tag{13}$$

For Π_{ik}=constant and $\int dS_k = S^0 \cdot n_k$, considering the interaction of quanta with the particle surface as being quasi-elastic, according to eq. (7) and (8), to the quantum pressure static force: $P_c = \rho_c \cdot v_c^2$ it corresponds an equivalent interaction surface: $S^0 = 4\pi r_0^2$, therefore the equation (12) becomes [26]:

$$F_i = m_p a_i = \frac{S^0}{k_1}(k_1\rho_c \mathrm{v_c^2} + k_1\rho_c \mathrm{v_c v_0})n_i = \mathrm{q_s}(E_i^0 + E_i^l) = F_i^0 + F_i^l; \quad \mathrm{v_c} \approx c \tag{14}$$

According to the eq. (7) and (14), the force F_i^0 is obtained as an electric type force.

In this case, the dynamogenic force, F_i^l, may be considered as of magnetic type, as follows:

$$F_i^l = q_s \cdot k_1\rho_c(v_i \cdot v_k)n_k = q_s(B_j \cdot v_k) \Rightarrow \vec{F}^l = q \cdot \vec{v}_o \, x \vec{B}; \qquad q_s = S^0 / k_1 \tag{15}$$

where B represents the magnetic induction, having-in eq. (15), the expression:

$$B_j(r) = k_1\rho_c(\mathrm{r}) \cdot \mathrm{v_i} \cdot n_k = k_1 p_\mathrm{i}(r) \cdot n_k; \;\; \mathrm{v_i} = \mathrm{v_c} \cdot n_i \, ; \mathrm{v_c} \cong c \tag{16}$$

where $p_i(r)$ represents the impulse density of field quanta which pass through the surface unit in the point P(r). According to eq. (7) we also may consider the force F_i^l as being a pseudo-Lorentzian force, generated by an electric type field, E^l, induced at the m_p-particle level by a magnetic type B -field displaced with the speed $v_B = -v_0$:

$$\vec{E}^{l} = \vec{\mathrm{v}}_0 \, x \, \vec{B} = -\vec{\mathrm{v}}_{\mathrm{B}} \, x \, \vec{B} \qquad (17)$$

The eq. (17) expresses – in a vectorial form, one of the electromagnetism' fundamental laws (referring to the generating of an electric E-field through a magnetic B – field) but generally deduced, i.e. which may be extended also for the dynamogenic gravitational field, (the gravito-magnetic field).

If an electric type field has the intensity vector E displaced with the speed $v_E = -v_k$ in a x_0 -point, the displacement of the impulse density: $p_i = p_s \cdot v_i$ generating an E_i-field, generates – in the x_0-point, an induction, B, of a magnetic type field, as follows:

$$B_j = k_1 \cdot \rho_c \cdot \langle \mathrm{v}_E \cdot n_i \rangle = \frac{1}{c^2} < \mathrm{v}_E \cdot (k_1 \cdot \rho_c c^2) n_i > = \mu_0 \varepsilon_0 < \mathrm{v}_E \, x E_i >, \; \vec{B} = \frac{1}{c^2} \vec{\mathrm{v}}_{\mathrm{E}} \, x \, \vec{E} \qquad (18)$$

The eq. (18) expresses – in a vectorial form, the fundamental law of electromagnetism referring to the generation of a magnetic B-field through an electric E-field, but generally deduced.

If the $\rho_c(r)$ – density of field quanta in the x_0 -point is varying in time, the continuity equation for ideal fluids may be applied to the vectonic fluid, in the form:

$$\frac{\partial \rho_c}{\partial t} = -\nabla(\rho_c \cdot \mathrm{v}_{\mathrm{E}}); \quad \frac{1}{c^2} \cdot \frac{\partial (k_1 \cdot \rho_c \cdot c^2)}{\partial t} = -\nabla (k_1 \cdot \rho_c \cdot \mathrm{v}_{\mathrm{E}}) \qquad (19)$$

and by eq. (7) and (16), it results another equation of electromagnetism, generally deduced:

$$\frac{1}{c^2} \frac{\partial E}{\partial t} = -\nabla \cdot B = -\,div B \qquad (20)$$

Considering that the density of quanta of **E** – and **B** – field is given by a quanta concentration: $n_0 = n_s \cdot n_{i,}$ where: $n_i \approx$ constant is the linear concentration and n_s – the concentration of quanta in a plane perpendicular on the **E**-field direction, according to eq. (16) it results that the **H**-intensity of the (pseudo) magnetic field can be considered proportional with the surface density of quanta: $\sigma_c = m_c.n_s$, and with the magnetic permeability – resulted as a size proportional with n_i:

$$H_j = k_1 \cdot \sigma_c.v_k = B_j/\mu_j;\ (v_k = v_E);\ \sigma_c = m_c.n_s;\ \mu_j = B_j/H_j = n_i \tag{21}$$

By the eqn: $v_l = 1/\sqrt{(\varepsilon\mu)}$ of the light speed in a medium with $\varepsilon\mu \neq \varepsilon_0\mu_0$, the eq. (21) explains the cause of v_l-light speed variation with $\mu = \mu_0\mu_r$.

The possibility to deduce the electromagnetic fundamental laws through hydrodynamic equations applied to the quantum and sub-quantum fluid is in accordance also with the Maxwell theory regarding the electromagnetic interactions intermediated by ether.

1.6 The Gravitic Interaction

To the attracted m_p-mass and to the gravitic field of an M-mass of a particle or of a body, can be assigned a conventional size: "electrogravitic" pseudo-charge, $q_{G,}$ respectively: "electrogravitic" field, $E_G(r, Q_G)$, whose expressions results by the general eq. (14) writted in the form:

$$\text{(22a)} \qquad q_G = \frac{S_g^0}{k_1}; \qquad \mathrm{E_G}(r, Q_G) = \pm k_1 \rho_g c^2; \qquad \mathrm{p_g}(r) = \rho_g(r) \cdot c = \rho_g^0 \cdot \frac{r_0^2}{r^2} \cdot c \qquad \text{(22b)}$$

In the expression (22b) of the electrogravitic field intensity, the meaning of the sign: ± is that the electrogravitic Q_G -charge generating the E_G-field is given by an uniform spherical distribution of an etheronic flux with a non-compensated component, i.e. – by the difference between the received etheronic flux $p_{ir} = \frac{1}{3}p_e$, ($p_{ir}\uparrow\downarrow r$) and the flux p_{rr} radially emerging from the inertial M-mass structure, ($p_{rr}\uparrow\uparrow r$). In the case of an attractive, gravitic M-charge, $p_g(r) = (p_{ir} - p_{rr}) > 0$ and $Q_G < 0$ and in the case of an repulsive anti-gravitic charge: $p_g(r) = (p_{ir} - p_{rr}) < 0$.

The antigravitic charge $Q_G > 0$ correspond – in consequence to the case of etherons loosing from the particle structure and the gravitic charge $Q_G < 0$ correspond to the case of etherons receiving and partially vortexing.

Therefore, considering this non-compensated etheronic flux as a gravitonic field flux having the impulse density $\Delta_r p_e(r) = \mathbf{p}_g(r)\uparrow\downarrow\mathbf{r}$, the generating of gravitation force $\mathbf{F_N} \sim \mathbf{p}_g(r)_{\uparrow\downarrow}$ complies with the Fatio's and LeSage's hypothesis [27] which presumes the screening of M-mass by the m_p – mass in report with the cosmicetheronic winds that comes radial-symmetrically towards the M-mass, because that $\mathbf{p}_g(r)_{\uparrow\downarrow}$ is inverse proportional with the M-mass transparency to etherons, (fig.3).

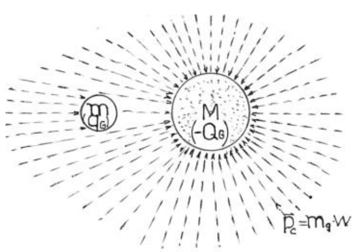


Fig. 3. *Gravitostatic interaction.*

The etheronic flux formed by a M-mass with disturbed sinergonic vortex which emits s-etherons with $\mathbf{p}_g(r)\uparrow\uparrow\mathbf{r}$ gives an antigravitic pseudocharge, generating a positive, repulsive E_G-field.

We shall reconsider the eq. (14) in the case of an interaction force acting on a m_p-particle having a q_G-electrogravitic pseudo-charge which crosses an etheronic wind of a gravitic field generated by an $Q_G(M)$-electrogravitic charge, with the speed $v_0 = v_p \cdot \cos\theta$ – perpendicularly on the v_s-speed of the etheronic wind,($v_0 \perp v_s$). Considering the m_p-particle formed by n_p quantons having the m_h-mass and the surface: $S_h = 4\pi r_h^2$, (where r_h is the quanton centrol radius), because the particle' penetrability to etheronic winds, the interacting surface of the m_p-particle with the etheronic wind is a sum of S_h-surfaces interacting with the elementary quantonic centrols, thus, in eq. (14) we shall consider that:

$S^0_g = n_p.S_h$ and the equation (14) become:

$$F_i^g = m_p a_{Gi} = -k_h \cdot m_p(\rho_g \mathrm{v}_g^2 + \rho_g \langle \mathrm{v}_g \cdot \mathrm{v}_o \rangle) \cdot n_i\,; \quad \mathrm{k_h} = S_h / m_h \ [\mathrm{m}^2 / kg] \qquad (23)$$

For the variation of $\rho_g(r)$-density of gravitonic wind, in compliance with eq. (23) of the electrogravitic $q_G(M)$-charge of the M-mass having the radius r_0 and for v_g=c, the gravitic force results from eq. (23) as having the form:

$$F_i^g = -k_h m_p . \rho_g c^2 \left(1 + \frac{\mathrm{v}_0}{\mathrm{c}}\right) n_i = -G\frac{m_p M}{r^2}\left(1 + \frac{\mathrm{v}_0}{\mathrm{c}}\right) n_i\,; \quad \rho_g(r) = \rho_g^0 \frac{r_0^2}{r^2} \approx \frac{M}{m_h}\rho_g^h \frac{r_h^2}{r^2} \qquad (24)$$

where: ρ_g^0 and ρ_g^h are the density of the gravitonic flux (i.e.-of the un-compensated etheronic wind) at the $M(r_0)$-mass surface and – respectively – at the $m_h(r_h)$-quanton surface.

If the m_p-mass represent a photon having the speed v_0 = c, the value of the F_i^g -force, acting as a gravitic type force, results from the equation (24) as: $F^g(r, c) = 2\, F^g(r,0)$ -of a double value comparing to Newtonian static gravitational force, in accordance with the Einstein's theory of relativity and the astrophysical observations.

This correspondence is explained by the fact that the form with lorentzian type term of the total gravitational force F_i^g, may be obtained also in the tensorial theory of gravitation for a weak gravitational field or reasonably flat space-time, giving as solutions the gravitational analogs to Maxwell's equations for electromagnetism, (Lano, Fedosin, Agop, N. I. Pallas et al. [28]), the increasing of F_i^g with the v-speed, being equivalent with an transversal relativistic effect of the gravitational mass growth: $F_v = g_g \cdot m_p(1+\beta) = g_g \cdot m_p^v$, $(\beta = v_0/c)$.

The eq. (24) gives – for the G-gravitation constant, the expression:

$$G = \frac{k_h \rho_g^0 r_0^2 c^2}{M} = \frac{k_h \rho_g^h r_h^2 c^2}{m_h} = \frac{4\pi \rho_g^h r_h^4 c^2}{m_h^2} = 6,67x10^{-11} \frac{N \cdot m^2}{kg^2}; \qquad (25)$$

The value of the density ρ_g^o of the un-compensated etheronic wind on the surface of a black-hole type star-for example, characterizes only the local (not also the intergalactic) etheronic density: ρ_e^o, because that it results by the speed's statistic distribution of the etherons received/emitted by the solitonic quantum-vortices of the elementary particles in number proportional with the density of the M-mass which may retain gravitationally also sinergons.

We observe also that – according to eq. (22) and (23), the value of S^0_g being given by a very great number of quantons, for an electron, for example, the value of q_G may be considered of size order of the electron charge, i.e.: $S^0_g \approx S^0_e \Rightarrow q_{Ge} \approx e$, resulting that the entire weakness of the gravitation force comparative to the electrostatic force may be considered as being given by the value of ρ_g^0, by the approximation: $k_\rho = F_N/F_e \approx \rho_g^0/\rho_a^0$.

In this case, for an unitary form of the electric and of the electrogravitic fields, we may obtain a plausible gauge value of k_h and of ρ_g^h considering for the electron case the gauge condition: $q_{Ge} \approx e$, which complies whith the expression of the electrogravitic field obtained also by M. Agop [28] starting from the a^e acceleration obtained by an electron in the field of another, i.e.:

$$a_i^e = \frac{F_N^e}{m_e} + \frac{F_e^e}{m_e} = a_{Gi}^e + \left(\frac{e}{m_e}\right) \cdot \frac{e}{4\pi\varepsilon \cdot r^2} = \left(\frac{e}{m_e}\right) \cdot (E_G^e(r) + E_e^e(r)); \quad E_G^e = \left(\frac{m_e}{e}\right) \cdot a_{Gi}^e \quad (26a)$$

resulting that $q_G \approx (m_p/m_e)e$ and the generalization: $E_G = (m/q_G) \cdot a_{Gi} = (m_e/e) \cdot a_{Gi}$ - used also for the obtaining of generalized London equations [28], which – by eqn. (22b) and (25), gives:

$$F_i^g = q_G \cdot E_G(r, Q_G) = -\frac{m_p}{m_e} e \cdot k_1 \rho_g c^2 = -k_h m_p \rho_g c^2 \Leftrightarrow \rho_g^0 \approx k_\rho \rho_a^0; \quad q_G = \frac{m_p}{m_e} e; \Rightarrow k_h = \frac{4\pi a^2}{m_e} \quad (26b)$$

resulting the gauge constants: $k_h = 27.4$ [m^2/kg], $r_h = 1.26 \times 10^{-25}$ m and:

$\rho_h = \rho_c^M = 8.8 \times 10^{23}$ kg/m^3 and respectively, by eq. (25): $\rho_g^0(m_e) = 1.24 \times 10^{-29}$ kg/m$^3 \approx \rho_g^h(m_h)$, ($a^2 m_h \approx r_h^2 m_e$). Also, by (26), it results that: $k_h = (e/m_e) \cdot k_1$.

The density ρ_h of the quanton inertial mass results comparable to those of a hypothetical preonic star.

If the g – and s-etheron have the same ρ_c^M density as the quanton, it result also the size order of the graviton and of the sinergon radius:

$r_g \approx 10^{-31}$m; $r_s \approx 10^{-28}$m – bigger than the Planck length (1.6×10^{-35} m) and the ratio: $r_s/r_g \approx r_h/r_s \approx 10^3$. Also, it results that: $Q_G = 4\pi\varepsilon_0 G \cdot M \cdot (m_e/e)$.

1.7 A galileian Relativist Expression of the Particles Acceleration

The abandonment of the concept of ether through the postulate of the light speed constancy in Einstein's special relativity, led to major paradoxes in the physical interpretation of relativistic equations, such as the so-called "the twins paradox" from which derives a version that may be de-named: "the three twins paradox". This version leads to the relativistic conclusion that, if two of three twin brothers flew in space with relativistic speeds on perfectly symmetrical trajectories in comparison with the third brother remained on Earth, but having a 45° …180° angle between these trajectories, then the first twin should meet to the second twin younger than himself (according to the relativistic equation of time dilatation), but this comes in contradiction with the fact that the third twin remained on Earth should observe that both of them returned younger than himself by an identical difference of age.

Also, the Einsteinian equation of speed-dependent mass increasing, leads to the philosophic paradox of infinitely mass growth by its movement with relativist speed. By the concept of cosmic ether, it is possible to avoid such paradoxes by a physical reinterpretation of the Einstein's relativistic equations.

In the case of an accelerated m_0-particle under a field action in a quasi-homogenous sub-quantum medium, (A_c), considering this medium as an ideal fluid with a ρ_s mean density, according to a specific equation for ideal fluids the acceleration a_p of the m_0 -particle "falling" into the sub-quantum medium is dependent on the "falling" v_p-speed because the resistance force of the sub-quantum fluid: $F(r, v) = S^0\rho_s v^2$, in the form:

$$a_{ps} = a_0\left(1 - \frac{v_p^2}{w^2}\right); \quad a_p = \frac{F_{(\bar{r}, v_p)}}{m_p}; \; a_0 = \frac{F_{(\bar{r},0)}}{m_p}; \; F_{(\bar{r},0)} = S^0 \rho_s w^2 \qquad (27a)$$

This equation, for a value of the limit-speed of "falling" into this medium equal to: w =√2c(c = the light speed) and for non-relativistic v_p-speed, approximates the Einstein's equation for the variation of mass acceleration given by a field, considered in the Einstein's theory of relativity as a result of the speed – dependent mass variation (and not of the F(r) – force variation), having the known form:

$$m = m_0/[1-(v/c)^2]^{½} = m_0/\beta,$$

Mathematically, the eq. (27a) is equivalent to a longitudinal relativist effect, of the particle inertial m_0-mass variation with the speed:

$$m_p^*(v_p) = m_p^0/[1-v_p^2/w^2] = m_0/\beta'; \text{ with: } w = \sqrt{2}.c \qquad (27b)$$

considering – formally, an invariance of F(r) – force with the mass speed.

So, the Lagrangean of a relativist particle results in the theory in the form:

$$L(t) = - m_p^0 c^2 \cdot \beta' = -m_p^0 c^2 [1-v_p^2/w^2] = -m_p^0 c^2 + ½\, m_p^0 v_p^2 \qquad (27c)$$

The previous theoretical result shows also a theoretical limit of the particles speed in Universe: w =√2c, which suggests also that the etherons may be tachyons, with $v_g > c$.

In this case, the "tachyonic" correction which must be made for the value of ρ_g^0, is:

$$\rho_g^0 \cdot c^2 = \rho_g^{0'} \cdot w^2 = \rho_g^{0'} \cdot (c\sqrt{2})^2; \Rightarrow \rho_g^{0'}(m_e) = ½ \cdot \rho_g^0(m_e) = 0.615\text{x}10^{-29} \text{ kg/m}^3 \quad (a)$$

The apparent quasi-constant c – speed of photons is possible to results as an effect of the local quasi-homogeneity of the cosmic etheronic winds pressure giving to photons the c-mean speed for a dynamic equilibrium, given by a density ρ_G^0 of pseudo-stationary etherons of the galactic/intergalactic space, by the equation:

$$\rho_G^0 \cdot c^2 = \rho_g^{0'} \cdot (w - c)^2; \Rightarrow \rho_G^0 \geq [(\sqrt{2} -1)^2/2] \cdot \rho_g^0(m_e) = 0.084\rho_g^0 \approx 10^{-30}\ \mathrm{kg/m^3} \quad \text{(b)}$$

By (27b), the eq. (24) result in a form similar to those of Şomacescu's classic theory of fields [6], which explains also the planetary orbits precession, the gravitation force being:

$$F_i^g(r) = F_i^g(0) \cdot \frac{1 + \mathrm{v}_0/c}{1 - \mathrm{v}_p^2/2c^2}; \quad F_i^g(0) = -G\frac{M \cdot m_0}{r^2}; \quad \mathrm{v}_0 = \mathrm{v}_p \cos\alpha \perp \mathrm{v}_s \qquad \text{(27d)}$$

It results also – according to eq. (8), that the F(r, v)-resistance force of the (sub) quantum fluid is equivalent with a relativistic force of (pseudo) electric type:

$$F_q(r, v) = S^0 \rho_s v^2 = q_r \cdot E_r; \ (q_r = S^0/k_1).$$

The galileian relativist expression of the electric field result – according to eq. (8), in the form:

$$\begin{gathered} E(q, r, v) = k_1\, \rho_r (c \pm v)^2 = E_0\, (1 \pm v/c)^2, \\ \text{by a relative speed: } \mathrm{v_r} = (c \pm v)_r \text{ of the q-charge} \end{gathered} \qquad \text{(27e)}$$

1.8 The Soliton Electron Model

1.8.1 The Electron Model

Along the time, were proposed some classical electron models: Abraham's rigid electron model; Lorentz's space-extended model [29]; Parson's annular model; Page model [30], which presumes the existence of a magnetic field inside the electron; the Poincare's model, which presumes the existence of a quantum pressure on the electron surface that gives its stability; the Born-Infeld model [31], which considers, as the Mie model, that the electric field does not differ essentially from the electron, the Yadava's model [32] and other models.

In accordance with the a3-a4 axioms of the theory, considering the proton as a composite fermion formed by gammonic pairs of degenerate electron cluster type, similar to A. O. Barut's particle model [33], from the deduced equality between the electron radius (for e-charge in surface) and the proton radius: $r_p=a=1.41$ fm, it result a similarity between the electron structure and the proton quantum structure, which is penetrable by electrons until to the core level having the radius of approx. 0.2 fm and by protons – until to an "impenetrable" quantum volume having the radius of approx. 0.45÷0.6 fm, [34].

The experiments of scattering electrons on protons revealed also some scattering centers ("partons"; Taylor, Friedman, Kendall, [35]) with the radius of approx. 10^{-18} m and an exponential distribution of the proton charge and of the nucleon magnetic moment, having the (η_{rms}) root-mean-square radius between 0.86fm and 0.89 fm (G. Simon; I. Sick et al, [36]).

Similar scattering centers, having the radius under 1% from the classic radius of electron, were evidenced by experiments of X-rays exploration of the electron structure, [37].

Some theories [38] based on this experimental result, considers that the electron has the inertial m_e – mass compressed into a volume with the radius $r^0=10^{-18}$m, but other electron models consider that the electron has a core surrounded by a penetrable cloud of virtual leptons conjugated in pairs having opposite charges, [39].

In the Composite fermions (CF) theory, the electron is a composite fermion carrying an even number of vortices of the many-particle wave function, [40], as a composite chiral soliton.

According to the known electron soliton model, the electron soliton characteristics results from a solution of a nonlinear Schrödinger type equation, the ψ-wave function of electron having a linear part which characterizes the de Broglie's wave and a nonlinear part which characterizes the distribution of the charge spatial density: $\rho_q(r) = e \cdot |\psi|^2$, and of the electron vortex field density, [41].

According to these researches and to the a1 – a4 axioms of the theory, for a classic non-relativistic CF chiral soliton model of electron, we consider a substructure of electron quantum volume formed by vexons stabilized by vexonic centrols, resulted by the confination of cosmic 3K photons formed by paired vectons, around an electronic centroid (centrol), by the electron soliton vortex, Γ_e, which generates also the μ_e -magnetic moment of electron.

The considered electron cold genesis by vectons confining is in accordance with Lorentz-Einstein's perception of elementary particles as "condensation" of electromagnetic field.

Because that the formed vexons forms also bosonic $(m_w - \bar{m}_w)$ pairs of vexons blended with polarized vectons inside the quantum impenetrable volume, they are distributed in electron according to a Boltzmann type statistic distribution: $\rho_e(r) = \rho_e^0 \cdot |\psi(r)|^2 \sim e^{-r/\eta}$ that also characterizes the mixtures of bosons and fermions, the electron surface containing lighter m_w^*-polarized vexons, (polarised "frozen" vectorial photons).

These vexons gives the inertial mass of electron by theirs inertial mass as "frozen photons" and forms the electron quantum volume with the density $\rho_w(r)$ having-in accordance with the a1-a4 axioms and by similitude with the structure of proton, the following substructure [26]:

1. an "impenetrable" supersaturated quantum volume having the radius a_i =0.5÷0.6fm, composed of vexonic layers-in even number for positrons and odd number for negatrons, with paired and magnetically coupled vexons to the radial and the meridian direction;

Considering a pseudo-charge: $q_w^* = q_w \cdot \zeta_w$ of vexons, ($\zeta_w = \pm 1$) it results that the vexons of the last layer of "impenetrable" quantum volume attracts light vexons with oppsed q_w* pseudo-charge.

2. a charge's and strong interaction's quantum volume, having the thickness $\Delta a = a - a_i$, formed by un-paired light vexons: m_w*, attracted by the last layer of the "impenetrable" quantum volume and polarized with the μ_w-pseudo-magnetic moments on the meridian direction, by the μ_e-magnetic moment of electron having vortexial nature.

The q_w^*-pseudo-charge of the polarised vexons from the strong interaction quantum volume of electron, gives the electron's charge: $e = \Sigma(q_w^*)$.

The attractive or repulsive interaction is carried through the vectorial quanta of the **E**-electric field, named "vectons" in theory, generated by the electron e-charge.

These m_v-quanta may comes from the bosonic pairs of the 3K-background radiation, attracted by the Γ_e-vortex and divided by the m_w^*-vexons of the charge's quantum volume, the m_v-vectons having the same q^*-pseudo-chargeas the m_w^*-vexons of the electron charge being rejected with an oriented spin, forming the E-field, and the remained antivectons being absorbed and destroyed by the m_w^*-vexons having bigger mass – according to the theory.

According to the model, the parallel polarization rate of m_w*-vexons of the electron charge and implicitly – the value of the vectonic flux: $\Phi_v(E)$, are proportional to the impulse density of Γ_e-electron vortex in the strong interaction quantum volume, by the dependence relation:

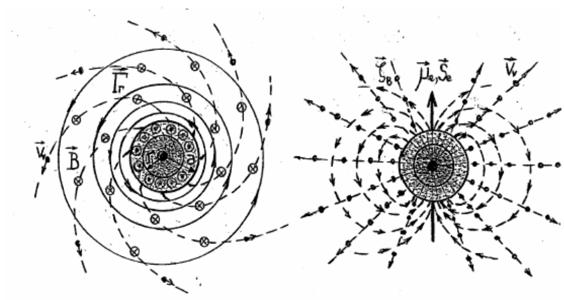


Fig. 4. *Model of chiral soliton electron.*

$$e \sim \mu_e(\Gamma_e) \sim \rho_\mu(a) \cdot c^2; \ (\rho_e(r) \sim \rho_\mu(r); \ (a_i \leq r \leq a) \qquad \text{(c)}$$

given by the dependence: $\mu_e(e;\Gamma_e) \sim B(e, a) \sim \rho_\mu(r) \cdot c$ – resulted by eq. (16) in accordance with the known proportionality between the electric charge and the magnetic moment.

In accordance with the experiments of electrons scattering concerning the value of the η_e mean radius of the e-charge and of the μ_e-magnetic moment density distribution inside the proton, according to an electron cluster type model of proton, by similitude it result by the model that the electron density $\rho_e(r)$ is proportional with the electron charge density $\rho_q(r)$ in the strong interaction quantum volume, given by the vexonspseudo-charge:

$$\rho_e(r) \approx \rho_q(r) = e \cdot \left|\Psi_e\right|^2; \Rightarrow \rho_e(r) = \rho_e^o \cdot e^{-\frac{r}{\eta_e}}; \quad \left|\Psi_e\right|^2 = e^{-\frac{r}{\eta_e}}; \quad \rho_e^o = \rho_e(0); \ \mathrm{a_i} \le r \le a \quad (28)$$

The classic probabilistic interpretation of the ψ-wave-function associated to the stationary electron result by the conclusion that at a distance x = r from the electron center, the electron is found in the proportion:

$[\rho_e(r)/\rho_e^0] = \psi_e \cdot \psi_e^* = |\Psi_e|^2 = R^2$, by the probability to found intrinsic quantons.

In accordance with the experiments [37] showing that the electron is a hard-core fermion we consider also the existence of a super-dense electronic centroid (centrol) having the density: $\rho^m \geq 10^{19}$ kg/m^3 and the radius: $r_0 \approx 10^{-18}$ m, so – being a very penetrant particle, which may explain – in consequence, the electronic neutrino as being a half of them (according to a resulted neutrino model – chpt. 12). Because that the density of an electronic centrol is bigger to those of a dense black hole, it is reasonable to consider: $\rho^m = \rho_e^0 \approx 10^{19}$ kg/m^3, giving a value:

$m_0 = ½ m_\nu \approx 0.5 \times 10^{-4}\ m_e = 4.5 \times 10^{-35}$ kg, (m_e – the electron mass), for the electron centrol, formed as a pseudo-compact assembly of quanton centrols- according to a3 and a4 axioms of the theory. In this case, for the neutrino mass, it result as plausible the approximative value: $m_\nu \approx 10^{-4}\ m_e$ – comparable with an existent experimental result [34] for the superior limit of the neutrino rest mass.

The super-dense electron centrol is characterized in our model by an intrinsic chirality: $\zeta_e = \pm 1$ ($\zeta_{e-} = -1$; $\zeta_{e+} = +1$) corresponding to a hypothetical helix form which determines the sense of the induced $\mathbf{\Gamma}_e$-soliton vortex relative to the $\mathbf{S}_e^*$ – spin sense and which correspond to a "string" form of electron centrol, with a radius $r_0 \leq 10^{-18}$ m.

In this case, the electron mass, $m_e = 9.1095x10^{-31}$ kg, is a sum between the electron centrol mass, m_0 and the mass $m_e^v = (m_e - m_0)$ of the quantum volume, having the radius: $a = 1.41x10^{-15}$m, that is:

$$m_e^v = \int_0^a 4\pi r^2 \rho_e(r).dr = 9{,}109x10^{-31} kg\,; \quad \rho_e(r) = \rho_e^o \cdot \mathrm{e}^{-\frac{r}{\eta_e}} = \rho_e^o \cdot \left|\Psi_e\right|^2 \quad (29a)$$

According to the model, the a-electron radius is equal to the limit-radius of the e-charge scalar cloud, defined as a separation limit between the vexonic quantum volume of electron and the volume of the e-charge electrostatic field, whose $\in_E(r)$-energy is given by a spheric-symmetrical distribution of vectons which have the same q_i^*-pseudo-charge sign like the m_w^*-vexons of the electron vexonic layer and do not take part to the electron inertial mass, being weakly linked with the electron.

The calculation of the mean radius η_e of the electron charge cloud results considering that all m_w^*-vexons of the electron layer are polarized by the μ_e-magnetic moment, giving the e-charge and by considering the continuity condition of the polarized vectorial photons density variation at the limit: r =a, i.e. considering that – at the electron surface, the vexonic density of electron is equal to the vectonic density of the E-field and have the value:

$$\rho_e(a) = \rho_E(a) = \mu_0/k_1^2 = 5.17 \text{ x } 10^{13} \text{ kg/m}^3 \quad (29b)$$

From this condition and by the eq. (29a), solving the integral of m_e-mass, it results a value: $\eta_e \cong 0.965x10^{-15}$ m, for the e-charge mean radius, that is – relatively close to the value of η^p_{rms}=0.895fm of the root-mean-square radius of the proton charge distribution experimentally deduced by Ingo Sick [36] and to the isoscalar magnetic mean radius: r_m=0.92 fm, given with the Skyrmion soliton model of proton, [42].

From (28) it results also: $\rho_e^0 = 22{,}24 \times 10^{13}$ kg/m^3.

We must also consider that the density of vexon-antivexon pairs confined inside the electron vortexial energy, complies with the chiral sub-solitons forming condition [22] which specifies that the energy density $\in_r = \rho_r c^2$ of the mass-generating vortex soliton field should be double, at least, comparing to the mass energy density: $\in_w = \rho_w c^2$ of the generated sub-solitons, i.e. $\in_r = 2\in_w$, leading to the condition: $\rho_r \geq 2\rho_w$.

Based on a theoretical result [9] which shows that at quantum equilibrium, on the vortex lines, the field quanta have the light speed: $v_t = c$, and in concordance with the chiral sub-solitons forming condition [22], we may consider that the energy density $\in_r$ of the generated Γ_r^e – vortex field is given by a soliton vortex of quantons, of the electron μ_e -magnetic moment: $\Gamma_\mu = 2\pi r v_{ct}$, with: $v_{ct} = c$ for $r \leq r_\mu$, ($r_\mu \cong r_\lambda$), and by a sinergonic vortex $\Gamma_A = 2\pi r \cdot w_t$, ($\sqrt{2}c \geq w_t \geq c$), having the same density: $\rho_s(r) = \rho_\mu(r)$, for $w_t \approx c$, which generates the magnetic **A**-potential of electron andinduces the Γ_μ-vortex, ensuring the negentropy and the stability of electron and explaining the constant values for both the e-charge and the μ_e-magnetic moment in electric and magnetic interaction, by the negentropic property of sub-quantum (etheronic) winds.

The hypothesis of the Γ_A-vortex existence is also in accordance with the Aharonov-Böhm effect which reveals the influence of a magnetic **A**-potential over the phase of de Broglie wave of a moving electron also in the case of a null magnetic induction **B**= **rotA**, [43].

According to eq. (8) and (18), it results that – for $r \leq r_\mu$, the magnetic induction of the electron field has the value: $B_j = k_1 \rho_\mu c = (1/c) \cdot E_i = k_1 \rho_v c$, because that the radial repulsive interaction of these vectons with the vexons of electron's e-charge determines a speed of quantons of the $\boldsymbol{\Gamma}_\mu$ -vortex relative to the vectons of the **E**-field – quasi-equal to the light speed, c, (figure 4).

So, for: $r \leq r_\mu$ we have: $\rho_\mu = \rho_v$ and $\boldsymbol{\Gamma}_\mu$ -vortex produces a kinetic energy density of electron magnetic field: $\in_{kB}(r) = \frac{1}{2}\cdot\rho_\mu.c^2$ -equal to the kinetic energy density of the **E**-electric field quanta in the volume unit: $\in_{kE}(r) = \frac{1}{2}\cdot\rho_v.c^2$ -given by theirs m_v-vectons having the spinorial mass: $m_S = m_v$ given by an induced quantonic vortex, according to eq. (4a).

Therefore, considering the electron m_e-mass as cluster of confined vexons: $\rho_e(r) = \rho_w(r)$, it results that the chiral sub-solitons forming condition [22] applied in the case of vexon-antivexon pairs generation inside the electron volume, is respected for an identical variation of the quanta density: $\rho_s(\Gamma_A)$, $\rho_\mu(\Gamma_\mu)$ and $\rho_{w(v)}(e; E)$, for the same c-speed of quanta, i.e.:

$$\rho_s(r) = \rho_\mu(r) = \rho_{w(v)}(r) = \rho_r(r)/2; \; (\rho_r(r)=\rho(\Gamma_r^e)=\rho_s(r)+\rho_\mu(r)) \qquad (30)$$

with$\rho(r)$ having the form (28) for $r \leq a$, $(\rho(r)=\rho_e(r))$ and the form (6) for $r>a$, $(\rho'(r) = \rho_v(r))$. The eq. (30) show also that is not possible a real increasing of particle mass without the increasing of its magnetic moment, μ.

To the value of sinergonic density, must be applied the tachyonic correction (a).

By the (c)-dependence relation: $e \sim \rho_\mu(a)$, the eq. (30) explain also the oppinion [44] that the proton charge and the mass density have almost the same variation, e-charge being contained by the strong interaction quantum volume.

Also, the relative similitude between the electron and the vectorial photon explain some pseudo-ondulatory properties of electron such as the electron beams diffraction or interference.

1.8.2 The Electron Entropy and Stability

Considering the $\Psi(r)$ – wave function associated to the electron structure, corresponding to a Schrodinger equation characterizing an electron soliton model [45], by a Bohm-Vigier hydrodynamic interpretation [8] of the square amplitude $R^2=|\Psi|^2$, that is: $\Psi(r)=R\cdot e^{iS/\hbar}$, $(S=p_h\cdot\delta l_r;\ \delta l_r\perp r)$, with: $R^2 = e^{-\varepsilon/k}$ associated to the internal entropy: $\varepsilon = -k_B\cdot \ln R^2$, the equality (30) suggests a linear proportionality between the position entropy inside the electron and a total quanton action on the electron vortex line:

$$S_h = \oint m_h c\cdot dl_r = 2\pi r\cdot m_h c;\ dl\perp r$$

in accordance also with the de Broglie's "hidden" thermodynamics of particle [9]. Considering the de Broglie's relation for the quantum temperature associated to the stationary particle: $T_c = m_0c^2/k_B$, it results a mean internal electron entropy:

$$\acute{\varepsilon}_e = k_B = \varepsilon_e(r=r_e) = m_ec^2/T_c = n_h\cdot\varepsilon_h(r=r_e);\ n_h=m_e/m_h \qquad \text{(d)}$$

$\bar{\varepsilon}_h$ representing the mean entropy per quanton inside the electron mass, m_e.

Considering also-for the solitonic part of electron, a stationary S_e-action and ε_e – entropy on the vortex line $l_r=2\pi r$, by the de Broglie's equation of particle's "hidden" thermodynamics at quantum equilibrium [9]: $\varepsilon/k_B\approx S/\hbar$, it result the proportionality between $\varepsilon_e(r)$ and $S_h(r)$:

$$\varepsilon_e(r) = k_B\cdot(r/\eta_e) = n_h\cdot\varepsilon_h(r) = \gamma\cdot(k_B/\hbar)\cdot n_hS_h(r) = \gamma\cdot(k_B/\hbar)\cdot S_e(r); \qquad (31)$$

by a γ – coefficient of correlation between (ε_h/k_B) and $(S_h/\hbar)$, theoretically permitted [46].

In consequence, the de Broglie relation of quantum equilibrium allows the conclusion that the amplitude, R, of the $\Psi(r)$ – function associated to electron structure characterizes the variation of the quantum density: $\rho_e(r)$ of the m_e-particle mass by the intrinsic entropy, $\varepsilon_e(r)$ and the imaginary part: $I = e^{iS/\hbar}$ characterizes the impulse density variation of the magnetic moment quantum vortex, Γ_μ, for which $S_\mu \sim p_\mu = \rho_\mu(r)\cdot c$, with: $S_\mu = (\delta m_e)_r \cdot c\cdot \delta l_r$, $(\delta m_e)_r = (\delta \upsilon_e)\cdot \rho_\mu(r)$.

By eq. (30), (31), we have:

$$\rho_\mu(r) = \rho_e(r) = \rho_e(0)\cdot R^2 = \rho_e^o \cdot e^{-\frac{\varepsilon_e}{k_b}} = \rho_c^o \cdot e^{-\frac{S_e}{\hbar}} = \rho_e^o \cdot e^{-\frac{r}{\eta_e}}; \qquad S_e(r) = \gamma\cdot n_h \cdot S_h(r) \tag{32}$$
$$R^2 = |\Psi|^2; \;\; \Psi = R\cdot e^{i\frac{-S_\mu}{\hbar}}; \quad S_\mu = (\delta m_e)_r c\cdot \delta l_r; \;\; S_h = \oint m_h c\cdot dl_r = 2\pi r\cdot m_h c$$

With η_e = 0.965fm, and: $n_h = (m_e/m_h) = 1.23\text{x}10^{20}$, it result from (32) that: $\gamma = 64$.

The stability of the electron quantum volume is explained by the attraction force generated by the Γ_e -soliton vortex which generates the electron magnetic moment, $\boldsymbol{\mu}_e$.

In accordance also with other soliton models of electron [45], the stability equation of the Γ_e soliton vortex may be expressed by the Schrödinger nonlinear equation (NLS) with soliton-like solutions, identifying in this equation the term: $k_n\cdot|\Psi|^2$, (k_n-the nonlinearity constant), with the strong self-potential, $V_p(r)$, of the particle, generated by its Γ_μ-vortex of quantum volume:

$$\text{(33a)} \quad i\hbar\frac{\partial\Psi}{\partial t} + \frac{\hbar^2}{2m}\frac{\partial^2\Psi}{\partial x^2} - k_n\cdot|\Psi|^2\Psi = 0; \;\; \Psi = R\cdot e^{i\frac{S_\mu}{\hbar}}; \;\; k_n\cdot|\Psi|^2 = k_n\cdot[\rho_\mu(r)/\rho_e^0] = -V_p(r) \quad \text{(33b)}$$

written for an infinitesimal vortex volume $\delta\upsilon_e = (\delta m_e/\rho_\mu)_r$ in conditions of quantum equilibrium to the vortex line: $l_r = 2\pi r$, ($x = \delta l_r \perp r$), – with $\delta l_r/\delta t = c$ and without vortex expansion or contraction, i.e:

$$-i\hbar\frac{\partial\Psi}{\partial t}=\hat{H}\,\Psi=(\hat{E}_{cf}+V_P)\cdot\Psi=-\frac{\hbar^2}{2\delta\, m_e}\,\frac{\partial^2\Psi}{\partial x^2}+k_n\cdot|\Psi|^2\Psi=0;$$
$$\Psi=R\cdot \mathrm{e}^{\mathrm{i}\frac{S_\mu}{\hbar}};\Rightarrow\; V_P(r)=-\frac{1}{2}\delta\upsilon_e\cdot\rho_\mu(r)\cdot c^2 \qquad (34a)$$

with $S_\mu=(\delta m_e)_r\cdot c\cdot\delta l_r$, which gives: $k_n=V_P^{\,0}(o)=-½\delta\upsilon_e\rho_\mu^{\,0}c^2$ and express the equality between the values of the centrifugal potential $E_{cf}(r)$ and the self-potential $V_p(r)=V_p^{\,0}\cdot|\psi|^2$.

The form (34) of the fermion strong self-potential corresponds to an Eulerian attractive force of quantum dynamic pressure gradient:

$f_p=\nabla_r V_p=-\delta\upsilon_e\cdot\nabla_r P_d$, generated by a pseudo-stationary quantonic medium accumulated by the Γ_A-sinergonic vortex, having the same (32) density variation and a relativistic c-speed in report with $(\delta m_e)_r$.

The same (34) expression has also the self-potential generated by the Γ_μ-vortex having the same relative impulse density, acting upon a (pseudo) stationary mass having the impenetrable quantum volume, i.e:

$$\delta\upsilon_e=\upsilon_I;\ V_P(r)=-½\,\upsilon_i\cdot\rho_\mu(r)\,c^2. \qquad (34b)$$

Because the solitonic nature of vexons, by eq. (32) it result that the quantum intrinsic energy of electron, which is liberated at electron-positron annihilation, is given as in the case of photon, (eq. (4)), by the intrinsic vortexial energy of vexons, (induced by the Γ_e-vortex), and by the kinetic energy of the electron magnetic moment:

$$E_w=½\textstyle\sum_e m_w c^2+½\sum_\mu m_c(\omega\cdot r)^2=m_e c^2 \qquad (35)$$

in accordance with the quantum mechanics conclusions.

For the electron external part, (r >a), according to the conclusions which show that the field quanta moves with the light speed, c, on the Γ_μ -soliton vortex lines, it results that the electron magnetic field is generated by a soliton vortex:

$\Gamma_e^e = \Gamma_A + \Gamma_B$, which continue the interior electron vortex: $\Gamma_e^i = \Gamma_A + \Gamma_{\mu}$.

By the effect of Γ_e^e-vortex and the e-charge action, the electric E-field is generated by a vectonic helicoidal pseudo-vortex: Γ_E, given by the vectons movement on an helical trajectory, (figure 4), with the total speed: $v_v = v_{vt} + v_{vr} = c$, and with $v_{vr} \to c$ along the radial direction, with a spheric-symmetric distribution given by the quanta total flux conservation, as in eq. (6):

$$\phi_m = 4\pi r^2.\rho_v(r) = 4\pi a^2.\rho_v(a) = \text{constant.}$$

For the case of electron, the stability is ensured by the Γ_e -soliton also by the condition of quasi-equality between the magnetic energy of the soliton vortex and the electrostatic field energy: $W^s{}_B = W^s{}_E \cong W_E = e^2/8\pi\varepsilon_0 a = m_e c^2$, given by the relation: $E = c \cdot B$ specific to the soliton electron vortex, W_E resulting equal with the intrinsic energy contained by the m_e-electron mass, like in the Yadava's electron model, [32], which deduces that: a =1.41fm, value which is characteristic to a (quasi) superficial contained e-charge, with the non-contribution of field quanta to the electron inertial m_e-mass. This stability condition is necessary be fulfilled for compensate – by the $W^s{}_B$-field energy, the W_E-electrostatic energy of electron surface which tends to disintegrate the electron surface by repulsion between the q_w^* vexonic pseudocharges which gives the e-charge, according to the model.

Some ondulatory properties of the electron given by the associate de Broglie wave, may be explained as speed-dependent electron spin rotation by interaction with quanta of the quantum vacuum, according to the model.

1.8.3 The Interaction between Vectorial Photons and the Elementary Charges

According to the theory, having an own μ_v-magnetic moment, the vectorial photon interacts magnetically. According to eq. (3) it results that the vectons or the vexons having the same sign for the ζ_v-chirality, the S_v-spin and the $q_v^*=q_v\cdot\zeta_v$ pseudo-charge, shall interact repulsively by magnetic elastical interaction. Thus, they will increase the vectonic pressure on the reciprocally interacting surfaces of e-charges with the same sign. These charges interact repulsively, in this case.

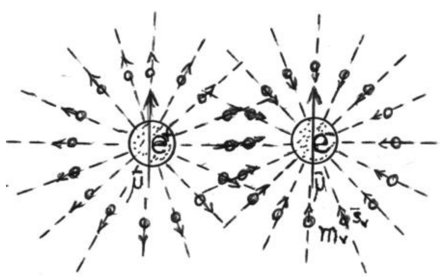


Fig.5. *Electrostatic attractive interaction.*

The vectons and the vexons having opposite signs for the intrinsic chirality, the spin and the q_v^*-pseudo-charge, shall interact attractively by magnetic interaction, (fig.5). They will form, by nondestructive pseudo-plastic interaction, (vecton-antivecton) – bosonic pairs, thus reducing thevectonic pressure on the reciprocally interacting surfaces: $S'=2\pi a^2$ of the e-charges having opposite signs. These charges shall also attract each other.

1.8.4 The Magnetic Field and the Magnetic Interaction

According to the model, the Γ_A vortex of a magnetic **A**-potential, generates a magnetic induction: **B=rotA,** by the gradient of the impulse density: $\nabla_r p_A = dp_A/dr$, which induces ξ_B-vortex-tubes of the **B**-induction around pseudostatio nary entrapped vectons of the q-charge.

This theoretical conclusion explains the fact that the direction of the vortex-tubes ξ_B, which can be expressed by their helicity: ζ_B, depends on the sense of charge's $\mathbf{v}_v$-speed and on the charge sign, as a result of the "intrinsic chirality", $\zeta_v = \pm 1$ of the **E**(**r**)-field vectons – giving the e-charge sign by theirs pseudo-charge: sign(q_v*)=ζ_v and which generates the **B**-field according to eq. (18) by theirs movement with the $\mathbf{v}_v$-speed relative to the quantonic medium.

For the same concentration: n^0_v, of vectons and of vortex-tubes: ξ_B, we have:

$$\begin{aligned}&B = n^0{}_v.\xi_B = \varepsilon_0\mu_0(n^0{}_v.q_v{}^*/\varepsilon_0)\langle u_r \bullet v_v\rangle; (u_r = r/r;\ \ u_v = v_v/v_v; E = u_r\, n^0{}_v\, q_v{}^*/\varepsilon_0);\\ &==> \xi_B = \mu_0\, q_v{}^*\langle u_r \bullet v_v\rangle\end{aligned} \tag{36}$$

which gives by eq. (8) in which: $\rho(r)=n^0_v m_v$, the values: $q_v^*=2.73\text{x}10^{-44}$C; $\xi_B=1.03\text{x}10^{-41}$T.

According to eq. (3), the value: $r_\mu = r_\mu^e = r_\lambda^e$ represents the virtual radius of the electron magnetic moment, which is equal to the electron Compton radius resulting by the known quantum expression of the magnetic moment, from the equation:

$$\mu_e = k_\mu \Gamma_\mu = \frac{e\, r_\mu^e\, c}{2} = \frac{e\, h}{4\pi\, m_e} = \frac{e}{m_e} S_e^*; \quad k_\mu = \frac{e}{4\pi}; \ \Gamma_\mu = 2\pi r_\mu^e c;\ r_\mu^e = \frac{h}{2\pi m_e c} \tag{37}$$

This value: $r_\mu^e = 3.86 \times 10^{-13}$ m, representing the classical magnetic radius of electron, (the magnetic moment radius), is found by the electron soliton models as representing the electron soliton radius [12] and because that:

$E = c \cdot B$ for $r \leq r_\mu^e$, it gives a magnetic energy of the solitonic vortex:

$$W^s_\mu = W^s_E = (e^2/8\pi\varepsilon_0 a - e^2/8\pi\varepsilon_0 r_\mu^e) \approx e^2/8\pi\varepsilon_0 a = m_e c^2$$

i.e. – approximately equal with the intrinsic energy of electron. By this theoretical interpretation of the eq. (37), is avoided the paradoxical explanation given by the classic electromagnetism which explains the value of the electron magnetic moment by an electron surface revolving speed exceeding of 274 times the light speed, c.

The solitonic significance of eq. (37) is that: $v_{ct} = c$ inside the soliton and that at a distance: $r > r_\mu$, the spinning of quantons in the Γ_B-vortex around the e-charge is achieved in conditions of quantum non-equilibrium, according to the vortexial kinetic moment conservation law:

$$\Gamma_B = 2\pi r \cdot v_{ct} = 2\pi r_\mu c = ct, \text{ for: } r > r_\mu, \quad (38)$$

with a relative velocity: $v^r_{ct} \approx v_{ct}$ in report with the vectons of **E**-field considered with a quasi-radial speed $v_{cr} \rightarrow c$ at distances $r > r_\mu$, (quasi-radially emitted -fig.4). This is equivalent with a relative circulation: $\Gamma_E = -\Gamma_B$ of the E(r)-field vectons around the electron charge.

The magnetic interaction between electrons is explained – according to the CF-soliton electron model, through the interaction between the quantonic ξ_B vortex-tubes of the **B**(r)-magnetic induction, aligned antiparallel with the electron $\boldsymbol{\mu}_e$- magnetic moment.

The **B**-magnetic induction around the e-charge has, by eq. (16), the expression:

$$B_j(r) = k_1[\rho_v \mathrm{v}_v^r](r) = k_1\rho_B(r)\cdot c; \quad \rho_v(r) = \rho_a^0 \frac{a^2}{r^2}; \quad \mathrm{v}_v^r = -\mathrm{v}_{ct}^r = -\mathrm{v}_{ct}; \ \rho_a^0 = \rho_v(a) \quad (39)$$

in which $\rho_B(r)$ represents the mean quanta density ofthe **B**-field given by its ξ_B-vortex tubes with their correspondent quantons speed: ω r =c, resulted from the conversion of Γ_B-vortex density into ξ_B-vortex tubes, by the gradient $\nabla_r p_A$.

According to eqn. (39), (16) and (38), for r >> r_μ the magnetic induction **B**(r) has the form which was found also by the classic magnetism:

$$B_j(r) = k_1\rho_v \mathrm{v}_{ct}^r \cong k_1\rho_a^0 \frac{a^2}{r^2}\cdot\frac{r_\mu c}{r} = k_1\rho_B c = \frac{\mu_0}{2\pi}\cdot\frac{\mu_e}{r^3}; \quad \rho_a^0 = \frac{\mu_0}{k_1^2}; \ \rho_B = \frac{\mathrm{v}_{ct}^r}{c}\rho_v; \ r > r_\mu; \quad (40)$$

Also, through the known relation: **B**=rot.**A**, it can be deduced by eq. (39), the solitonic expression of the magnetic **A** – potential of the electron magnetic field:

$$A_k(r) = \frac{B_j(r)\cdot r}{2} = \frac{k_1 r_\mu c}{2}\rho_a^0\frac{a^2}{r^2} = \frac{k_1 r_\mu}{2}\mathrm{p}_A(r) = \frac{k_1\cdot\Gamma_A(r_\mu)}{4\pi}\rho_s(r) = \frac{k_1\cdot\Gamma_A(r_\mu)}{2\pi}\rho_s'(\mathrm{r});$$
$$\mathrm{r}\geq \mathrm{r}_\mu; \qquad \rho_s(r) = \rho_a^0\frac{a^2}{r^2}; \quad \Gamma_A(r_\mu) = 2\pi.r_\mu c; \quad \mathrm{p}_A(r) = \rho_s(r)\cdot c; \quad \mathrm{n}_k \perp r \quad (41)$$

in which ρ_s(r) represents the density of Γ_A -sinergonic vortex, resulted as having the identical variation with the density of Γ_B – quantonic vortex, according also to the eq. (30), but for which must be applied the tachyonic correction (a), (for a real sinergon speed: w=$\sqrt{2}\cdot$c, ρ_s'=ρ_s/2) explaining and the anomalous value of μ.

The gradient: $\nabla_r A_k \sim \nabla_r p_A(r)$, which gives the magnetic induction B_j by vortex-tubes forming, generates also a magnetogravitic force and field, according to eq. (23), i.e.: $F_{Mg} \sim -\nabla_r \rho_s(r)\cdot c^2$.

The μ_e magnetic moment is generated like in the figure 6, by the $\boldsymbol{\Gamma}_\mu$-vortex, ($\boldsymbol{\mu}_e \uparrow\uparrow \boldsymbol{\Gamma}_\mu$), which induces secondary quantonic $\boldsymbol{\Gamma}_w$-vortexes of the light m_w^*-vexons of e-charge, (in the electron surface), with the sense depending on theirs ζ_w -intrinsic chirality: $\Gamma_w \sim \zeta_w$ and continuing the exponential part of $\boldsymbol{\Gamma}_e$ by $|\Psi|^2 \sim r^{-2}$, explaining the (c) – dependence and the relation (37) between $\boldsymbol{\mu}_e$ and e.

The use of relation: $\mu_e = e r_\mu c/2$ in eq. (40) is justified by the equivalence: $\Gamma_E = -\Gamma_B$ and by the relations: $e = \varepsilon_0 S(a)E(a) = \varepsilon_0 S(r_\mu)E(r_\mu)$, $\Rightarrow B(r_\mu) = E(r_\mu)/c$, which gives: $\mu_e = \varepsilon_0[(S\ E)_{(r\mu)}]\ r_\mu\ v_v^r/2$, (given by the relative vortex $\Gamma_B(r_\mu)$).

The pre-quantum electron spin: $S_e^* \cong S_e = ½ m_e c \cdot r_\mu = ½\hbar$ is generated according to eq. (3), (5) generalized for the electron case by similitude with the vectorial photon, (comparing the electron with a semi-gammon) by a proportion:

$$k_{\rho s} = (\rho_{ws}/\rho_v)_r = (\rho_{ws}/\rho_v)_a = a/2r_\mu = 1.8\text{x}10^{-3},$$

$$(r_\mu \geq r > a);\ \rho_{ws}(a) = m_s/4\pi a^2 r_\mu;\ m_s = m_e;\ m_s\text{-spinorial mass}$$

of paired vectorial photons representing – in the model, paired ultra-light m_w – vexons vortexed around the e-charge by the induced $\boldsymbol{\Gamma}_w$-vortexes, with $v_{wt}(r) \approx c$, inside the volume of Compton radius, r_μ.; ($\mathbf{S_e} \uparrow\uparrow \boldsymbol{\Gamma}_w$). The m_s – spinorial mass of the spinorial field, not contribute to the inertial m_e-electron mass because the weakness of the attractive interaction between the (m_w- $\overline{m}_w$) photons and m_e. By eq. (5), the m_s-mass may be also a ring multiphoton: $n \cdot h\nu$ of scalar radiation (with two rows), with the length: $l_s = \pi r_\mu$ and a density $\rho_w(m_w) \sim r_\mu^{-2}$ given by eq. (34b):

$$F_C = \frac{m_w c^2}{r_u} = -\nabla V_p = -\frac{m_w}{\rho_w}\rho_a^2\left(\frac{a^2}{r_\mu^3}\right)c^2$$

The case: $\mathbf{S_e}\uparrow\uparrow\mathbf{\Gamma}_w\downarrow\uparrow\mathbf{\Gamma}_\mu$ corresponds to the negatron, ($\mathbf{S_e}\downarrow\uparrow\boldsymbol{\mu}_e$; $\psi^- = R\cdot e^{-iS/\hbar}$), explaining its stability and the case: $\mathbf{S_e}\uparrow\uparrow\mathbf{\Gamma}_w\uparrow\uparrow\mathbf{\Gamma}_\mu$ corresponds logically to the positron, ($\psi^+ = R\cdot e^{iS/\hbar}$; $S = S_\mu=(\delta m_e)_r\cdot c\cdot\delta l_r$).

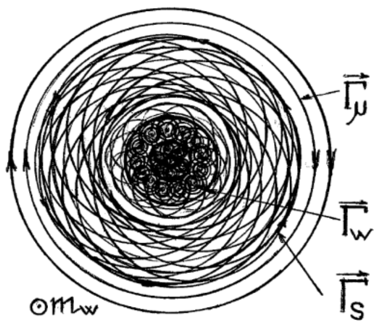


Fig. 6. *The generation of μ_e and S_e.*

The fact that the positron is vortexially less stable than the negatron in a very strong magnetic field – because the radially oriented Magnus-type force acting over the $\mathbf{\Gamma}_w$ vortexes in the field of $\mathbf{\Gamma}_\mu$, (magnetic repulsion), may explainalso the magnetic moment anomaly of the electron:$(g_{e+}-g_{e-})/\ \overline{g}_e = (-0.5\pm2.1)x10^{-12}$.

1.8.5 The Magneto-Electric Interaction (the Lorentz Force)

According to the CF-electron model of the theory, the vexons of electron superficial layer, by theirs μ_w-magnetic moment having-conventionally, the same sign of ζ_w-intrinsic chirality as the electron centrol ζ_e-intrinsic chirality, gives the e-charge: $e^\pm= e\cdot\zeta_e$, ($\zeta_e=\pm1$).

In this case, the resultant of vexonic quantons rotation at the electron surface, considered in the form of an electron surface circulation:

$\Gamma_a^* = \Gamma_s(a) = 2\pi a\cdot c$, depends of the charge sign:

$$\Gamma_a^* = \Gamma_s(a) = 2\pi ac\cdot\zeta_e;\zeta_e=\pm1 \qquad (42)$$

For an electron that passes with the $\mathbf{v}_e$ – speed through a **B**-magnetic field having the $\rho_B(r)$ – mean density of quantonic ξ_B vortex-tubes, the electron surface circulation, $\mathbf{\Gamma}_a^*$, generates a quantonic Magnus type $\mathbf{F}_L$-force on the moving electron, (fig. 7). The $\mathbf{F}_L$-force sense depends also on the sense of the **B**-induction field lines, through the electron $\boldsymbol{\mu}_e$- magnetic moment oriented parallel with the ξ_B vortex-tubes of the external **B**-field. This force represents the Lorentz force which is of Magnus type – according also to other theories [6] and depends on the dimension: $l_e = 2a$ of the electron – considered as pseudo-cylinder (proto-electron, with barrel-like form) and on the **B**-magnetic induction, i.e. proportional with the ρ_e vectons density of **E**-field generating the **B**-field and with the relative speed of **B**-field quantons in report with these vectons, conform to eq. (39):

$B \sim p_c^r = \rho_e v_{ct}^r = -\rho_e v_v^r = -p_v^r$, i.e:

$$F_L = 2a \cdot \Gamma_a^* \cdot \rho_B \cdot \mathrm{v_e} = q \cdot B \cdot \mathrm{v_e} = e\zeta_e \cdot k_1(\rho_e \mathrm{v}_{ct}^r)_r \cdot \mathrm{v_e}; \quad \Gamma_a^* = 2\pi \cdot a \cdot c \cdot \zeta_e; \quad \rho_B = \rho_e(r) \cdot [\mathrm{v}_{ct}^r / c] \quad (43)$$

in which the expression (10) of the e-charge depends, in the electron soliton model, on the electron Γ_a^*-surface circulation and has the solitonic form:

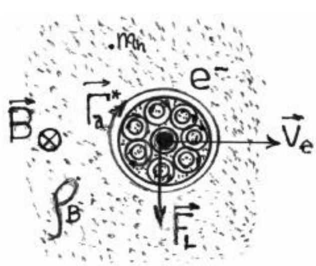


Fig. 7. *The Lorentz force.*

$$q = e \cdot \zeta_e = 4\pi\, k_1 \varepsilon_0 a^2 \rho_a^0 c^2 \cdot \zeta_e = 2a \cdot \Gamma_a^* \sqrt{\varepsilon_0 \rho_a^0}; \quad \rho_a^0 = \rho_e(a) = 5{,}17x10^{13} \left[\frac{\mathrm{kg}}{\mathrm{m}^3}\right]; \quad \zeta_e = \pm 1 \quad (44)$$

1.8.6 The Emission of Electromagnetic and of Scalar Radiation

According to the chiral soliton model described in the theory, for an electromagnetic vibrating charge, the pulsatile loosing and absorption of vexons/vectons from/in the strong interaction quantum volume explains the electromagnetic waves emission, in particular-by a Munera's type model of photon [15], composed by pairs of vexons-according to our model. This pulsating losing and absorption of paired vexons, having the resonance frequency: $\nu = \omega/2\pi$ of the electromagnetic radiation, is a consequence of the relative moderate perturbation of the particle quantum volume, caused by the vibration of particle kernel with the increasing of intrinsic entropy, which produces a pulsating inflation of particle quantum volume by partial destruction and alternative regeneration of vexons by etherono-quantonic winds. This process is equivalent to the generation of electromagnetic wave fronts with the same frequency of charge vibration and with the energy: $\in_f = h\nu_f = m_f c^2$, which, for another e-charge, determines its vibration with the same frequency, by an effect which is equivalent to a pulsating electrostatic interaction, caused by the interaction of the quantonic wave fronts of the photonic vexons with the charge surface and may be expressed by SNL eq. (34) written for an vexonic pair of energy $\varepsilon = \hbar\omega$ initially contained by the charge surface of a-radius and emitted under the quantonic pressure effect of the Γ_μ -vortex when:

$$-i\hbar \cdot (\partial/\partial t)\Psi_a = \hbar\omega \cdot \Psi_a = [E^i_{cv} + V'_v(a)] \cdot \Psi_a;\ \Psi(r,t) = R \cdot e^{i(k \cdot x - \omega t)};\ V'_v(a) = (V^0_i - \Delta V_v)_a;\ k = 2\pi/\lambda = \omega/c \quad (45)$$

where $V_v'(a) = h/\Delta\tau = \hbar\omega$ represent the periodic decreasing of the initial potential $V_i^0(a)$, the loosed mass being periodically completed by the mass of n vectons, $h\nu_v$, absorbed by the charge when the initial value $V_i^0(a)$ of the potential is restored, i.e.: $V_i^0(a) = (E_{cv}' + n \cdot h\nu_v) = E_{cv}^i$.

At the fermion vibration or deceleration under energetic shocks, $\Delta\varepsilon_s$, the intrinsic vexons of the particle are easier destroyed by the kernel and the vortexial structure is strongly disturbed, decreasing also the elastic character of photons interaction with vexons of the e-charge surface. In this case, n photons of energy $h\nu_i$ which in the unperturbed state are reflected, can penetrate quasi-simultaneously the charge quantum volume and they are periodically converted inside the particle volume, by the Γ_μ-vortex, into vexons having bigger mass, afterwards emitted through the particle Γ_μ-vortex, i.e.:

1. $E_c^i - V_v'(a) = \Delta\varepsilon_s = (V_v^0 - V_v')_a; \Rightarrow$
2. $E_c^f = E_c^i + n\cdot h\nu_i; \Rightarrow$
3. $E_c^f - V_v^0 = \varepsilon_w = h\nu_w = n\cdot \varepsilon_i$.

This conclusion is sustained also by the experiment [47] of photons-electron interaction, made in 1997 with the Stanford particle accelerator, using interaction of green laser pulse with 10^{22}W/m^2 peak power density with 46.6 GeV electron beam, in which the resulted photons was gamma rays producing e^--e^+-pairs and by the observations of γ-rays emission generated by thunderstorm, (italian group, 2000, [48]). It results also that the exceeding mass of theparticle may be emitted-at least partially, as a stable-bounded vexon-antivexon bosonic double pairs: $\varepsilon_w = 2(m_w - \bar{m}_w)\cdot c^2$, having null pre-quantum spin, under the action of the Γ_μ – magnetic moment quantum vortex, (figure 8).

Fig. 8. *Scalar quanta emission.*

This possibility corresponds to a scalar radiation quantum emission, realized according to the energy conservation law applied to the conversion of quasi-simultaneously captured photons into a scalar quantum of double vexonic pair with bigger mass, having the form:

$$n\cdot\varepsilon_i + m_p c^2 \rightarrow (\text{by } \Delta\varepsilon_s) \rightarrow m_p^* c^2 + \varepsilon_w;\ n\cdot\varepsilon_v \cong \varepsilon_w;\ E_v \geq E_v^0 = \varepsilon_w / K_v \qquad (46)$$

where: ε_i; ε_w -are the energy of the captured photons and, respectively, of the emitted scalar quantum and K_v is a constant which can be of over – unity value – according to some experiments [49], without contradiction with the energy conservation law. The eq. (46) may explain in this case some controversial phenomena such as the kinetobaric effect [49] consisting in a dynamic effect over a balance with a body with water and a microwaves antenna, obtained by the absorbed microwave energy transmitted in pulses of high frequency, as consequence of the ionizing effect of the ε_w-scalar quanta, [26].

Also, the Keller effect of radioactivity diminution of radium (for example) by thermal energy or high RF-waves (ORANUR effect) may be explained with the theory as effect of gamma-ray absorption by the vibrated atomic particles. The eq.

(46) predicts also the possibility of $(m_p - \bar{m}_p)$ – bosons conversion in (particle-antiparticle) – pairs by laser rays.

The emitted bosonic double pairs with a null spin: $\varepsilon_w = 2(m_w - \bar{m}_w)c^2$, corresponds to the characteristics of the scalar radiation photons which-as in the theory of Gupta and Bleuler [50], do not contribute to the electromagnetic radiation energy – phenomenon explained with the soliton model of photon by the fact that these bosons represents a pair of two hν-photons of electromagnetic radiation coupled in anti-phase, as in the Tesla's theory of scalar waves, with inertial mass but with null magnetic moment along $x /\!/ m_w c$. These scalar radiation quanta corresponds also with the experimental results of T. G. Hieronymus [51] concerning the emission of scalar radiation obtained by electromagnetic vibration of atomic nuclei, with the energy of scalar quanta in the violet and ultraviolet spectra: $\varepsilon_w \cong 2 \cdot h\nu_{w-}$ proportional with the mass of the vibrated nucleus, according to the equation of harmonic oscillator frequency: $\nu \sim \sqrt{(k/M)}$; $(M = m_n.A$; k-the quasielastic constant). According to the theory and by eq. (46), the nuclei with nuclear self-resonance and giant-resonance, are natural emitters also of scalar radiation quanta.

1.8.7 The Electron's Cold Genesis

Considering the formation of the quantonic Γ_μ -vortex as the main condition for the fermion genesis in a very strong magnetic field which generates a genesic quantum potential: Q_G, for the movement of a single quanton to the Γ_μ-vortex line: $l_r = 2\pi r$ $(r \leq a)$, it results that-in the fermion genesis process, at quantum equilibrium, when: $\Gamma_c = 2\pi m_c c$, the genesic Q_G – quantum potential compensates the quanton centrifugal potential, so:

$$Q_G = - E_{cf} = -p_c^2/2m_c$$

For the fermion genesis, the nature of the genesic Q_G-quantum potential results – according to a1-a4 axioms, as being a magnetic genesic field, given by the Γ_A-sinergonic vortex of an external super-strong magnetic field as those of a magnetar type star or equivalent, acting by a pseudomagnetic (sinergonic) B_S – induction in report with μ_c – pseudomagnetic moment of quanton and having the vortex centre in coincidence with the formed fermion centrol.

It results, in consequence, according also to the eq. (16) of the magnetic induction, which the Q_G -quantum genesic potential is given by the equation:

$$Q_G = -\mu_c \cdot B_S(r) = -\mu_c \cdot k_{1} \cdot \rho_s^* c = -p_c^2/2m_c = -h/2 = - E_{cf} \quad (47a)$$

acting as a pseudomagnetic interaction of the quanton with the genesic magnetic field. The dynamic equilibrium of forces, for $\rho_s = \rho_s^0 e^{-r/\eta}$; $\eta \approx 0.96\text{fm}$, gives:

$$F_G = \nabla Q_G = (-1/\eta)\ Q_G = (1/\eta)\ h/2 = m_h c^2/r = h/r_l;\ \Rightarrow r_l = 2\eta \approx 1.92\text{fm} > a; \quad (47b)$$

For the electron cold genesis, the eq. (30) resulted from the chiral sub-solitons forming condition [22], impose-by the relation: $2\pi a^3 \cdot \rho^0_a = m_e$ for the proto-electron, the condition: $\rho_s^* \rightarrow \rho_a^0 = 5.17\text{x}10^{13}$ kg/m^3, resulting that: $\mu_c \rightarrow 1.36\text{x}10^{-46} \text{A} \cdot \text{m}^2$; $B_S \rightarrow 2\text{x}10^{12}$ T.

The obtained critical value of B_S represents – in the theory, the minimal value of a genesic magnetic field which determines the confination of vectons and of quantons in particles, and is characteristic to a magnetar-star which can generates electrons by a genesic Q_G-potential similar to but different from the de Broglie quantum potential.

The previous mechanism of CF – particle cold genesis is different from those resulted from the quantum mechanics as a process of virtual particles transformation in real particles in the gravitational field of rotating black-holes, from the polarized quantum vacuum, (Zeldovich, Hawking, [52]) but it is in relative accordance with the classic conclusions about the etheronic structure of electron (Larmor, Lorentz) and of the magnetic field (Maxwell, Helmholtz).

1.9 The Cold Genesis of Particles in the Protouniverse's Period

The possibility to explain the basic properties of the elementary particles by a fractalic cold genesis structure, sustains also the conclusion that before the actual material Universe, existed a Protouniverse formed initially by leptons of a proto "dark energy", i.e. -etherons and quantons which was vortexially confined, forming "dark" photons, "dark" particles with bigger mass and Majorana neutrins which -by theirs vortexial confination, are generated massive neutrins (postulated as components of Protouniverse also by the Dark matter Universe model) and micro – and mini-black-holes with growing mass and magnetic field.

The possibility of "dark particles" formation by the confination of "dark energy", as "dark chiral solitons", is argued also in other theories [53]. Also, the forming of vortexial balls of dark energy which may forms micro/mini-black holes corresponds to the case of a "gravistar" forming and evolution, i.e. -a dark energy ball with hard-core, similar to the hypothetical "gravastar", proposed by E. Mottola and P. O. Mazur [54], [55].

By the considered proto-dark energy structure, resulted from the theory: g-etherons, ($m_g = (10^{-68} \div 10^{-72})$kg), s-etherons ($m_s = (10^{-59} \div 10^{-61})$kg) and quantons, ($m_h = h/c^2 = 7.37\text{x}10^{-51}$ kg), and by the considered inertial mass quantum volume radius of CF-particles: $r_{CF} = 1.41$fm, it result that-according to the considered chiral sub-solitons forming condition [22], the mean proto – "dark energy" density necessary for cold genesis of a CF-particle having a m_{CF} mass, is:

$$\bar{\rho}_{\Lambda}^{*} = 2m_{CF} / \upsilon_{CF} = 2m_{CF} / 11.7 fm^3 \qquad (48)$$

value which can be obtained locally by vortexial confination from a low density.

The local temperature and pressure of the proto – "dark energy" with $\rho_{\Lambda}=\rho_{\Lambda}^{*}$ is given by the quantons of quantonic winds, according to the classical equations:

(49a) $m_h c^2 \approx k_B T_{\Lambda}$; $P_{\Lambda}=(\bar{\rho}_{\Lambda}/m_h)\cdot k_B T_{\Lambda}= 2m_{CF}c^2/\upsilon_{CF}=1.5x10^{61}m_{CF}$ [N/m^2] (49b)

resulting that: $T_{\Lambda}=4.8x10^{-11}$ K, $\rho_{\Lambda}^{*} \cong 3.7x10^4 Kg/m^3$ and: $P_{\Lambda}^{r}=3.3x10^{21}$ [N/m^2] for the cold genesis of the 3K-background radiation semiphotons and photons, ($m_{CF}=m_v=3x10^{10}m_h$).

At the same time, the obtained T_{Λ} value explains the possibility of micro-black holes forming without evaporation, in the Protouniverse.

So, the theory permits the hypothesis of a cold genesis of the 3K – back-ground radiation.

The eq. (49b) shows also that the proto – "dark energy" quantonic pressure locally necessary for the dark particles genesis was the quantonic pressure necessary for the electron cold genesis, i.e.: $P_{\Lambda}^{e}=1.36x10^{31}$[N/m^2], value which permitted the formation of Big Balls of protomatter in the "dark energy" vortexes of the Protouniverse.

The great "dark energy" density in the Protouniverse centre not permitted the formation of stable atoms, according to the theory, but could be formed metastable states of "atonium", i.e. pseudo-atoms having a nucleus and non-quantified electronic orbitals, formed in conditions of metastable dynamic equilibrium:

$$F_S(r) = F_R(r) \Leftrightarrow \rho_s(r)\cdot(c-v_e)^2 = \rho_R(r)\cdot v_e^2(r);\ \rho_R(r) \leq \rho_s(r),\ v_e \leq c/2, \qquad (50)$$

realised between the $F_S(r)$-force of sinergonic Γ_S-vortex and the advancing resistance force, $F_R(r)$, given by the brownian non-vortexed component $\rho_R(r)$, of the "dark energy".

1.10 The Nucleons and the Nuclear Forces

The well-known theory of Yukawa for the nuclear forces exercised between nucleons, presuming an exchange of magnetically interacting vectorial and pseudo-scalar mesons between nucleons, has some deficiencies that determined the proposal of a version with repulsive term of the nuclear potential, (Friedman, Kendall [35]). Also, it is necessary to explain in the mesonic theory which force impedes the mesonic quanta to leave the nucleon.

In NLS equation, particularly, the non-linear term (33b) may be taken in the form of a non-local interaction of Yukawa type [56], possibility that suggest a CF type of nucleon, with internal vortexial structure.

The electron soliton model of the theory allows an cvasi-unitary explanation also for the nuclear forces, through a degenerate electron cluster model of nucleon, presumed also by A. O. Barut [33] by the known model of electron, but resulted in CGT by the axioms: a1-a4 of the theory, supposing a model of "cold" formed proton as chiral soliton cluster, composed of (N^p+1) degenerate electrons (semi-gammons) vortexially confined, (N^p-even number), which gives the proton mass by a cluster of N^p bounded degenerate electrons and an attached positron with e^+integer charge. For the proposed CF model of nucleon, in accordance also with the quarks theory, we may consider for the bounded degenerate electron, a charge degeneration to the value: $^{2}/_{3}e$, complying also with the hypothesis of "quasi-electrons" with fractional charge: $^{2}/_{3}e$, used by Haldane and Halperin for explain the fractional quantum Hall effect, [57], and we will consider these bounded degenerate electrons of the N^p cluster, as being quasielectrons, ($e^*={}^{2}/_{3}e$).

1.10.1 The Proton Model

It is known that – in comparison with the interaction at high energy, when the negatron is annihilated by the positron, resulting two gamma quanta, at low energy interaction the negatron and the positron can form a hard-gamma quantum, without annihilation of magnetically coupled electrons, which can be broken into the two component electrons, in an electric field of a nucleus or in an intense magnetic field or by a laser beam, (particle pair production phenomenon, [58]).

The possibility to form quasistable (e^+-e^-)-oscillons at low energy of (e^+-e^-) – interaction resulted from the theory, brings arguments for a proton cluster model of (N^p+1)-degenerate electrons, [26], having an attached positron with degenerate spin and magnetic moment, axially positioned, entrapped by an inert cluster: N^p, as in the proton model of G. C. Wick model, [59], which-according to some theoretical opinions (A. Pais, 1986), explains also the "abnormal" value of the proton magnetic moment, (the proton gyro-magnetic ratio).

In our CF model, the N^P-inert cluster is composed by bounded quasielectrons, having $e^* = \pm{}^{2}/_{3}e$ charge, i.e. – electrons with degenerate charge, mass and magnetic moment, magnetically coupled by the Γ_e-quantum vortices in negatron-positron pairs, with the inertial mass in the same quantum volume having the radius: r_n=a=1.41fm and with theirs centrols forming the m_0-mass of the nucleon core having the radius: r_m=0.21fm – according to the experimental data [34], seeming as a Bose-Einstein condensate of gammonic (e^+-e^-)-pairs.

The degeneration of electrons coupled in (e^{*+}-e^{*-})-pairs, supposing a decrease of its mass, of r_μ-radius and of Γ_μ-vortex density in the strong interaction quantum volume, results by the quantons mutual interaction in these partially superposed vortices, interactions that diminish the quantonic $\rho_\mu(r)$ – density of the Γ_μ-vortex on the electron surface, to a value corresponding -by rel. (d), to the charge: $e^*={}^2/_3e$ of a quasielectron, i.e.:

$$\rho_\mu^x(a) = \rho_e^o \cdot e^{-\frac{a}{\eta^x}} = \rho_e'(a) = \frac{2}{3}\rho_e(a) = 3{,}44x10^{13} kg/m^3;\;\; a = 1.41\text{fm} \quad (51)$$

where $\rho_e'(a)/\rho_e(a)$ = (2/3), represent the proportion of m_w*-vexons parallely polarised by the Γ_μ^*-vortex in the e*-quasielectron surface, reported to the normal electron, according to the (c)-dependence relation of the theory:

$$e \sim \mu_e(\Gamma_e) \sim \rho_\mu(a) \cdot c^2;\; (\rho_e(r) \sim \rho_\mu(r);\; a_i \leq r \leq a).$$

The value: $\rho_\mu^*(a)=({}^2/_3)\rho_e(a)$ corresponds-by eq. (51), to a degenerate mean radius of the magnetic moment distribution, of value: η_e^*=0.755fm, resulted by the increasing of internal entropy of electron – which explain – by rel. (c), the quasielectron charge in a CF-model different from the “dressed electron” model of quasielectron, (A. Goldhaber, J. K. Jain, [60]), supposing CF-medium screening, which explain relative artificially the proton charge.

The sinergonic Γ_A – vortices of the N^p-cluster may be considered as un-degenerate, because that we may neglect the weak mutual interactions between sinergons which has cvasinull vortex, according to the theory.

Presuming-according to the model, an un-degenerate Γ_A -sinergonic vortex of quasielectron in the N^p-cluster, in accordance with eq. (30) derived from the chiral sub-solitons forming condition [22], we may approximate the m_e^*-mass of quasielectron in the N^p cluster, considering a degeneration of the strong interaction quantum volume mass, at the value: $\Delta m_e^* \cong ½\cdot(1+⅔)\cdot\Delta m_e$, obtaining for the mass of a bound quasielectron, the value:

$$m_e^* \cong ½\cdot(1+⅔)\cdot(m_e - \rho_e^0\cdot\upsilon_{i)}+\rho_e^0\cdot\upsilon_i \cong 7.925\text{x}10^{-31}\text{ kg} \cong 0.8722\cdot m_e = f_d\cdot m_e, \quad (52)$$

which corresponds by (29a), to a mean radius of the $\rho_e(r)$-density variation: η_d=0.93fm-close to the value: η^p_{rms}=0.895fm found by I. Sick [36] for the proton's charge distribution, (considered with the same variation like de proton mass density).

For the mass of a degenerate gammon $\gamma^* = (m_e^* - \overline{m}_e^*)$, it results also by eq. (29a), the value: $m_\gamma^*=2m_e^*=1.742m_e$. In this case, the neutral proton cluster is formed by: $N^p=1835.1/f_d \cong 2104$ paired quasielectrons, according to the model. The loosed part of electron energy: $\Delta\varepsilon_e(\gamma^*) \cong (1-f_d)\cdot m_e c^2 = 65.3$keV, in the degenerate γ^* – gammon formation process, has the significance of a binding energy per quasielectron-similar to the case of the deuteron.

The virtual radius r_μ^n of the proton magnetic moment, μ_p, compared to the electron, decreases when the protonic positron is included in the N^p – cluster volume, from the value: $r_\mu^e=3.86\text{x}10^{-13}$m, to the value: $r_\mu=r_\mu^p$ =0,59fm, as a consequence of the increasing of impenetrable quantum volume mean density, in which is included the protonic positron centrol (m_0), from the value: $\overline{\rho}_e$ to the value: $\overline{\rho}_n \cong f_d \times N^p \times \overline{\rho}_e$, conformed with the equation:

(53a) $$\mu_p = k_p \frac{m_e}{m_p}\mu_e = k_p \frac{\bar{\rho}_e}{\bar{\rho}_n}\mu_e \cong k_p \frac{1}{f_d \cdot N^P}\mu_{Bp} = \frac{e \cdot c \cdot r_\mu^p}{2}; \quad k_p = \frac{g_p}{g_e} = 2.79 = \frac{\rho_n(r^+)}{\rho_n^0} = e^{-\frac{r^+}{\eta_d}}$$ (53b)

in which: g_P; g_e -the g-factor of e^--; p^+ – magnetic moment; $\bar{\rho}_e;\bar{\rho}_n$ – the mean density of electron and of nucleon; r+ -the position of the protonic positron centrol in report with the proton's center; f_d -the degeneration coefficient of the m_e*-mass of quasielectron.

The interpretation of the particle's mass-depending magnetic moment variation, given in CGT by eq. (53), explains also the fact that – when the proton is transformed in neutron, the emitted positron re-obtain the μ_e-magnetic moment value of the free-state, by the negentropy of quantum and of subquantum medium, given by quantonic and etheronic winds – according to the theory.

The virtual radius of the proton magnetic moment: r_μ^p=0.59fm, resulted from eq. (53a), may be considered approximately equal to the radius of the impenetrable nucleon volume, of value: $r_\mu^p \cong r_i \cong 0.6$fm – used in the Jastrow expression for the nuclear potential, [61], by the conclusion that the impenetrable nucleon volume, being supersaturated with quantons it limitates the decreasing of $\Gamma_\mu^p = 2\pi r_\mu c$ -quantonic vortex radius, at the value: $r_\mu^p = r_i$.

The value $\mu_N = \mu_c/1836$ of the nuclear magneton, gives-by eq. (53), a magnetic moment radius: $r_i^o = r_m = 0.21 \times 10^{-15}$m, that represents the Compton radius of the proton, given by a presumed central position of the proton charge – value close to the experimentally deduced proton core radius: 0.21÷0.3fm ([34]; [62]) and to the experimentally determined proton quark radius, [62]. The eq. (53b) also gives: $r_e^+ = 0.96$ fm for the axial position of the protonic positron centrol, which may explains also the P – parity violation in the beta transformation, (i.e: the electron/ positron emission predilectly in the decay direction, opposite to those of the nuclear spin).

1.10.2 The Forming of Electronic Orbitals in Atoms

Considering-in particular, the case of the hydrogen atom, according to the considered CF-cluster model of proton with incorporated positron, the sinergonic Γ_A-vortex of the protonic positron explain the $v_e(r)$-speed variation of the atomic electrons by the conclusion that these electrons are revolved around the nucleus by the action of a tangent force: $F_A(r)$, given by the sinergonic pressure of the Γ_A vortex: $P_s(r) = \rho_s'(r)\cdot w^2 = \rho_s(r)\cdot c^2$, (according to the tachyonic correction, (a)), in a dynamic equilibrium with the advancing resistance force: $F_R(r)$ given by a spatial density, ρ_R of a equivalent pseudo-stationary sinergonic medium:

$$\rho_s'(r)\cdot(w-v_e)^2=\rho_R(r)\cdot v_e^2(r);\ (\rho_s(r)=\rho_s^a\cdot(a/r)^{2;}\sqrt{2}c \geq w > c) \qquad (54a)$$

The electron $v_e(r)$-speed variation in the hydrogen atom results from the quantification law of the orbital kinetic moment of electron: $L_e=m_e v_e r_e=n.h/2\pi$, ($v=v_0/n$; $r=n^2 r_0$), in the form:

$$v_e(r)=c\cdot\sqrt{\frac{2a}{r}};\quad \frac{v_0}{c}=\sqrt{\frac{2a}{r_0}}=\frac{1}{137}=\alpha;\quad r^0=0{,}53\overset{0}{A} \qquad (54b)$$

For r >>a, $(w-v_e) \approx w$, so it results that: $\rho_R(r) = \rho_s^a\cdot(a/2r)$. The eq. (54b) shows also that at the distance $r_\mu^a \cong 2a$ from the proton, the electron would be revolved by the Γ_p-proton vortex with the speed: $v_e^M \to c$, which may be explained – in our model, if the proton's Γ_μ^p-quantonic vortex satisfy the condition:

$$r_\mu^a \to 2a \Rightarrow \Gamma_\mu^p \to 2\pi r_\mu^a c, \qquad (55a)$$

So the eq. (54a) may be approximated by eq. (54b), for $w \cong \sqrt{2} \cdot c$ and: $\rho_s'(r) \cong \frac{1}{2} \cdot \rho_s(r)$, by the semi-empiric form:

$$(55b) \quad \rho_R(r) = \frac{\rho_s^a}{2}\left(\frac{a}{r}\right)^2 \cdot \left(\gamma\sqrt{\frac{r}{a}} - 1\right)^2; \quad \rho_R(2a) \approx \frac{\rho_s^a}{8} \cdot (\gamma\sqrt{2} - 1)^2; \quad \rho_R(r) \cdot v_e^2 \cong \frac{\rho_s^a}{2}\left(\frac{a}{r}\right)^2 \cdot (\sqrt{2}c - v_e)^2; \; \gamma = e^{\frac{r^0}{r}} \quad (55c)$$

with $\gamma = e^{r0/r} \to 1$. An argument for the eq. (55) is the fact that – at β disintegration of the neutron, the released electron has an energy corresponding to a speed close to the light speed, ($v_\beta = k \cdot c \cong 0.92c$) explained with eq. (55) by the conclusion that this speed is given to the electron of β^- – radiation by the Γ_μ^p – vortex of the remained proton. Also, the same vortex gives the neutrino speed. So, the atom properties may be explained by a vortexial model, different from the classic (vortexial) model proposed by Thomson and Kelvin.

The apparent contradiction between the value $r_\mu^a \to 2a$ and the radius: $r_\mu^p = 0{,}59$fm of the proton's μ_p-magnetic moment, may be explained in the model by the fact that the protonic Γ_μ^p – vortex, given by its positron, generates also the Γ_w-vortex of parallel polarized m_w^*-vexons of proton surface, giving the e^+-charge and having the confined vortexial energy: $w_w = w_\mu = \frac{1}{2}\Sigma m_h(\omega_h r)^2 = \frac{1}{2} m_w^* c^2$ contained by a chiral soliton with radius: $r_w^n \to (a_n - r_\mu^p)$. This $\Sigma(w_w)$-vortexial energy decreases exponentially-in the proton case and gives the value r_μ^a of $\Gamma(\mu_P)$-proton vortex radius, like in figure 2, the r_i^o-virtual radius of the proton magnetic moment being explained by the fact that the linear part of the protonic Γ_μ^p -chiral soliton is induced around the proton kernel and around the m_0 – centrol of protonic positron according to eq. (53).

Because that – for the electron CF – model case, the vexons of electron surface has a degenerate Compton radius approximate equal with the electron Compton radius: $r_w^e \cong r_\mu^e$, explaining the electron prequantum spin: $S_e = \frac{1}{2}\hbar$, (fig.2), it results by eq. (53) that for a vexon of the proton's surface ($r \cong 1.4$fm), we have for a $\mathbf{\Gamma}_w$-vortex: $r_w^n \cong (r_\mu^e/1836)\cdot e^{1.4/0.93} = 0.946$fm. So we may consider in eq. (55) the value: $r_\mu^a \approx a + r_w^n \cong 2.35$ fm, for which: $\Gamma_\mu^p \cong 2\pi r_\mu^a$ c.

It results – in this case, a semi-empiric relation for the variation of quantons tangent v_{ct}-speed in the Γ_μ^p-proton vortex, which corresponds to the eq. (38), (53) and (55), in the form:

$$v_{ct}(r) = \begin{cases} c, & for: r < r_\mu^a = a + r_w^n \cong 2.35\, fm; \quad (\mathrm{a} = 1.41\mathrm{fm}) \\ c\left(\dfrac{r_\mu^p}{r}\right)^{\left(1-\frac{r_\mu^a}{r}\right)}, & for: r \geq r_\mu^a \cong 2.35\, fm; \quad r_\mu^p = r_i = 0{,}59\, fm \end{cases} \tag{56}$$

The equality between eqs. (55b) and (55c) results for $r_\mu^a \cong 2.35$ fm and v_e=k·c=1c, by a value $\gamma = e^{r0/r} = 1.095$, corresponding to: $r^0 = 0.21$ fm $= r^0_i$.

The exponential form of γ is given by the density of the superposed secondary $\mathbf{\Gamma}_w$-vortexes in the volume of radius: $a < r \leq 2a$.

In accordance with the resulted relation: $k\cdot\gamma \cong \sqrt{(2a/r)}$, by eqs. (55b) and (55c) it results also, for $r \to a$, that a nuclear particle such as an emitted γ – quantum or a neutrino emitted in a β-transformation or in a mesonic transformation ($\pi^\pm \to \mu^\pm + \nu_\mu$), may be accelerated by the protonic Γ_A -vortex in a time of ~10^{-23}s to a speed v_ν =k·c with k >1, (exceeding the light speed, c). For example, for r =1.5 fm, k =1.19.

So, it is possible to explain by the theory, the result of the recent OPERA experiment [100] in which was observed neutrins with a speed exceeding the light speed, emitted from a CERN's accelerator and detected to the Gran Sasso lab of Italy, (“Nature”, 22 sept. 2011). Is explained also the recoilless γ-radiation emission/absorbtion phenomenon, (the Mössbauer effect).

At the same time, the value of $\rho_R(r)$ for $r \to r_\mu^a$, explain “the stopped light” experiment (L. V. Hau, 2001) which evidenced the possibility to reduce the speed of a light beam which is passed by a small cloud of ultracold atoms of sodium forming a B-E condensate, [101].

Also, the Compton radius variation may be explained by eq. (55) with a value of the γ-coefficient: $\gamma = (m/m_p)\cdot e^{r_0/r}$, (m; m_p-the particle’s and the proton’s mass), in the form: $r_\mu = r_i^0/\gamma \approx r_i^0\cdot(m_p/m)$.

The resulted pre-quantum soliton model of atom, of T→0K, which degenerates in the Bohr-Sommerfeld’s model at T>0K, is also consistent with some other soliton models of atom [63] and allow the explaining of the electron transition on sub-fundamental level (n=1/2) in the hydrogen atom, (i.e: the “hydrino” atom [64]) observed in some experiments of cold nuclear fusion [64] by the conclusion that the quantification of the electron number of an atomic energy level: N(n), corresponds to a superficial charge density σ_e of constant value for an energetic layer considered as having quasi-cylinder (barrel-like) form, of l_σ-height and quantified r_e-radius, (figure 9):

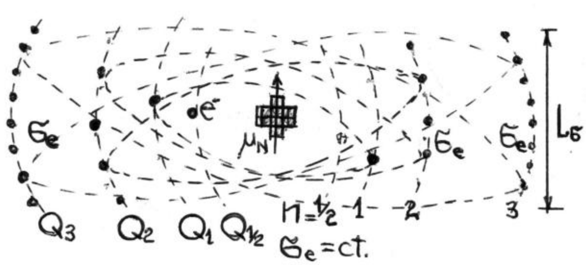


Fig. 9. *Pre-quantum atom.*

$$N(n) = Q(n)/e = (\sigma_e.2\pi r_e\, l_\sigma)/e = 2n^2;\; Q(1)=2e,\; r_o=e/(\sigma_e.\pi.\, l_\sigma);\; r_e=n^2.r_o \quad (57)$$

According to the model, the transition on sub-fundamental level (n=1/2) is specific to the hydrogen atom, by the condition Q(n=1/2) = e, (H-atom having a single electron), condition which gives a radius for the under-fundamental level orbital: $r_o^* = e/(\sigma_e.2\pi.l_\sigma) = r_o/2$.

For other atoms, with bigger mass, the transition on sub-fundamental level: (n=1)→(n'=½) results as possible by stimulated electronic transition, according to the model, (by laser excitation with: $h\nu = E_1 - E_{½}$), resulting possible also the producing of "mascons" (concentrated mass, resulted by the atomic radius decreasing and stronger inter-atomic forces).

By this possibility it may be generated a stimulated K½ -electronic capture to some atoms (such as Am): $p^+ + e^- \rightarrow n^0 + \nu_e$, according to the model.

1.10.3 The Nuclear Force

In the case of a protonic cluster, formed by N^p-quasielectrons, the quantonic Γ_μ^*-vortices of paired quasielectrons, induced by the sinergonic Γ_A^* – vortices around each electronic centrol with reciprocally opposed senses, have – logically, an quasi-identical variation of the v_c-tangential speed of quantons as in the case of the Γ_μ^P-soliton vortex, given by eq. (56).

It results – for a proton, that the superposition of the (N^P+1) quantonic vortices: Γ_μ^*, generates – inside the volume with the radius: r_μ^a =2.35fm, a total dynamic pressure: $P_n = (1/2)\rho_n(r)\cdot c^2$ having a variation according to eqs. (32) and (51), i.e:

$$P_n(r) = \frac{1}{2}\rho_n(r).c^2 = \frac{1}{2}\rho_n^o.c^2.e^{-\frac{r}{\eta^*}} = P_n^0 \cdot e^{-\frac{r}{\eta^*}}, \ \eta^* = 0{,}755 fm; \ \mathrm{r} \le \mathrm{r}_\mu^{\mathrm{a}} = 2.35 fm \quad (58)$$

in which the proton density in its center has the value: $\rho_n^o=(N^p+1)\cdot\rho_e^o=2105\cdot\rho_e^o=4.68\times10^{17}kg/m^3$, (with: $\rho_e^0=22.24\times10^{13}$ kg/m^3), and gives an approximate mass of the impenetrable quantum volume, $\upsilon_i(a_i)=0.9$ fm^3, of value: $m_i(a_i) \cong \rho_n^0\cdot\upsilon_I = 4.21\times10^{-28}$ kg.

According to the law of ideal fluids extended for quantum fluids in a form that neglects the exterior forces, i.e.: $P_d(r) + P_s(r)=P_s^M$ =constant, (P_s^M corresponding to the totally destroyed vortex), in the proton nuclear field volume having the radius: $r_\mu^a \cong 2.35$ fm, the gradient of quantonic dynamic pressure: $P_d(r) = P_n(r)$ acting upon the impenetrable nucleonic volume $\upsilon_i(a_i)$ of an another nucleon, generates a scalar nuclear force: $F_n(r)$ = grad $V_s^n(r)$, conforming to the Euler's equation [26]:

$$F_s(r) = \nabla V_s^n(r) = \rho_n^0\upsilon_i.\frac{d\mathrm{v}}{dt} = -\upsilon_i.\nabla P_d(r) + \rho_n(r)\cdot f_{ext} \ , \mathrm{with:}\ \rho_n^0\upsilon_i = \mathrm{m_i}; \quad f_{ext} \cong 0 \quad (59)$$

through the static quantonic pressure gradient having the same value but an opposed sign:$\nabla P_s(r) = \nabla(P_s^M(r) - P_d(r)) =-\nabla P_d(r)$.

The scalar nuclear force between two nucleons is produced by a scalar nucleonic potential: $V_s^n(r)$, having-by eq. (32), (51) (58) and (59), the form:

$$V_s^n(r) = -\upsilon_i \cdot P_n(r) = -\frac{\upsilon_i}{2}\rho_n(r)\cdot \mathrm{v_c^2} = V_s^0\cdot e^{-\frac{r}{\eta^*}}; \ (\mathrm{v_c} = \mathrm{c}); \ V_s^0 = -\frac{\upsilon_i}{2}\rho_n^0\cdot c^2; \ \mathrm{r} \le \mathrm{r}_\mu^{\mathrm{a}} = 2.35\mathrm{fm} \quad (60)$$

The $F_s(r)$-force acts only upon the υ_i-impenetrable quantum volume because that the rest of nucleon is penetrable to the field quanta action, (to the quantons action), according to the model.

Thus, by eq. (60) is theoretically re-found the expression of the exponential nuclear potential, with a specific deepness of the potential well:

$$V_s^o = -118.4 \text{ MeV and with } \eta^* = 0.755 \text{ fm}$$

comparative with the known exponential potential, which has:

$$V_s^o = -189.3 \text{ MeV and: } \eta^* = 0.67 \text{ fm, [34].}$$

At the distance d ≅ 2fm between deuteronic nucleons (generally considered as the dimension of the nuclear potential well), it results from eq. (60) that the scalar nucleonic potential $V_s^n(r)$ has the value: $V_s^n(d) = -8.37$ MeV-value which corresponds to the known mean binding energy inside the stable nuclei: -7.5….-8.5 MeV.

By the given interpretation of the eq. (53) the mesonic theory of the nuclear force results as formal, (only quantitative), in our model of CGT.

We observe also that the form (60) of the nuclear potential comply with the form (34) of the strong potential of the electron, previously deduced by the SNL equation (33a) with soliton-like solution, by a particular value: $k_n = -V_s^o$ and with $\delta\upsilon = \upsilon_i$, $V_s^n(r)$ resulted from eq. (34), in accordance with the superposition principle, specific also to the quantum mechanics.

The sinergonic dynamic pressure: $P_d^s(r)$ of the Γ_A^n vortices of (N^p+1) - protonic cluster, generates a scalar gravito-magnetic potential, similar to the nuclear potential $V_s^n(r)$ but acting upon a volume:

$$\upsilon_c^n \cong m_p/\rho^M = 1.67\text{x}10^{-27}/8.8\text{x}10^{23} \cong 1.9\text{x}10^{-51} \text{ m}^3$$

given by the sum of the electronic and quantonic super-dense centrols of the m_i-inertial mass of impenetrable nucleonic volume, υ_i. Because that the value υ_c^n result as being of ~10^6 times smaller than the value υ_I =0.9fm^3, by eq. (30) it results that the scalar potential generated by the sum of sinergonic Γ_A -vortices is of a relative negligible value related to the nuclear potential.

However, related to the nucleon gravitic potential, this magneto-gravitic potential $V_{Mg}(r)$ results of significant value, having – for $r \leq r_\mu^a$, a variation according to eq. (60), of short range and may contribute – at the macro-scale, to the "black hole" effect, especially in the case of a "magnetar" type super-dense stars, according to the theory.

At the micro-scale, this gravito-magnetic potential contribute to the maintaining of vexons and of quasi-electrons centrols inside the nucleonic quantum volume – explanation complying also with the chiral soliton model with quantum potential, suggested also by other theories, [8].

For $r > r_\mu^a$, by eq. (59) it results that the gravito-magnetic potential generated by an elementary particle over another particle with the mass m_p, has the form:

$$V_{Mg}(r) = -\frac{\upsilon_c}{2}\rho_s(r)\cdot \mathrm{w}_t^2 = -\frac{m_p}{2\rho^M}\rho_a^0\frac{a^2}{r^2}\cdot c^2 = V_{Mg}^0\left(\frac{a}{r}\right)^2;\ V_{Mg}^0 = -\frac{m_p}{\rho^M}\rho_a^0 c^2 \quad (61)$$

1.10.4 The Neutron Model

Complying with the CF proton soliton model, the neutron results in the theory conforming to a Lenard-Radulescu dynamide model, (Dan Radulescu, 1922, [65]) according to which the neutron is composed by a proton centre and a negatron revolving around it with the speed $v_e^* < c$ at a distance $r_e^* \leq a$, at which – according to eq. (53), it has a degenerate μ_e^S-magnetic moment and a S_e^n-spin.

The revolving of the neutronic negatron generates a negative orbital magnetic moment, μ_e^L, the neutron magnetic moment resulting according to equation:

$$\mu_n - \mu_p = (\mu_e^L + \mu_e^s) = (-1{,}91 - 2{,}79)\,\mu_N = -4{,}7\,\mu_N\,;\, with:\ \mu_e^L = \frac{e \cdot v_e^* \cdot r_e^*}{2} \quad (62)$$

Because that the neutronic negatron orbital rotation take place under the action of the dynamic pressure: $P_d = ½\cdot\rho_\mu(r_e^*)c^2$ of the Γ_μ^n-quantonic vortex, forming the μ_p-proton magnetic moment and having the $\rho_n(r)$ – density inside the quantum volume, we can consider also the equilibrium relation of the dynamic pressures given by these densities acting over the revolved degenerate negatron area: $S' \cong 2\pi a_i^2$, by the approximation: $\rho_n(r_e^*) \cong N^p\cdot f_d\cdot\rho_\mu(r_e^*)$ conform to eqs. (53a) and (30), in the form:

$$\rho_\mu(r_e^*)\cdot c^2 \cong \rho_n(r_e^*)\cdot v_e^2;\ \Rightarrow \rho_\mu^0 c^2 \cong f_d\cdot\rho_n^0 v_e^2,\ (f_d=0.8722);\ v_e \cong c/\sqrt{f_d\cdot(N^p+1)} \quad (63)$$

with: $\rho_\mu^0=\rho_e^0=22.24\text{x}10^{13}$ kg/m^3; $\rho_n^0=4.68\text{x}10^{17}$ kg/m^3, resulting that:

$$v_e=0.0233\cdot c \cong 7\text{x}10^6\text{m/s}.$$

Also, by eq. (53) regarding the magnetic moment degeneration, considered also for the incorporated neutronic negatron, it results that:

$$\mu_e^S = \mu_N \cdot \frac{\rho_n^0}{\rho_n(r_e^*)};\quad \rho_n(r_e^*) = \rho_n^o \cdot e^{-\frac{r_e}{\eta_d}};\quad \eta_d = 0{,}93\,fm; \qquad (64)$$

By (62), (63) and (64), it result that: $r_e^* = 1.41$ fm; $\mu_e^L \cong -0.1563\mu_N$; $\mu_e^S \cong -4.554\mu_N$, so the μ_n value results by the conclusion that the neutronic negatron has the m_0-centrol of the quantum volume positioned in the surface of the protonic quantum volume, (fig. 10), while for the positronic proton which is axially positioned, the eq. (53) gives: $r_e^+ = 0.96$ fm.

The spin and the revolving frequency of the neutronic negatron around the proton centre results by:

$$\nu_e = v_e/2\pi r_e = 0.79\text{x}10^{21}\ \text{Hz}$$

$$\mu = (e/m_e)\cdot S; \Rightarrow S_e^n = \mu_e^S\cdot(m_e/e) = 0.0025\ \hbar,\ (\hbar=h/2\pi),$$

in concordance with the (quasi) equality between the spin of proton and of neutron, ($S_n \approx S_p = ½\hbar$), resulted in the quantum mechanics.

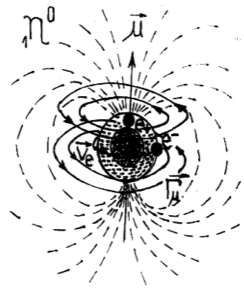


Fig. 10. *The neutron model.*

So, by eq. (53) in which r_n = a for all CF-particles, our model solve the classical problem of the nucleon spin and magnetic moment value, problem which determined the abandonment of the classical nucleon model presuming incorporated nucleonic electron(s).

The continuous energy spectrum of β-radiation observed at the neutron transforming, corresponding to a v_e-speed of β-electron of value: 0.7÷0.92c, is explained-in accordance with eq. (55), (56), through the acceleration given to β-electron by the Γ_μ^p-vortex of the remained proton after β-disintegration, which also depends on the β-electron emission angle, θ_β.

1.10.5 The Deuteron Model and the Deuteron's Self-Resonance

In the case of deuteron, the experiments [66] evidenced a binding energy: ΔE(d) = - 2.226 MeV, for the real deuteron having parallel nucleonic spins and of about - 0.07MeV for the virtual deuteron having anti-parallel nucleonic spins. Comparatively to the binding energy value: V_n(d) = -8.4 MeV, (d=2fm), of the undisturbed deuteronic state fromstable multi-nucleonic nuclei, the value $\Delta E(d) = -2.226$ MeV indicates, by eq. (56) and eq. (60) of the model, a decrease of the quantonic dynamic pressure:

$P_d(r) = (1/2)\rho_c(r)\, v_{ct}^2$ in the CF chiral soliton of the N^p-protonic cluster.

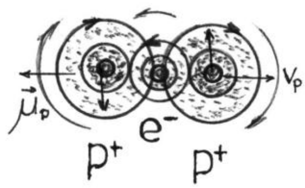


Fig. 11. *The deuteron.*

This decreasing is generated by the decreasing of r_μ^a -radius of the exponential part of quasielectron chiral soliton, Γ_μ^*, at a value: $r_\mu^c < r_\mu^a = 2.35$fm, as consequence of the perturbations caused by the protonic kernel's intrinsic vibration inside the deuteronic nucleons with an E_v-energy which decrease also the value of the nuclear potential well: V_s^0, in accordance with eq. (60), to a value: $V_s^{0*} < V_s^0$.

This conclusion is in concordance with the Onsager's observations regarding the decrease of the circulation value for a super-fluid perturbed over a critical value, [67].

Conformed to eq. (56) and (60), the expression of the deuteron binding energy results – in consequence, according to:

$$V_s^*(r) = -\frac{\upsilon_i}{2}\rho_n(r)\cdot v_c^2(r) = V_s^{0*}\cdot e^{-\frac{r}{\eta^*}}\cdot\left(\frac{r_\mu^c}{r}\right)^2 = V_d^{0*}\cdot e^{-\frac{r}{\eta^*}};\; r_\mu^c \le d;\;\; V_d^{0*} = k_v^*\cdot V_s^0\cdot\left(\frac{r_\mu^c}{r}\right)^2 \quad (65)$$

in which: $\eta^* = 0.755$fm and $V_s^{0*} = k_v^* \cdot V_s^0$, ($k_v^* < 1$; $V_s^o = -118.4$ MeV) – by the deuteronic self-resonance mechanism.

From energetic point of view, the effect of the E_v-vibration energy which decreases the deuteron binding energy to the value $\Delta E(d) = -2.226$ MeV, may be explained by the contribution of the nuclear potential, $V_s(d)$, to the deuteron self-resonance state through an alternatively "destruction-regeneration" mechanism of the un-perturbed deuteron state.

Therefore, if the deuteronic nucleon vibration has the amplitude A_v around the position x=d, between two positions: x_1 and x_2, (figure 11), the kinetic energy: $E_c = V_s(x_1)-V_s(x_2)$ of the deuteronic proton is transformed at the impact of nucleons υ_i-quantum volumes, in an energy $\varepsilon_v = \Sigma m_w c^2$ of destroyed vexons in the surface $S_i = \pi a_i^2$ of υ_i-impenetrable volume. This destruction which transforms the intrinsic ε_v -energy of destroyed vexons into static quantonic pressure, partially transforms the attractive gradient of dynamic quantonic pressure into repulsive gradient of quantonic pressure, with a degeneration of the potential well: $V_s^0 \rightarrow V_s^{0*}$, in accordance with eq. (65), by the increasing of nucleon internal entropy, which produces the nucleons re-separation against a degenerate nucleonic potential:

$$V_s(d) = \Delta E_D \approx -2.22\text{MeV}.$$

The decreasing of the V_s^0 -nuclear potential well results in this case proportional with the mean vibration energy: $E_v(d, l_v)$ permitted by the nucleon vibration liberty: $l_v = A_v$, according to:

$$V_s^{0*} = V_s^0 \cdot \left(1 - \frac{\varepsilon_v(d, l_v)}{\varepsilon_v^0}\right) = V_s^0 \cdot \left(1 - \frac{E_v(d, l_v)}{E_v^0(d, l_v^0)}\right) = k_v^* \cdot V_s^0 \qquad (66)$$

in which ε_v^0; $E_v^0(d, l_v^0)$ represents the critical values of ε_v and of $E_v(d, l_v)$ which cancel the attractive potential $V_s^*(d)$. Because that the mass defect: $\Delta m_D = (m_p+m_n-m_D) \cong 2.23\text{MeV}/c^2$, resulting at the deuteron forming as destroyed vexons mass/energy, $\varepsilon_v^{0,}$ corresponds to the ΔE_D -binding energy, it results that: $E_v^0(d, l_v^0) = ½\, m_p v_p^2(d) = \varepsilon_v^0 = -\Delta E_D = 2.226$ MeV.

According to the model, simplifying, we may approximate also that the initial value: $V(r_\mu^a)$ of the potential well is recovered by the negentropy of the etheronic winds at the distance-limit between proton and neutron: $r_d = d+A_v^*$ for which the nuclear potential given by eq. (60) formally extended also for $r>r_\mu^{a,}$ has the approximate value: $V_s(r_d) = \Delta E_D = -2.23$MeV. In this case, by eq. (65) it results that:

$$V_S^*(d,E_V) = V_S(d+l_V^*) = V_S(d)\cdot e^{-\frac{l_V^*}{\eta^*}} = V_S(d)\cdot k_V^* \left(\frac{r_\mu^{c*}}{d}\right)^2 \cong V_S(d)\cdot \left(\frac{r_\mu^{c*}}{r_\mu^a}\right)^2 = \Delta E_D\,;\;\; \eta^* = 0{,}755\,fm\,; \quad (67a)$$

resulting that: $r_d \cong 3$fm and $A_v^* = l_v^* = 1$fm. With: $r_\mu^a = 2.35$fm, it results also from eq. (67) that: $k_v^* = 0.72$; $r_\mu^{c*}\cdot\sqrt{k_v^*} \cong 1$fm; $r_\mu^{c*} \cong 1.2$fm.

By eq. (66) it result that: $E_v^*(d, l_v^*) = 0.66$MeV and that:

$$r_\mu^c = r_\mu^a \cdot e^{-\frac{l_v}{2\eta^*}} \quad (67b)$$

This theoretical result complies with the conclusion of quantum mechanic's deuteron model, that-on average, the deuteron nucleons are found outside the limits of the potential well having the length: $d_d = 2$fm, the probabilistic deuteron radius being, in QM: $R_D = 4.32$fm, [34].

The value: $E_v^*(l_v^* = 1\text{fm}) = 0.66$MeV, corresponds – by a classic equation of the vibration energy:

$$E_v^D = 2\pi^2 \nu_\gamma^2 m_p \cdot A_v^2 \quad (68)$$

to a vibration frequency of nucleons in the real deuteron, of value: $\nu_v = \nu_v^D = 1.8 \times 10^{21}$ Hz, which corresponds in the quantum mechanics to a phonon with the energy: $h\nu_v = 7.4$ MeV.

So, it is explained by the model the fact that was observed emissions of γ-quanta with energies $h\nu_v$ until to 17MeV-exceeding the nucleon binding energy, without the nucleon separation, like in the case of reaction:

$$^{7}_{3}Li + p^{+} \rightarrow ^{8}_{4}Be + \gamma$$

According to the model, the γ-quantum is emitted by the vibrated nucleon at the impact of nucleons impenetrable quantum volume, when: $V_s(r) \geq h\nu_\gamma$.

Comparative with the plastic interaction of deuteronic nucleons with $A_v \rightarrow 0$, when the vexon energy: $\Delta\varepsilon_v(\Delta\rho_n^0)$ of the nucleon superficial destruction is emitted as a binding energy, ($\Delta\varepsilon_v = \Delta m_n c^2$), in the vibrated proton case this energy is used for nucleons re-separation followed by emission of γ -photons by the vibrated proton, with the regeneration of the nucleon mass and vorticity, by the Γ_A^* -vortices and by quantum and sub-quantum winds.

It is thus explained also – by the nucleon pre-quantum model of the theory, the mechanism of the non-destructive interaction between nucleons at relative high energies.

Another kinetic cause which induces the protonic kernel vibration inside the deuteron, determining the decreasing of r_μ^a-radius of the Γ_μ^*-soliton, is - according to the model, the revolving movement of the deuteronic proton centres around the neutronic negatron under the action of the $\Gamma_\mu(e^-)$ – vortex quantonic pressure, which determines also magnetic attraction.

Thus, considering the protonic centers revolving with the v_p-speed around the neutronic negatron at an average distance: $r_d/2 \cong 1.5$fm from it, the difference between the sum of the magnetic momenta of the deuteronic nucleons in free state and the deuteron magnetic moment experimentally found: $\mu_d=0.857\mu_N$' results from the equation:

$$\Delta\mu_d = (\mu_n + \mu_p) - \mu_d \cong \mu_e^L - \mu_D^L = 0{,}0226\mu_N; \quad with: \mu_D^L = 2\mu_p^L = (e^+ \cdot v_p \cdot r_d)/2 \quad (69)$$

Therefore, with $\mu_e^L = -0.147\mu_N$ it results that: $\mu_D^L = -0.167\mu_N$; $v_p=3.5\text{x}10^6$ m/s and a value: $V_{CF}(r) = ½m_p v_p^2 = 64$keV of the nucleon centrifugal potential, which compensates the potential of electrostatic interaction. In consequence, the theory explains the normal deuteron as being a quasi-stable oscillonic couple: $({}_1p^1\text{-}{}_1n^0)$, i.e. with self-resonance.

In the virtual deuteron case, the nucleons having anti-parallel spins, the neutronic negatron revolves as in its free state around the proton center of the neutron, passing periodically with the frequency: $\nu_e= 0.8\text{x}10^{21}$Hz between the two deuteron protonic centers, and because that the two deuteronic protons has antiparallel magnetic moments, the neutronic negatron intervenes with a repulsive magnetic potential: $V_\mu^n(d_d/2) \cong 0.3$MeV against the proton.

As a consequence of the induced deuteron's self-resonance, the deuteronic protons are thus re-separated to a distance: $r_d' = d+A_v^{*'}$ with $A_v^{*'} > 2r_i$, which determines – in accordance with eq. (68), a maximum decrease of the degenerate value r_μ^c given by (67b) at the value: $r_\mu^p \cong 0{,}6$fm – corresponding at: $l_v^*=A_v^* \cong 2$fm, and a decrease of the scalar nuclear potential at a minimal value: $V_s^*(d;\, l_v') \cong -0.6$ MeV -which is canceled by the remained nucleon's vibration energy, explaining the fact that the deuteron having anti-parallel nucleon spins is a virtual state.

In consequence, according to the model, the spin-dependence of the nucleons strong interaction is given by different values of the vibration energy and of vibration amplitude.

In a conventional simplified form, de spin-dependent nuclear potential may be expressed-in accordance with the resulted phenomenological model and with eq. (67), in the form:

$$V_s^n(r) = V_s^0 \cdot e^{-\frac{r}{\eta^*}} \cdot e^{-\frac{l_v^*}{\eta^*}}\,[\mathrm{MeV}];\quad \mathrm{l}_\mathrm{v}^* = l_v^0 \cdot \left(\frac{3}{2} - \frac{1}{2}\vec{\tau}_p \cdot \vec{\tau}_n\right);\quad \vec{\tau} = \frac{\vec{s}}{s}; \qquad (70)$$

with: V_s^0 = -118.4 MeV; η^*=0.755fm; $l_v \cong A_v$; $l_v^0(E_v^*) \cong$ 1fm – for the deuteron and: $l_v(E_v=0) = 0$.

The deuteron model of quantum mechanics consider also a self-resonance vibration mechanism of the deuteron for explain the deuteron's E_D-binding energy but in a different way, considering a reciprocal vibration of these deuteronic nucleons with an energy: $E_v \cong$ 20MeV, [34] – value which is in a relative discrepancy with the value of the E_D -binding energy.

The correspondence with the quantum mechanics formalism for the nuclear interaction [34] may be justified writing the eq. (34) for: $\delta m_i = \upsilon_i \cdot \rho_p(r)$ in the particular form:

$$\frac{\partial^2 \Phi}{\partial r^2} - k_\lambda^2 \cdot \Phi = 0;\ k_\lambda^2 = \left(-\frac{2\delta m_i \cdot V_p}{\hbar^2}\right)_{r \to 0};\ \Phi(r) = \Phi_0 \cdot e^{-k_\lambda r};\ V_p(r) = k_n \cdot |\Psi|^2 = -\frac{1}{2}\delta\upsilon_i \cdot \rho_p(r) \cdot c^2 = V_p^0 \cdot e^{-\frac{r}{\eta}} \qquad (71a)$$

i.e. considering the $m_i(a_i)$-mass of the impenetrable quantum volume of the attracted nucleon in a quasi-rectangular potential well V_p^0 of another, having the radius: $a_r = \pi/2k_\lambda$.

For a pseudo-protonic cluster of N_c=1837 un-degenerate electrons, $(V_p)_{r\to 0} \approx V_p^{\,0} = V_s^{\,0}\cdot(N_c/N^p+1)$ =-103.32 MeV, $(\rho_p)_{r\to 0} \to \rho_p^{\,0} = N_c\cdot\rho_e^{\,0}$ and $k_\lambda \approx (-2V_p^{\,0}/\hbar c)$, so: $\eta \approx \lambda^* = 1/k_\lambda$= 0.956 fm – very close to the value: η_e= 0.965 fm of the e-charge – and mass – mean radius of the electron, obtained in the theory.

Also, for the protonic cluster of (N^p+1) degenerate electrons, to $V_s^{\,0}$ = -118.4MeV it correspond in (71a) a value: $\lambda' = 1/k_\lambda$= 0.8(3) fm, so the form (60), (70) of the nuclear potential classically obtained, with $\eta = \eta^*$= 0.755 fm, may be re-obtained by a degeneration function: $f_D = e^{-0.1245\cdot r - l_v}$ in the form:

$$V_s^n(r) = f_D\cdot\Phi(r) = f_D\cdot V_s^0(r)\cdot e^{-r/\lambda'} = V_s^0(r)\cdot e^{-r/\eta^* - l_V}\ ;\ \ V_s^o = -118.4MeV;\ r > a_r = 1.3 fm \quad (71b)$$

Also, considering that the nuclear vibration spectra is generated by excedentary nucleons as quantified deuteronic vibrations with phononic energy: $E_v(d) = n\cdot\hbar\omega + \frac{1}{2}\hbar\omega$, ($\hbar\omega \approx$ 0.33MeV, [34]) the resulted deuteron model of the theory explain also phenomenologically the zeroth vibration energy: $E_v^{\,0} = \frac{1}{2}\hbar\omega$, of $T \approx$ 0K, by the specific self-resonance mechanism.

Also, it results the non-reciprocity of nuclear interaction, i.e.: the nuclear potential $V_{NK}(r)$ generated by a proton ($_N$) over a meson ($_K$) differs from $V_{KN}(r)$, generated by a meson over a proton.

The deduced model of nuclear interaction is in accordance also with the conclusion of Q. M. model which considers that the strong charge of nucleons decreases with the interaction energy, in nucleon-nucleon collisions.

1.11 The Atomic Nucleus; A Quasicrystal Nuclear Model

Conforming to the solitonic "dynamide" neutron model, to the resulted deuteron model and to the observations regarding the nuclear stability that shows a maximum stability for the even-even nuclei, the pre-quantum nuclear model of $T\rightarrow 0$ K results as a quasicrystalline cluster having nucleons coupled in deuteronic pairs, and corresponding also to the α-particle cluster model, to the "nuclear molecule" model and to the extreme -uniparticle type model, [68].

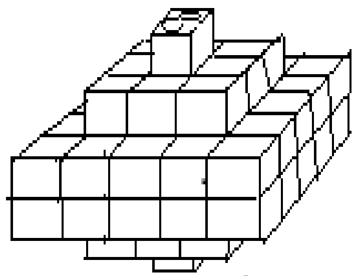


Fig. 12. *Quasicrystal nucleus.*

According to this quasi-crystal model, the nucleus consists of magnetically and symmetric coupled square root forms with an integer number of α-particles. According also to another quasicrystal nuclear model, (Lonnroth, [69]), the weakly bound excedentary nucleons or alpha-particles formed from the valence nucleons, are revolved around the quasicrystal nucleus, as in the extreme-uniparticle model (Schmidt, [68]), by the action of quantonic Γ_μ^N-vortex of the nuclear magnetic moment which explains also the nuclear centrifugal potential – according to the theory and to the resulted quasi-crystal nuclear model:

$$B_\alpha = (1/20)\,L(L + 1) = m_\alpha v^2_\alpha/2;\ (\rho_R \cdot v_\alpha^2 \approx \rho_\mu v_c^2;\ B_\alpha \sim \mu_N) \qquad (72a)$$

for L=1 resulting: $v_\alpha = 2{,}2\text{x}10^6$ m/s, value corresponding to a nucleus with $S = 9/2$ and $\mu_n \approx 4\ \mu_N$ such as the α-emissive nucleus of ^{212}Bi: $\mu_{Bi} = 4{,}08\ \mu_N$.

Also, the eq. (66) for the nuclear potential well is in accordance with the generalized model of nucleus which considers an interaction potential of the excedentary nucleons forming the superficial shell with the rest-part, of the form:

$$V(r) = -V_o\left[1-\left(\frac{r}{R}\right)^2\right] = -V_o + \frac{1}{2}m.\omega_o^2.r^2; \quad \omega_o^2 = \frac{2\mathrm{V_o}}{\mathrm{m.R^2}} \qquad (72b)$$

The orbital revolving liberty of the unpaired nucleon around the quasi-crystal nucleus results by eq. (65), (66) and (71) as a consequence of its low binding energy determined by a bigger l_v -vibration liberty, which explain also the α-decay of nucleus by the nuclear barrier decrease, without the hypothesis of nuclear barrier “tunneling”, used by the quantum mechanics.

The stable nuclei, with a “magic” number of protons or neutrons: 2;8;20;28;(40);50;82 and 126 (for neutrons) may be found by the model as symmetrical quasi-crystal forms, resulted from the superposition of square root forms with an integer n^2-number of α -particles, having $2n^2$ protons [26]: Z=Σ($2n^2$), **(**n=1.2….7) and with tendency to a minimum deformability: 2; 2x2^2=8; (2x3^2=18); 18+2=20; 20+8=28; (2x4^2=32); 2x5^2=2x3^2+2x4^2=50; 50+32=82, (figure 12) or of quasi-stable triangular forms (^{10}Ne) or hexagonal forms (^{19}K) completed with additional neutrons, for Z >20. The $_{82}Pb^{208}$ nucleus corresponds to the initial form: $_{104}N^{208}$ (Z=2(4^2+6^2)) in which 22 protons was transformed into neutrons by β^--emission giving Z = 82, according to the model.

The model explains similarly also the super-asymmetrical nuclear fission [70]:

1. Ra222→C14+ Pb208, (Oxford, 1984); U234 → Mg28 + Hg206, (P. Price, 1986),
2. U232→Ne24 + Pb208; Pu236→Mg28 + Pb208, (Dubna 1984, 1987),

through eq. (65), (71), by the conclusion that the incompleteness of the quasi-crystal network or an exceeding number of nucleons determines a bigger l_v-

vibration liberty for these nucleons weakly bound, which decrease the scalar nucleonic potential and generates either the nucleus fission in sub-nuclei with symmetrical quasi-crystal forms, (frequently – in "magic" stable or quasi-stable forms), particularly – alpha-particle emission, either vibrational gamma-spectra resulted by the self-resonance of weakly bound nucleons or alpha-particles.

Through the same equations (65), (71), by the deuteron self-resonance mechanism and without the hypothesis of exciting energy concentration on a single nucleon or of nuclear barrier tunneling, used in the quantum mechanics, it is also possible to explain the following: – the compound nucleus transformation mechanism by excitation with particles having low energy, up to 2MeV, as in the case of Be9 which can be transformed with a γ -quantum of only 1.78MeV even if the binding energy given by the sum of the nucleons is 58 MeV;

1. some reactions with thermal neutrons (having some tens of eV), as in the reaction: Li7+H1 $\rightarrow$ Be8 + 2He4 + γ, generated with only 125eV proton energy, or in typical reactions (n;α), such as the reaction: B10+n$\rightarrow$Li7+α, generated by thermal neutrons even if normally there are necessary neutrons having an energy of 0.5…10MeV; [34].

2. The emission of a nucleon or a α – particle from a compound nucleus excited with particles having only 1÷2MeV, after approx. 10^{-15} seconds, as in the nuclear reactions of the type: Ca (p, n) Sc; Al (p, α) Mg.

By the property of rigid rotator, the quasi-crystal model of nucleus complies also with the vibrated rigid rotator model of nucleus, (Schmidt type-with the unpaired nucleon generating the nuclear spin and magnetic moment) and with the experiments of α-particles scattering on heavy nuclei, which have evidenced a behavior of these nuclei in accordance with a quasi-crystalline nuclear structure (W. Bauer, K. Ershov, [71]) which can be formed when the distance between alpha-particles is comparable with the length of de Broglie wave of alpha-particle and which can captures alpha-particles, (K. A. Gridnev, K. V. Ershov et. al, [72]).

1.12 The Beta Disintegration

The fact that – according to the neutron “dynamide” model, the protonic positron co-exists with the neutronic negatron inside its quantum volume until the neutron transformation with emission of an electron and an antineutrino, $\bar{\nu}_e$, may be explained by our CF model of nucleon, through the hypothesis that the difference of approximate 2.53 m_e between the neutron mass and the proton mass is given by the sum of the neutronic m_e-negatron mass and a degenerate γ*-binding gammon, considered as a (quasinegatron-quasipositron) pair having a common degenerate quantum volume and spaced centrols by an effect of “static” type charge (generated by reflection of sinergons). This γ*-binding gammon, called “σ-gluol” in our model, have thus the intrinsic energy:

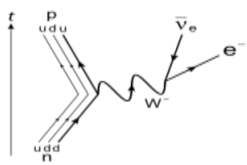
$$\in_\sigma = 2m_e{*}c^2 \cong 1.74 m_e c^2 \cong 0.889 \text{ MeV}.$$

For a bound neutron inside the nucleus, this σ-gluol has a quasi-stable position between the proton center and the neutronic negatron. Through an intrinsic vibration of the neutron, i.e.-of the neutronic negatron in report wiht the protonic center, induced in nucleus by neutron vibration, the centrols of σ-gluol comes into contact and its e*-quasielectrons reciprocally annihilates each other, loosing the quantum volume whose intrinsic energy, $\in_\sigma$, is transformed by the resulted quantonic static pressure, in the β-disintegration energy of the neutron, acting upon the remained centrols of σ-gluol and upon the neutronic negatron.

At the same time, the couple of centrols of the disintegrated σ-gluol, having the mass: $2m_0$, is emitted by the sinergono-quantonic Γ_μ -vortex of the remained proton in the form of a very penetrating particle by the action of the local quantonic pressure with the speed $v \to c$ or with tachyonic speed, this particle being experimentally identified – according to CGT, as electronic antineutrino having the approximate superior limit of the rest mass [34]:

$$m_v(\nu_e) = 2m_0 \cong 10^{-4} m_e = 9x10^{-35} kg$$

Considering the electronic pair: $e^- + e^+$ of the CF-neutron as a gammonic metastable state: $\gamma^0 = e^- + e^+$, attached to the particle neutral M*-cluster formed by quasi-electrons, it result that the known reaction of beta disintegration [34]:



$$^0 n_e \to ^1 p_r + ^{-1} e^- + \bar{\nu}_e + Q_k (728 keV) \qquad (73)$$

may be considered in the theory, as derived from a reaction of the form:

$$(M_n * + \gamma^0 + \sigma) \to (M_n * + e^+) + e^- + \bar{\nu}_e + \in_\sigma (889 keV); \; (M_n * + e^+) = ^1 p_r \quad (74)$$

given by the dissociation of the metastable γ^0-gammon with the transformation of the σ-gluol:

$$t^0 = \gamma^0 + \sigma \to e^+ + e^- + \bar{\nu}_e + \in_\sigma (889 keV); \; \in_\sigma \to Q_k + \Delta\varepsilon; \; (\Delta\varepsilon - \text{loosed energy}) \quad (75)$$

reaction in which the couple (γ^0 - σ) may be considered as a neutral particle: a “trion”, t^0.

The escape of β-electron from the nucleonic field result -in the theory, in the condition of neutron self-resonance with an intrinsic E_v^e – vibration energy of the neutronic electron, induced by a $E_v^n(d)$ -vibration energy of a deuteronic neutron satisfying the condition:

$$E_v^n(d) \geq E_v^0(d, l_v^0) = \Delta E_D = 2.226\text{MeV};\ E_v^e \to m_e c^2 = 0.511\text{MeV} \qquad (76)$$

value which cancel momentary the $V_s(d)$ nuclear potential, conform to eq. (66).

The resulted $\in_\sigma$-quantonic energy acts upon the resulted $\bar{\nu}_e$-neutrino and upon the β^--electron and determines the penetration of the neutron field by these particles, by an energy of the β^--electron impenetrable quantum volume: $\in_i \to m_i c^2 = 0.112\text{MeV}$ – which explain the loosed energy: $\Delta\varepsilon = \in_\sigma - Q_k \cong 160\text{keV}$ - necessary for leave the neutron at a canceled value of the neutron strong potential, obtained according to eqs. (65), (66) and (76). An argument for this theoretical conclusion is the fact that the energy of γ-quanta emitted by a nucleus after β-transformation may be until to 2÷2.5MeV, [34], – value explained in the model by the vibration energy of the proton remained bound in nucleus by the field of adjacent nucleons.

Because that the maximum energy of neutrino is: $\in_\nu = 2m_0c^2 \cong 10^{-4}$ MeV - according to (27b), the neutrino emission not solves the problem of non-conservation energy in β-transformation.

The explanation of the observed continuous energy spectrum of β-electrons resultsin the model by the energy given to β-electron by the Γ_μ^p-soliton vortex of proton and it depends on the angle of electron initial impulse, $\theta(\mathbf{p}_\beta; \mathbf{r}_p)$, given by the $\in_\sigma$-energy, in correlation with eq. (55) which explains also the experimentally observed tachyonic neutrinos, (OPERA experiment) and the Mössbauer effect, (the recoilless gamma-radiation emission/absorption).

In this case, the hypothesis concerning the existence of a $W^{\pm}$ -boson mediating the weak interaction of β-disintegration, used in the quantum mechanic's standard model, is not strictly necessary, in our model its natural equivalent being the couple: $w^- = (\sigma + e^-)$, (a "weson") which generates the beta disintegration in the form: $w^- \rightarrow e^- + \bar{\nu}_e + \in_\sigma$ when: $\sigma \rightarrow \bar{\nu}_e + \in_\sigma$.

The reaction of proton transformation by K-electron capture by an Eu-nucleus – for example, (Gamow-Teller transition), in which is emitted a neutrino of 890 keV energy:

$$^1p_r + e^- \rightarrow {}^0n_e + \nu_e(890\text{keV}) \qquad (77)$$

may be explained similarly by the conclusion that the captured negatron and the protonic positron form a metastable gammonic state: $\gamma^0 = (e^- + e^+)$ of degenerate electrons, which is transformed into an ν_e-electronic neutrino by reciprocally annihilation of the electronic quantum volumes and emission of the centrol couple having the mass: $m_\nu(\nu_e) = 2m_0$.

Because that the neutronic negatron – being open thermodynamic system, regains the free state values of spin and magnetic moment when it is emitted as β^--electron, according to eq. (53), by the quantum medium energy, the total spin S_n is not conserved in the beta disintegration-according to the model, the characteristic relation between particle spins being in consequence:

$$S_n + ½ = (S_p + S_e + S_\nu) \qquad (78)$$

resulting that: $S_\nu(\bar{\nu}) = S_\nu(\nu) = 0$, because that: $S_n = S_p = S_e = ½$, the neutronic degenerate electron having the spin almost null, as a "selectron" in the Supersymmetry.

The eq. (78) explain also the fact that – at the proton transformation by K-electron capture, the electron spin is not transmitted with the μ_B-value to the formed neutron. From eq. (78) it result also that the electronic antineutrino is identical to the electronic neutrino, this theoretical result being in accordance with the conclusion that the electronic neutrino is formed as a doublet of electronic centrols having opposed ζ_e-intrinsic chiralities, which determines a null chirality of the neutrino – that explain the lack of vortexial structure and magnetic interactions of the electronic neutrino and implicitly -its property to penetrate the matter. This theoretical result is complying with the Majorana model, which consider a neutrino as a superposing of two Majorana fields having equal masses and opposed CP parities, [73] and may explain the double beta decay confirmed by the double electron capture in $_{130}$Ba observed in 2001.

The reciprocally opposed quantum helicities of the negatron and positron, remarked in the β^- and β^+disintegration (Wolfenstein [74]), are explained in the theory by the S_e^*-soliton spin dependence of the ζ_e-intrinsic chirality of m_0-electronic centrol which – by its supposed helix form, determines an electron spin orientation either parallel or antiparallel with the impulse direction when is passing through a quantum and sub-quantum medium.

In accordance with the theory, at high temperatures as those of supernovae, (T~10^{11}K), because the perturbation of the nucleonic vortexial structure by particle vibration, the e^+-gammonic positron of the neutron may not be retained by the neutronic M_n*-cluster and the neutron is transformed, with a temperature-dependent probability, by gamma – emission, in the form:

$$(M_n^* + \gamma^0 + \sigma) \to M_n^* + \gamma^0 + \bar{\nu}_e + \in_\sigma (889\ \text{keV}) \qquad (79)$$

By eq. (79) is explained also the effect of “internal conversion”, i.e. the nuclear emission of a (e^-+e^+) pair by a nucleus excited with an energy: $h\nu > 2m_ec^2$ and the γ-rays emission of pulsars and of some lightning phenomena.

The previous conclusions can explain also the cosmic pulses of gamma radiation detected as coming from the direction of Oort cosmic cloud [75] and resulting by collision of nuclear components – phenomenon not enough understood by other theories. According to the eq. (79), this pulses may be explained as being produced by pulsatile contraction of the volume of a supernova or a neutronic star, with pulsatile increasing of the nuclear temperature, $T_{n,}$ or by integrally gammonic transformation of the nucleonic M_n*-cluster at $T_N \cong 10^{13}$ K.

In accordance with the theory, because that at high energy, in the interior of stars, it is produced – with a probability depending on the nuclear temperature, also the reaction (79), it result the possibility to explain the discrepancy between the actual model of solar neutrins emission and the observed solar neutrinic flux (r_ν=9/1) by the hypothesis of nucleons mutual transformation: $p_r \leftrightarrow n_e$ with neutrino absorption, according to the reactions:

$$p_r + \bar{\nu}_e + \gamma^0 \to (p_r + \sigma + e^-) + e^+ \to n_e + e^+;\ n_e + \bar{\nu}_e \to p_r + e^- \quad (80a, b)$$

by the transformation of $\bar{\nu}_e$ -antineutrino in a σ-gluol inside the proton: $\bar{\nu}_e \longrightarrow \sigma$ and the disintegration of the formed n_e -neutron, induced by a neutrino absorption, characterizing especially the reactions:

$$Ar + \bar{\nu}_e + \gamma^0 \to {}^{37}Cl + e^+;\ {}^{37}Cl + \bar{\nu}_e \to {}^{37}Ar + e^-.$$

Also, the P – symmetry violation in the β-decay, may be explained with our neutron model by the conclusion that the β^--electron is initially attracted by the protonic positron positioned to the bottom part of the remained proton with $\mathbf{S_p}\uparrow\uparrow\mathbf{y}$-axis, being emitted with $\mathbf{p_e} = m\mathbf{v}\uparrow\downarrow\mathbf{S_p}$.

1.13 The Elementary Particles; The Mesons and the Baryons

The previous conclusions concerning the β disintegration weak force, may be generalized for other particles formed at cold, by a Q_G – genesic potential – according to the theory, as a neutral M*-cluster having an even number of quasielectrons and which has attached:

1. a positron, in the positive charged particle case (or a negatron – for theirs antiparticle);
2. a trion, (t^0), for the null electric charge particle case, or:
3. a trion (t^0) and a negatron (e^-), forming a "tetron": $T^- = t^0 + e^- + \sigma = t^0 + w^-$,

for non-nucleonic baryons, i.e: a positron attached to the neutral cluster M* core and two diametrically opposed negatrons revolved around the core, at the particle quantum volume surface, bound each of them to the core of M*-cluster by a σ-gluol.

The particle soliton model of degenerate electron cluster type is also in concordance with the theory of Olavi Hellman [76] which consider the particle intrinsic energy (mc^2)-equal to the total energy of a spin field expressed by the Ψ-wave function and interacting with the electro-magnetic field, according to the Schmidt model (1959) of the binary interaction between spin fields. This theory deduces the value of elementary particles mass, by a simplified relation:

$$M_p = \frac{K_m}{2\alpha} m_e; \quad \alpha = \frac{e^2}{hc} = \frac{1}{137}; \quad \mathrm{m_e} = 9.1x10^{-31} kg \tag{81}$$

with a tolerance under 1%, neglecting the electromagnetic field contribution, by integer values of K_m, as a multiple of the mass: $M_0 = 68.5m_e$; (K_m=3; 4; 14 for the mesons μ, π, K).

The concordance of Olavi Hellman's theory with the CF chiral soliton model of particle, results in our theory by the conclusion that the spinorial solitonic mass of electron is equal with its inertial mass, with the non-participation of the electromagnetic or spinorial field mass to its value, m_e.

By the value $m_e^* \cong 0.872\ m_e$ of the quasielectron mass, obtained in our theory, the basic neutral constituent with null spin and the mass closest to the value: M_0=68.5 m_e obtained by O. Hellman, is the neutral "zeron": $z^* = 78 \cdot m_e^* \cong 68\ m_e$, which may be considered a quasistable fundamental constituent of the elementary particles by a model of "cold genesis" of it, by very strong magnetic field vortex of a magnetar type star or equivalent.

By the basic z*-zeron it is possible also to deduce a quark model of cold formed particles with current mass of quarks, which gives the particle mass by the sum rule, considering as fundamental stable solitonic constituent of mesons and baryons, the "quarcin" $c_0^{\pm} = z^*/2 = 39 \cdot m_e^* \cong 34 m_e$, with $q^* = \pm{}^{2}/_{3}e$ and $S^*_c = ½\hbar$ - in free state, which can form derived quarcins, i.e: "quarkons", with odd number of $c_0^{\pm}$ – quarcins and "zerons": z, with even number of paired c-quarcins.

The resulted structure of the fundamental elementary particles, considered as formed "at cold" by quarks with current mass and fractional electric chargeq* = $(+{}^{2}/_{3}e;\ -{}^{1}/_{3}e)$, formed as prionic clusters, is given by the following sub-structures:

quarcins (S^{*}=½; q* =$\pm^{2}/_{3}$e):

$c_0^{\pm}$ =34m_e=(c_0^{0}+e^{*}); $c_1^{\pm}$= 3$c_0^{\pm}$ =102m_e; (pseudo-preons)

basic zerons (S*=0):

z*= (c_0+ $\overline{c}_0$) = 68m_e; z_1=2z* =136m_e; z_μ= (c_1^{-}+c_1^{+}) =3z*=204m_e

basicquarks (S*=½):

m_1^{+}= (z_1 -e^{*-}) = (136 -0.87)m_e =135.13m_e; (mark$_1$ -q* = +$^{2}/_{3}$e);

m_2^{-}= m_1 + e^{-}+σ =137.87m_e; (mark$_2$ -q* = -$^{1}/_{3}$e); $m_2^{-} \rightarrow m_1 + e^{-} + \overline{\nu}_e$;

Derived zerons (S*=0):

z_2 = (c_1^{-}+m_1^{+}) =237.13 m_e; z_3 = 2($c_1 \pm^{+} z_1$) =476 m_e;

z_4 = z_2+z_3 =713.13 m_e

Derived quarks (S*=½):

p^{+} =m_1+z_3 =611.13 m_e, (park- q*= +$^{2}/_{3}$e);

n^{-} =m_2+z_3 = 613.87m_e, (nark- q*= -$^{1}/_{3}$e);

λ^{-} = n^{-}+z_2=851 m_e, (lark- q*= -$^{1}/_{3}$e); s^{-} = λ+z_1 =987 m_e, (sark- q*= -$^{1}/_{3}$e);

$$v^{-} = s^{-} + z_1 = 1123 m_e, \ \left(\text{vark} - q^* = -\tfrac{1}{3}e\right);\ n \rightarrow p^{+} + e^{-} + \overline{\nu}_e$$

Elementary particles:

Mesons (S*=0): (theoretical masses) / (known masses); ($\overline{s} = s -$ antiquark)

μ^{-}= z_μ+e^{-}= 205 m_e / μ^{+}=206.7 m_e

$$\pi^{o} = m_1 + \overline{m}_1 = 270.26\ m_e \ / \ \pi^{0} = 264.2\ m_e$$

$$\pi^{+} = m_1 + \overline{m}_2 = 273 m_e \;/\; \pi^{+} = 273.2\ m_e$$

$$K^{+} = m_1 + \overline{\lambda} = 986.13\ m_e \;/\; K^{+} = 966.3\ m_e$$

$$K^{o} = m_2 + \overline{\lambda} = 988.87\ m_e \;/\; K^{o} = 974.5 m_e$$

$$\eta^{o} = m_2 + \overline{s} = 1124.87\ m_e \;/\; \eta^{0} = 1073\ m_e$$

Baryons (S*=½):

p_r^{+} =2p+n=1836.13 m_e; n_e=2n+p=1838.87m_e; /p_r^{+}=1836.1 m_e; n_e=1838.6 m_e

Λ^{o} = s+n+p=2212 m_e; / Λ^{0}=2182.7 m_e

Σ^{+} = v+2p=2345.6m_e; Σ^{-} = v+2n=2350.74m_e; / Σ^{+}=2327 m_e; Σ^{-}=2342.6 m_e

Σ^{o} = v+n+p=2348m_e; / Σ^{0}=2333 m_e

Ξ^{o} = 2s+p=2585.13 m_e; Ξ^{-}=2s+n=2587.87m_e; /Ξ^{o}=2572 m_e; Ξ^{-}=2587.7 m_e

Ω^{-}= 3v =3369 m_e; Ω^{-*}=2v+s=3233 m_e; / Ω^{-} =3278 m_e.

The difference between the obtained theoretical masses and the known experimental masses may be explained by the conclusion that the impact energy of particle forming from other particles, determine the transformation of some constituent γ*-degenerate gammons in ν_e -neutrins by the loss of the quantum volume energy; (sub-chapter 12 of the theory).

According to the theory, it result also the existence of the next baryon “resonances” as particles which could be formed also at cold:

Δ^{o} =2v+p =2857.13 m_e; Δ^{-} =2v+n=2859.87 m_e; (known mass: 2850 m_e), and: Ξ^{-*} = 3s^{-} = 2961 m_e; (known mass: 3004 m_e).

The way in which the real charge of the transformed particle is redistributed on the resulted particles was considered according to the quark theory, considering a fractional electric charge: $q^* = +({}^2/_3)e$, given to quark by a quasielectron and corresponding to a degenerate magnetic moment. The sum of the current quark charges and correspondent magnetic moments result as equal to the real charge: 0, e, 2e, and to the real magnetic moment of the initial particle, because that the impulse density of $\Gamma_\mu(e)$ -soliton vortex of the real elementary unpaired e-charge of the elementary particle is given as a sum of component vortexes corresponding to the component quark charges, according to the (c)-dependence:

$e \sim \mu_e(\Gamma_e) \sim \rho_\mu(a)\cdot c^2$; $(r_i < r \leq a)$, specific to the theory:

$$\rho_\mu \cdot c^2 \cdot (e) = \rho_\mu \cdot c^2 \cdot ({}^2/_3 n - m)\cdot e;\ \mu = (n\cdot\mu_p - 4.7\mu_N\cdot m)\ [\mu_N] \qquad (82)$$

where n; m-the total number of quarks and respectively-the number of quarks with negative charge, $(-{}^1/_3 e = +{}^2/_3 e - e)$.

From eq. (82) and the relation: $\mu_{ne}/\mu_{pr} \approx -2/3$ - resulted in the known theory of quarks, for the nucleons magnetic moments, it results that:

$$\mu_p = 8x4.7/15 \approx 2.5\ \mu_N;\ \mu_n = (\mu_p - 4.7\mu_N) \approx -2.2\ \mu_N.$$

By eq. (82), it can be explained also the fact that in the β^+disintegration the whole proton charge is emitted by a single lepton – the emitted positron.

It results also from eq. (82) that the cold genesis of baryons with more than three quarks is possible.

The previous pre-quantum CF model of particle, argues -also by eq. (82), the possibility of the cold genesis of particles, in very strong quantum vortices, the model not-being in disagreement with the chiral soliton quark models of the quantum mechanics, [77].

It result also-from the theory, that the charged $\mu^{\pm}$; $\pi^{\pm}$ mesons have a non-null pre-quantum spin: $S^*_{\pi} = (m_e/e)\cdot\mu_{\pi} = (\mu_{\pi}/\mu_e)\cdot S_e = 0.00185\ \hbar$, given by the intrinsic degenerate electron.

It can be observed also that-excepting the particles Σ and Ξ, the masses of the principal elementary particles can be found as cluster of zerons:

$z^* = 2c_0^{\pm} = \nu_{\mu}^* = 68m_e$, having the form:

a) $2^n z^*$, (n=1...5); b): $(3\ x2^n+n)\cdot z^*$, (n =1...3), c): $3x2^n z^*$, (n = 4) (83)

which indicates the tendency of smaller particles to form clusters in a a)-form:

a): n=1, $(m_{1,2})$; n=2, $(\pi^{0,\pm})$; n=4, (η^0); n=5, (Λ^0);

or triplets in b) – or c)-form:

b): n=0, $(\mu^{\pm})$; n=1, (z_2); n=2, $(K^{0,-})$; n=3, $(p_{r,}\ n_e)$;

c): n=4, (Ω^-); or: $(3x2)^n z^*$; n=2, $(\Sigma^{0,\pm}, \Xi^{0,-})$,

a tendency specific also to the quarks theory of the particle standard model.

According to the model, in weak interactions are transformed quarks: m_2; n^-; λ^-; s^- or/and v^- in their components, forming new particles, like in the examples:

a1) (Exp.): $\Omega^-(3v) \rightarrow \Xi^o(2s+p) + \pi^-(\overline{m}_1 + m_2) + Q$; (Q-the reaction energy);

(theor.): $2v^- \rightarrow 2s^- + 2z_1$; $v^- \rightarrow \lambda^- + 2z_1 \rightarrow m_2 + z_4 + 2z_1$; $2z_1 \rightarrow m_1 + \overline{m}_1$;

$z_4 \rightarrow z_2 + z_3$; $\overline{m}_1 + m_2 \rightarrow \pi^-$; $m_1 + z_3 \rightarrow p^-$;

$p^- + 2s^- \rightarrow \Xi^o$; $\Omega^- \rightarrow \Xi^o + \pi^- + (2z_1+z_2)$; $(2z_1+z_2) \rightarrow Q$;

a2) $\pi^+(m_1 + \overline{m}_2) \rightarrow \mu^+(z_\mu + e^+) + \nu_\mu$;

$m_1^+(z_1 - e^{*-}) + \overline{m}_2(\overline{m}_1 + e^+ + \sigma) \rightarrow 2z_1 + e^+ \rightarrow (3z^* + e^+) + z^*$; $\pi^+ \rightarrow \mu^+ + z^*$; $z^* \rightarrow \nu_\mu + Q$;

a3) $\Omega^-(3v) \rightarrow \Lambda^o(s+n+p) + K^-(\overline{m}_1 + \lambda)$; (a controversial reaction)

(theor.): $v^- \rightarrow \lambda^- + 2z_1$; $2z_1 \rightarrow m_1 + \overline{m}_1$; $\lambda^- + \overline{m}_1 = K^-$

$v^- \rightarrow n^- + (z_2+2z_1)$; $v^- \rightarrow s^- + z_1$; so: $\Omega^-(3v) \rightarrow K^-(\overline{m}_1^- + \lambda) + (s+n+m_1+z_2+3z_1)$.

Because that: $p^+ = m_1+z_3$, the reaction is possible if: $z_2 + 2z_1 \rightarrow z_3 + c_0^0$, and by: $m_1+z_3 \rightarrow p^+$, in the form:

$$\Omega^-(3v^-) \rightarrow K^-(\overline{m}_1^- + \lambda) + \Lambda^o(s+n+p) + (z_1+c_0^0);\ (z_1+c_0^0) \rightarrow Q,$$

but because that the z*-zeron is quasi-stable, the reaction probability is low.

In the strong interaction of particles, the conservation of the “strangeness” quantum number is equivalent to a law of quarks conservation which states that the quarks which enters in strong interactions are not transformed by weak interactions, but they can forms zerons with other quarks or combinations with quarks resulted – in form of quark-antiquark pairs, also from zerons of the polarised quantum vacuum, by the Q_i-interaction energy which transforms bosonic (zeronic) virtual $(q-\overline{q})$ pairs of the polarized quantum vacuum in real $(q-\overline{q})$ pairs by quarks separation, when $Q_i \geq E_q$-binding energy of $(q-\overline{q})$ pairs, like in the examples:

b1) $\pi^-(\overline{m}_1^- + m_2) + p_r(2p^+ + n^-) + Q_i \rightarrow \Lambda^o(s+n+p) + K^o(m_2 + \overline{\lambda})$;

(Experimentally evidenced as possible)

(theor.): $\overline{m}_1^- + p^+ + Q_i \to \overline{m}_1^- + (m_1+z_3) + Q_i' \cong \pi^0 + z_3 + Q_i' \to (s^- + \overline{s})$;

$s^- + n^- + p^+ \to \Lambda^o$; $\overline{s} + m_2 \to \eta^o$; – reaction theoretically permitted in the form:

$\pi^- + p_r + Q_i \to \Lambda^o + \eta^o$ with an ulterior transformation of η^o:

$\eta^o(\overline{s} + m_2) \to K^o(m_2 + \overline{\lambda}) + Q_e(z_1)$

b2) $\pi^-(\overline{m}_1^- + m_2) + p_r(2p^+ + n^-) + Q_i \to \Lambda^o(s+n+p) + \pi^o(m_1 + \overline{m}_1^-)$;

(Reaction forbidden by the law of strangeness conservation);

According to the theory, the reaction imply the transformations: $m_2 + p^+ + Q_i \to s^- + m_1$, which is in contradiction with the considered law of quark' conservation and with the fact that the reaction energy: Q_i, can form only $(q-\overline{q})$-pairs and all resulted quarks must be bounds in particles, so the reaction is not permitted by the proposed pre-quantum model of particles.

b3) $\nu_\mu + p_r \to \nu_\mu + p_r + \pi^+ + \pi^- + \pi^0$; (reaction mediated by neutral Z-boson-in QM)

According to the theory, the interaction energy generates real $(q-\overline{q})$-pairs from the polarized quantum vacuum zerons:

$$\nu_\mu + p_r + Q_i \to \nu_\mu + p_r + 2(m_1 + \overline{m}_1^-) + (m_2 + \overline{m}_2^-) \to \nu_\mu + p_r + \pi^+ + \pi^- + \pi^0.$$

So, the hypothesis of a neutral Z^0 boson of Q. M. is not strictly necessary for explain the particles cold forming and theirs interactions, the generating of particles with bigger mass than those of particles that enter in reaction being explained-in our theory, by the decomposing of quantum vacuum "zerons" of

m_z-mass and x_r = a-radius in real (q- $\bar{q}$)-pairs, by the Q_i – interaction energy, considered in quantum mechanics, when $O_i \approx E_q = m_z c^2$.

These “zerons” of ,quantum vacuum’ are – in our theory, a classic equivalent of bosonic background of “dark matter” and may be considered as bosonic m_z - particles with self-resonance, (oscillons), with a phononic intrinsic vibration energy of paired quarks given by: $E_v \cong (\Delta p \cdot \Delta x_v / \Delta\tau) < E_q$, ($E_q = m_z c^2$; $\Delta x_v \leq 2a$), ($\Delta\tau$; Δx_v -the self-resonance period and amplitude), which explains the existence of pseudo-virtual paired quarks and fermions in the “quantum vacuum”.

It results also the possibility of exotic particles cold forming as hexaquarks or nine-quarks clusters and the quark→fermion transforming, ($q^{+2/3} \to p^{+1}$), at T>>0, by the relative detaching and moving in the quark interaction quantum volume (Δa), of the un-paired quasielectron e^* whichgives its charge $e^{*\pm 2/3}$ and which is auto-transformed in this case in degenerate electron with e-charge (and degenerate magnetic moment and spin), according to CGT:

$q^{\pm 2/3} \to p^{\pm 1}$; ($e^{*\pm 2/3} \to e^{\pm 1}$, by the quantum medium negentropy).

1.14 The Strong Interaction of Quarks and the Proton Disintegration

The principal strong force necessary to keep quarks – formed as sub-clusters of quasielectrons, inside the “impenetrable” quantum volume of a particle is given – according to our CF chiral soliton model, by the gradient of a quantum and sub-quantum potential having the form (54). This potential is produced by the sum of $\Gamma_q^* = (\Gamma_\mu^* + \Gamma_A^*)$-vortices which acts upon the υ_q-volume of quark sub-cluster and respectively – upon theirs centrols.

For example, in the case of proton – having $n_q = 3$ quarks with a radius of approximate value: $r_q \cong 0.2$fm, [62], the kernel of p^+-quark located at a radial distance: $r_b = 2\, r_q = 0.4$fm from the other two quarks (n^- and p^+), is attracted in a strong interaction given by theirs Γ_q^*-quantonic vortices, by a potential having the form (54) and an approximate value:

$$V_s^q(r_q) = \tfrac{2}{3}(\upsilon_q/\upsilon_i)\cdot V_s(r_q) \cong -1.5\text{MeV};\ V_s(r) = V_s^0\cdot e^{-r/\eta'};\ V_s^0 = -118.4\text{MeV} \quad (84)$$

that permits the keeping of quark inside the "impenetrable" quantum volume of proton, if the proton were not vibrated with a vibration energy bigger than: $\in_p^0 = \frac{1}{2} m_p c^2 = 0.47$GeV, because that the energy of vexons destroyed by the vibrated particle kernel, actions against the kernel's tendency to penetrate the quantum volume. According to the CF particle model of the theory, this binding energy, V_s^q, of current mass quarks, is supplemented by the binding energy:

$$\in_q^\sigma = -n_\sigma\cdot\in_\sigma \text{ of: } n_\sigma \leq n_\sigma^0 = [(1/n_q)\cdot N^p]^{2/3} \cong 79 \text{ binding } \sigma\text{-gluols}$$

formed by the ($\overline{e}$ *-e*)-quasielectron pairs of quark interface, having:

$\in_\sigma = 2m_e^* c^2 = 889$ keV, these n_σ – gluols being-in our CF model, the pseudo-equivalent of "gluon" of the standard model, in accordance also with the observed correspondence between QCD and superconductivity which shows that the gluon-gluon attraction is similar to the electron-positron attraction.

In the case of an axial arrangement of quarks, it results by the model that:

$n_\sigma = n_\sigma^0$ and the deconfination temperature for the proton results of maximum value, according to the relation:

$$T_d = \in_q^\sigma / k_B = (79\text{x}0.889)\text{ MeV}/ k_B = 0.72\text{x}10^{12}\text{ K} \quad (85)$$

in accordance with the result of some experiments of collision between ionic fascicles at relativistic speeds, which evidenced the possibility of nucleon disintegration into mesons and leptons at a collision temperature: $T_n \approx 10^{12}$ ℃, [78], so the proton quarks are axially coupled.

The short lifetime of other baryons (10^{-10}s.), indicate-according to the model, that: $n_\sigma << n_\sigma^0$, i.e – a relative positioning specific to quarks vibration inside the baryon.

The fact that the proton disintegration with mass→energy transformation may occur usually at vibration energies exceeding the value: $m_p c^2 \cong 1$GeV in an einsteinian relativist expression, may be explained also -by the CF nucleon model of the theory, by the conclusion that – at a critical value: $\in^0_p \cong m_p c^2$ of the proton intrinsic vibration energy, its super-dense kernel having the mass: $N^p m_o$ can penetrate the nucleon quantum volume, causing its destruction.

The value of the energy necessary to nucleonic kernel for penetrate the proton impenetrable quantum volume, is quasi-equal to the kinetic energy of the $N^p m_0$ -cluster at speed $v_0 \rightarrow c$, in a classic expression permitted by eq. (27a), which gives an approximate value: $E_0 = ½N^p m_o c^2 \cong 0.11$MeV that is obtained by the proton's vibration with an energy: $\in^0_p = ½m_p.c^2 = 0.47$GeV and a critical frequency of its destruction: $\nu_c^0 = 1/\tau_c = c/a = 2x10^{23}$Hz -corresponding to the penetration of the proton quantum volume by its kernel.

The energy which must be given to the proton for its destruction is obtained by the relativist expression of mass: $m_p^r = m_p/\beta'$, given by (27b), with $v^0 \rightarrow c$, and corresponds to a proton energy value:

$\in^R_p = ½m_p^r.c^2 = 2\in^0_p = m_p.c^2 = 0.94$ GeV – equal with the intrinsic energy, which explains the proton destruction mechanism in concordance with the inferior limit of the proton destruction energy obtained by the quantum mechanics. By that, is explained in a non-contradictory manner, also the quasar energy generated by nucleon mass→energy transformation, by a quasar's nuclear temperature having the real value:

$T_N = \in_p^R/k_B \approx 10^{13}$ K – value that is more plausible than those imposed by the Big-bang model of Universe, (10^{14}K).

According to the theory and complying with the astrophysical hypothesis concerning the quasar energy generation by proton mass destruction, it results that the proton destruction presumes the existence of a high matter density of stars, which characterizes a high temperature, such as in case of a supernova, by a contained little star with a strong magnetic field by which can accumulate nuclear particles, i.e.: white dwarf, neutron star, black hole or magnetar star. This theoretical conclusion is in accordance with the fact that the ratio between the magnetic energy and the rotational energy is highest for quasars [79].

1.15 The Particles Disintegration

According to the CF-model of the theory, it results also that the fermions entropization at high temperatures with partial destruction, generate -by emission of quantons and sinergons of the perturbed quantum volume, a temperature-dependent mass decreasing and a pseudo-antigravitic field of a Q_a-pseudocharge having the expression (10) and a value proportional with the particle vibration energy: $\varepsilon_v = k_B T$. This theoretical conclusion may explain the observed temperature-dependent gravitational mass decreasing for which Shaw and Davy [80] obtained, with a relation of temperature-dependent gravitational force having the form:

$$F_G(T) = F_0(1 - \alpha T);\ F_0 = -G \cdot (M \cdot m)/r^2 \qquad (86)$$

a value of temperature coefficient: $\alpha = 1/T_G = 2.0x10^{-6}$ [K^{-1}], ($T_G = 5x10^5$K).

For the inertial mass was used a similar relation for the temperature-dependent mass of u – and d – quarks in the QMDTD model (quark mass density – and temperature-dependent), [81]:

$$m_q = \frac{B}{3n_B};\quad \mathrm{B} = \mathrm{B}_0\left(1-\frac{T}{T_c}\right)\quad \text{or}\quad \mathrm{B} = \mathrm{B}_0\left(1-\frac{T^2}{T_c^{\,2}}\right);\quad q = u, d; \tag{87}$$

where B is the vacuum energy density; B_0-parameter; n_B – baryon density; T_c- the quark deconfination temperature deduced from the thermodynamic QMDTD model, of value: $170\text{MeV}/k_B \cong 1.3x10^{12}$K, [81].

According to the theory, in accordance also with eq. (86), the attractive gravitational mass: M(T) is totally compensated at $T=T_G$ by an antigravitational pseudocharge: $q_a(T) = -M\cdot(T/T_G)$ given by partially destroyed sinergonic vortexes of destroyed vexons from the M-mass quantum substructure, as a result of a destructive intrinsic vibration of particle super-dense kernel, with the frequency:$\nu_v = k_BT/h$.

The observed relation: $T_G \ll T_c$ is done by the fact that -according to eq. (10), for a nucleon, for example, the value: $\phi_a(T_G) = 4\pi a^2\cdot\delta\rho_s^{\,a}c^2$ representing the flux of loosed sinergons necessary for compensate the attractive gravitic field, is much smaller than the flux of loosed quantons necessary for quarks deconfination, $\phi_h(T_c)$, resulted from destroyed intrinsic vexons, i.e:

$$\phi_a(T_G) \ll \phi_h(T_c) = 4\pi a^2\delta\rho_h^{\,c}\cdot c^2.$$

Because that the quantity of destroyed intrinsic vexons is proportional with the vibration energy: $\Delta m_pc^2 \approx k_s\cdot\varepsilon_v = k_s\cdot k_BT$, by a $k_s<1$ constant of subquantum medium negentropy, it is logical to consider a temperature-dependent decreasing of the inertial mass for all particles, in the form:

$$m_P(T) = m_P^0 - \Delta m_P(T) = m_P \cdot \left(1 - \frac{T}{T_c}\right); \quad \Delta m_P(T) = m_P^0 \cdot \frac{T}{T_c} \qquad (88)$$

T_c corresponding to a particle total destroying temperature, ($T_c = T_N \approx 10^{13}$K).

So, the quark deconfination of elementary particles by transformation of the neutral M*-cluster is achieved – according also to our CF model of particle having current mass quarks, by the vibration of the component quark cores, as in the case of a Skyrme chiral soliton model of baryons, constructed from a mesonic field and considered as a bound state of pentaquarks with individual and collective rotation and vibration, [82].

The eq. (88) shows also that – for "hot" confination of 2-3 quarks with constituent mass, the quark mass cannot exceed the formed particle mass, because that the mass defect given as difference between the constituent and the current quark mass, is liberated in the form of static quantonic pressure which acts against the quarks kernel in the sense of deconfination.

Complying with the a1-a4 axioms of the theory, the quark vibration destroys partially also the Γ_μ -quantum vortices, diminishing the strong interaction between the component quarks.

Because that the total intrinsic vibration of the M*-cluster logically depends on the vibration frequency of the quark cores by an eq. specific to phonons: $\varepsilon_v = n\, h\nu_i$, (n – the number of component quarks), in accordance also with eq. (88) we may consider also a temperature-dependent lifetime of the elementary particle: $\tau_k \sim 1/\Delta m_P(T) \sim (T_c/T)$.

Considering the $\mu^{\pm}$ -lepton, having a lifetime: τ_{μ} = 2.2x10^{-6} sec. [34], as single-particle cluster and taking into account that the majority of baryons-considered with n=3 quarks in the M*-cluster sub-structure, has a lifetime: $\tau_B \cong 10^{-10}$ sec. and the majority of mesons (n=2) has a lifetime $\tau_m \cong 10^{-8}$ sec. at the ordinary temperature: T≅ 300K of the particle medium, the lifetime of the elementary particles results-by the considered dependence: $\tau_k \sim 1/\Delta m_P(T)$, inversely proportional to the total intrinsic ε_v-vibration energy of the M*-cluster considered as oscillon with an intrinsic temperature $T_i \sim T$, according to an semi-empiric relation of approximation:

$$\tau_k = \frac{\tau^0}{k_v \cdot 10^{2n}} \approx \frac{\tau_0 \cdot m_p}{\Delta m_P(T)}; \qquad \tau^0 \cong 10^{-14}\text{sec.}; \quad k_v = \frac{\varepsilon_v}{\varepsilon_v^o} = \frac{n \cdot \nu_i}{\nu_c^o} = \frac{n \cdot T}{T_N}; \quad T_N \cong 10^{13}\text{K} \qquad (89)$$

in which: ν_c^0 and ε_c^0 represents the critical frequency and the critical phononic energy of particle vibration at which the proton total disintegration take place:

$\nu_c^0 = \nu_c(T_N \cong 10^{13}\text{K}) = 2\text{x}10^{23}$Hz, according to the theory.

The great stability of proton may be explained in the theory by the homogeneity and the continuity of the M*-cluster of degenerate electrons, which determine a low value of the particle intrinsic vibration energy.

As a consequence of eq. (89), when a particle pass with the v-speed through a quantum medium of the space, the dynamic quantum pressure generated in a relativistic way by the quanta and subquanta of this medium, has a cooling effect for the M*-particle cluster, which explain also the existence of polarized quantum vacuum bosons as metastable particles.

This phenomenon can be mathematically expressed considering an ε_v-energy of phonons associated to the particle intrinsic vibration, proportional with the intrinsic quantum temperature, T_q, and with the $P_c(v)$ -static quantum pressure inside the elementary particle, depending on the quantons brownian energy, and taking into account a ρ_c^0-density of quantons in the space of deplacing, according to equation:

$$\varepsilon_v(\mathrm{v}) = h \cdot \nu_i = k_p \cdot k_B T_q = k_p \frac{P_c(\mathrm{v}) \cdot m_h c^2}{P_c^0} \;; \quad P_c(\mathrm{v}) = P_c^0 - \frac{1}{2}\rho_c^0 \mathrm{v}^2 \;; \; P_c^0 = \rho_c^0 c^2 \qquad (90a)$$

which is equivalent with a relation for the intrinsic quantum temperature variation, of the form:

$$T_q(v) = T_q(0)\cdot(1-v^2/2c^2) = T_q(0)\cdot\beta'; \; k_B\cdot T_q(0) = m_h c^2 \qquad (90b)$$

similar to the Einsteinian relativistic relation: $T=T_0\cdot\beta$, but with β’ in the classic form (27b).

For eq. (90) it was considered the simplified form of the Bernoulli’s equation between the static and the dynamic quantonic pressures.

The k_p -constant depends on the “zeroth” intrinsic entropy of the particle. From eq. (89) and (90) it results that:

$$(91a) \qquad \frac{\varepsilon_v(\mathrm{v})}{\varepsilon_v(0)} = \frac{P_c(\mathrm{v})}{P_c^0} = \left(1 - \frac{\mathrm{v}^2}{2c^2}\right) = \frac{\tau_k(0)}{\tau_k(\mathrm{v})} \;; \quad \tau_k(\mathrm{v}) = \tau_k(0) \cdot \left[1 - \frac{\mathrm{v}^2}{2c^2}\right]^{-1} \qquad (91b)$$

The eq. (90), (91) explains in the theory, also the lifetime increasing for relativistic $\mu^{\pm}$-mesons or other relativistic particles with $v \to c$, the eq. (92b) being mathematically quasi-equivalent to the einsteinian relativistic relation used by Rossi and Hall, [83], but obtained without the einsteinian hypothesis of the speed-dependent lifetime dilatation.

Another argument which sustains the considered dependence of the particles lifetime on the intrinsic quantum temperature, T_q, is given by the fact that the lifetime of the neutral variant of a composed particle, (with quasi-null magnetic moment), is sensible smaller than the lifetime of the charged variant:

$$\tau(\pi^{\pm}) \cong 10^{-8}\text{s};\ \tau(\pi^{0}) \cong 10^{-16}\text{s};\ \tau(K^{\pm}) \cong 10^{-8}\text{s};\ \tau(K^{0}) \cong 10^{-10}\text{s};$$

$$\tau(\Sigma^{\pm}) \cong 10^{-10}\text{s};\ \tau(\Sigma^{0}) \cong 10^{-14}\text{s},$$

phenomenon explained in the model by the considered cooling effect of quantum dynamic pressure of the Γ_{μ} – magnetic moment vortex of particle chiral soliton. A possible analogy may be made with the solar-spots phenomenon.

1.16 Implications of the Theory in Cosmology

Logically, in the interstellary space, the un-compensed etheronic winds forming the gravitonic flux at the quanton surface and at the particle surface-generally, is a constant fraction of the local etheronic mean density of space, ρ_e^0. In this case, the value of G-gravitation constant results, according to eq. (26), proportional with the galactic matter mean density, matter which emits also etherons coming from the solitonic quantum-vortices of vibrated elementary particles-according to an etherono-solitonic theory of fields and particles.

This dependence may explain also the gravitic force decreasing during the Universe expansion after the supposed “big bang”, by the conclusion that simultaneously with the matter volume expansion was expanded also the quantum and subquantum medium volume.

In the standard Einstein-Friedmann cosmological model of the cosmic expansion, the etheronic density of space: ρ_e^0, may be identified with the “dark energy” of space: ρ_{Λ}^{*}, (“vacuum energy”), which is considered as the physical cause of the cosmic expansion explaining the correspondence between the

Einstein-Friedmann equations and the Hubble law of the Universe expansion: $v_R = H \cdot R$, (where H is the rate of expansion) by the cosmological constant Λ depending on ρ_Λ^* [84]:

$$3\frac{\ddot{a}}{a} = \Lambda c^2 - 4\pi G\left(\rho_m + \frac{3p_m}{c^2}\right) = -4\pi G\left(\rho_m + \frac{3p_m}{c^2} - 2\rho_\Lambda\right); \quad \rho_\Lambda = \frac{\Lambda c^2}{8\pi G} \quad (92a)$$

$$H^2 = \left(\frac{\dot{a}}{a}\right)^2 = \frac{8\pi G\rho_m + \Lambda c^2}{3} - k\frac{c^2}{a^2} = \frac{8\pi G(\rho_m + \rho_\Lambda)}{3} - k\frac{c^2}{a^2}; \quad \rho_c = \frac{3H^2}{8\pi G} \quad (92b)$$

where ρ_m and p_m are the mean density and pressure of the ordinary matter and radiation, Λ is the cosmological constant, possibly caused by the vacuum energy, G is the gravitation constant, k=1, 0, – 1 is the curvature, (according to whether the shape of the universe is hyperspheric, flat or hyperbolic respectively), a -is the scale factor ($a = R_{u(t)}/R_u^0$), c is the light speed and ρ_c is the critical density for which the Universe is flat (Euclidean): $\rho_c = \rho_m + \rho_\Lambda \cong 1.6\text{x}10^{-26}$ kg/m^3.

The Hubble's constant was estimated to the value: H=75Km/s·Mps by A. Sandage (1958, [94]) and to H=70.4 Km/s·Mpsby W-microwave anisotropy (2010).

It results also a proportionality of the local Λ-cosmological constant with the mean density of the matter, proportionality which can explain also the fact that the "vacuum energy" density and the cosmological constant results with different values calculated by the scalar field model of quantum mechanics for different scales of mass distribution.

1.16.1 A Hypothesis Concerning the Cause of the Cosmic Expansion

The observations made by the BOOMERANG project (1999), regarding the cosmic background radiation anisotropy, are indicates that the “concordance model” of the Universe is a flat Universe (k=0), filled with “dark energy” and corresponding to an Euclidean geometry, [85]. In accordance with the observational result regarding the redshift-magnitude relation of some supernovae, it proves also that the geometric space-time is flat and the measurements agrees with the relativistic cosmological model with $\Omega_\Lambda \approx 0.75$ and $\Omega_m \approx 0.25$, [86], according to the Einstein-Friedmann condition for a flat Universe filled with matter (ρ_m), with dark energy (ρ_Λ) and with 3K-radiation (ρ_R):

$$\Omega_m + \Omega_\Lambda + \Omega_R = \frac{\rho_m}{\rho_c} + \frac{\rho_\Lambda}{\rho_c} + \frac{\rho_R}{\rho_c} = 1; \quad \rho_c = \frac{3H_c^2}{8\pi G}; \ \Omega_\Lambda = \frac{\Lambda_0 c^2}{3H^2} \qquad (93)$$

that gives a value of the mean “dark energy” density:

$$\rho_\Lambda(R_L) = \Lambda c^2/8\pi G \cong 1.2\text{x}10^{-26}\ \text{kg/m}^3.$$

In accordance with the observations, $\Omega_m = (\Omega_{DM} + \Omega_M) \cong (0.2+0.05)$, in which Ω_M measures the mean density of the baryonic observed matter and Ω_{DM} measures the mean density of the hypothetical non-baryonic cold dark matter needed for satisfy the cosmological tests.

In 1985 there were significant arguments against the Cold Dark Matter model (CDM), referring mainly to the empty state of the voids – existent between the concentrations of the large scale galaxies, (Peebles, 1986, [87]).

Some theoretical models try to explain in what kind of structural forms it is possible to exist the “dark matter” and the “dark energy”, like in the case of the “quintessence” model (Caldwell, Dave’ and Steinhardth, 1998, [88]), which suppose the existence of some bosonic concentrations of matter and energy – forms which was not discovered yet.

An etherono-solitonic theory of fieds and particles which supposes alsothe existence of an gravitomagnetic field given by an etheronic pseudovortex of amagnetic potential: $A(\mu)$, allow the acceptance of the hypothesis of "quintessence" bosonic structures, in the form of a photonic energy, accumulated by a little "black hole" type star by its own gravitomagnetic field, but this model suppose or a cold non-emitting structure, which cannot contribute to the cosmic expansion force, or a hot structure, with photonic emission, that is-observable.

According also to eq. (88) of CGT, only a hot and visible cosmic structure can emit "dark energy" in a pulsatory way at $T \rightarrow T_c = 10^{13}$K and the emission can be modeled as that of a scalar field Φ_a with the energy density: $\varepsilon_\Phi = ½ |\nabla\Phi_a|^2$.

If we suppose that the "dark energy" emission forming the Φ_a-scalar field consist of an etheronic emission produced by entropized baryons vibrated at ultrahigh temperature inside ultrahot cosmic structures as the quasars, the galactic centers or the supernovae, according to an etherono-solitonic model of particle and by eq. (22) based on the LeSage's hypothesis concerning the etheronic cause of the gravitation it results by eq. (86) and (88) that this etheronic Φ_a-scalar field of the cosmic structures correspond to a pseudo-antigravitic field: $V_g^a(q_a, r)$ given by a pseudo-antigravitic charge, q_a, which results in theory as proportional with the intrinsic vibration energy and with the mass value, M, also for a multi-fermionic structure: $q_a \cong -M \cdot (T/T_G) \sim k_B T = \varepsilon_v$. So, according to CGT, q_a is given by sinergonic vortexes of fermionic vexons and by the pseudovortex Γ_A.

It results in consequence – by the theory, the conclusion that – at ultrahigh temperature inside an ultrahot cosmic structure, the antigravitic charge q_a can exceed the gravitic attractive charge: q_G=M, resulting a total gravitic charge:

$$q_{Gt} = (q_G + q_a) \cong M\cdot[1 - (T/T_G)] < 0 \text{ for } T > T_G \quad (94)$$

The total gravitic charge $q_{Gt} < 0$ generates an antigravitic force, F_{Gt} and an a_G - acceleration:

$$a_{Gt} = \ddot{r} = -G\frac{(q_G + q_a)}{r^2} = -G\frac{M}{r^2}\left[1 - \left(\frac{T}{T_G}\right)\right];\ T > T_G \quad (95)$$

Apparently, a total antigravitic charge q_{Gt} of a star results in contradiction with its gravitational relative stability. For a cosmic structure with black hole such as a Ia-supernova or a quasar, the attracted baryons (nuleons forming atomic nuclei) may have – at the black hole's surface, a high pressure/density and a high temperature $T \to T_N$, which determine the particle disintegration at its impact, according to CGT, (eq. (88)). If the mean flux of relativist particles which are destroyed is a little higher than the critical value Φ_0^a which cancel the M_G – gravitic charge of the black hole, the generated antigravitic charge of BH: $M_a = -k_a M_G$with $k_a > 1$, will determine the rejection of the matter and will cancel its cause, decreasing the M_a value at $k_a < 1$, and because that the induced acceleration and deceleration of particles, corresponding to $k_a < 1$ or $k_a > 1$, is realized quickly but gradually, it results that the antigravitic charge M_a of the BH is a pulsatory, oscillating charge, which not impede its growing and not affect its stability. It results also that the quasars, some supernovae of Ia type and the galactic centers with antigravitic charge, are pulsatile structures.

Also, if the central black hole is a rotational star of magnetar type, with a strong gravitomagnetic and magnetogravitic field: $a_{GM} \sim r^{-3}$ and $a_{MG} \sim r^{-4}$ –

according to eq. (41), (39), this field can exceed the resulted antigravitic field: $a_{at} \sim r^{-2}$, under a critical limit, r_l, continuing the cause of M_a – charge and explaining also the expansion of the Universe by the considered hypothesis of an antigravitic repulsion between antigravitic charges of ultrahot cosmic structures (quasars, galactic centers, Ia-supernovae), especially – of those existent in the central part of the Universe:

$$r< r_l \Rightarrow a_{GM}(r) = a_{GM}^0(r^0/r)^3 > a_{at}^0(r^0/r)^2$$

The hypothesis is in concordance with the high value for the quasar's redshift: $z = \Delta\lambda/\lambda = (2\div 6)$, (Fan et al., 2001) and for giant elliptical galaxies redshift: $z \cong 2$, because that Esthatiou and Rees (1988) showes that the value z=6 for quasars fits with the "dark energy" model (ΛCDM) if the quasar have a black hole mass $\sim 10^9 M_S$ (M_S-solar mass) in a dark halos with mass $\sim 10^{12}$ M_S, [89].

Considering the antigravitic repulsion between (pseudo) antigravitic charges of the ultrahot cosmic structures, it result that to the mean density of the visible matter: $\rho_M = \Omega_M/\Omega_m \approx (1/5)\rho_m$, corresponds conventionally a mean antigravitic charge density, ρ_a, and a total gravitic charge density: $\rho_{Gt} = (\rho_M+\rho_a)_R$.

The dynamics generated by the repulsive antigravitic charges of an expanding ellipsoidal quasi-flat Universe with mass: $M_{fRu} \sim 2R^0\cdot\pi R_u^2\cdot\rho_u$ for which the local mean matter density is: $\rho_m(R) \sim R^{-1}$, may be approximated by eq. (95) according to the Poisson's equation, if it is equivalent with a deformed sphericalUniverse, with $\rho_m'(R) \sim R^{-2}$ having the same mass with it for each R-radius, (fig. 13), i.e:

$$\begin{aligned} &M_{fR} \cong \int 2R^0 \cdot 2\pi R \cdot \rho_m(R)dR \cong \int 4\pi R^2 \cdot \rho_m{}'(R)dR = M_{sR} \quad \Leftrightarrow \\ &\Leftrightarrow \ \rho_m(R) = \rho_m{}^0 \cdot (R^0/R); \quad \rho_m{}'(R) = \rho_m{}^0 \cdot (R^0/R)^2 \end{aligned} \tag{96}$$

$$a_u(R) = \ddot{R} = -G\frac{4\pi R^3(\rho_m + \rho_R + \rho_a)}{3R^2} = (\mathrm{H}^2 + \dot{\mathrm{H}})\cdot \mathrm{R}\,; \quad \rho_{\mathrm{R}} = \frac{3p_R}{c^2} \qquad (97)$$

where: ρ_R; p_R – the space radiation density and pressure (mainly-of 3K), ρ_m – the mean matter density and v(R) = dR/dt = H·R, (i.e considering the Hubble law).

The eq. (97) is classically equivalent to eq. (92a) for the flat Universe (k=0) with negligible matter pressure, p_m, by: $|\rho_a| = 2\rho_\Lambda$, which is explained by the fact that ρ_a depends on the mean temperature of the Universe, $T_u(R)$ according to the eq. (95).

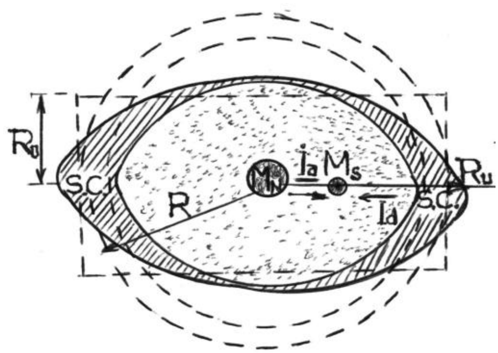


Fig. 13. *The expanding Universe' model.*

According to eq. (97), the Universe expansion is obtained by the antigravitic charge of the total matter given by the ordinary observed matter forwhich $\Omega_M \cong 0.05$and with $\Omega_\Lambda \cong 0.75$, in accordance with eq. (92), by $|\rho_a| = 2\rho^*_\Lambda$ and a mean temperature $T_M$of the visible matter, conform to:

$$\left|\rho_a^e\right| = 2\rho_\Lambda^* \cong \frac{\mathrm{T_u}}{\mathrm{T_G}}\cdot\rho_m^e = \frac{\mathrm{T_M}}{\mathrm{T_G}}\cdot\rho_M^e \approx 6\cdot\rho_m^e \cong 30\cdot\rho_M^e \qquad (98)$$

In this case, the "dark energy" pressure is explained by the baryonic antigravitic charge of ultra-hot cosmic structures as those of quasars, whose energy is explained by the disintegration of constituent baryons (nucleons) which gives an intense photonic but also etheronic emission – corresponding to a very high antigravitic (pseudo) charge-according to the theory. For example, because that the relative intensity of the gravitational force is $\sim 10^{-42}$, writing the electric field energy of electron in the form: $\in_E = ½\, a \cdot F_e(a) = m_e c^2$, for: $F_{ea} = -e^2/4\pi\varepsilon_0 a^2$ and $F_{eN} = -G \cdot m_e^2/a^2$, it results that the (electro) gravitic energy of the electron is:

$$\in_G = ½\, a \cdot F_{eN}(a) = m_e^2 G/2a, \text{ and: } \in_E/\in_G = \rho_a^0/\rho_g^0 = 2ac^2/m_e G = 4x10^{42}, \quad (99)$$

so the gravitic field energy of the m_e-gravitic charge is of $\sim 10^{42}$ times smaller than the etheronic energy contained by the sinergonic Γ_A -vortex of the particle magnetic moment: $\in_s = m_s c^2/2$, which is emitted at the particle disintegration, giving at the disintegration moment an antigravitic charge of $\sim 10^{42}$ times bigger than the m_g -gravitic charge, according to the theory. It is possible to explain in this case also the expansion of the outer layers of a supernova by the nuclear reactions generated at its kernel collapse, at $T \geq 10^{11}$K, (close to T_N).

At the same time, the hypothesis of cosmic expansion by repulsion between antigravitic charges of the ultra-hot cosmic structures, gives a physical justification for the supposed quasi-homogeneity of the hypothetical "dark energy" which generates cosmic expansion, by the natural tendency of a charge distribution to cancel the gradients of charge density.

1.16.2 A Phenomenological Model of the Cosmic Expansion

For a model of the Universe evolution, the Hubble's law of cosmic expansion: $v_R = H \cdot R$, even if it is confirmed for the case of our cosmic time: t_L and our location from the Universe centre: R_L, it may be a particular case.

A possibility to deduce this particular cosmologic case from a more general case of the Universe expansion-generated by repulsive antigravitic charges, according to the theory, is obtained considering a variation with the t_E -expansion time of the total mean gravitic charge density: $\rho_{Gt} = (\rho_M + \rho_a)_R$.

This variation can be approximated by a phenomenological model of the cosmic expansion [90] based on our pre-quantum theory of fields and particles, considering also a Macronucleus of Universe with a R^0 radius, having a macro-black-hole with a Macro-vortex around it and an Universe mass, M_{fR}, given by a local mean matter density: $\rho_m(R) \sim R^{-1}$, according to eq. (96).

This hypothesis results by the generalization of the a1-axiom for elementary particles, permitted as a consequence of ideal fluids classic mechanics, reconsidering also the hypothesis of a fractalic organization of the Universe by a “vortices cascade” process, (A. N. Kolmogorov et al. [91]).

The conclusion of the “black holes” forming in the early Universe is theoretically sustained also by other scientists [92] and the possible existence of a revolving axis of the Universe is suggested also by some observations concerning the rotation of the electromagnetic radiation polarization plane at cosmic distances, (John Ralston, Borge Nodland, [93]).

In the hypothesis of a variation of the etheronic pressure: $P_c(R) \sim [R^{-1} \div R^2]$ with the R-distance from the supposed Macronucleus – specific to a magneto-gravitic pseudo-vortex with similar density variation as the matter density, the gravity G – constant depending on the quantumpressure: $P_c(R)$ by the etheronic density, ρ_G^0, according to eq. (26), decreasesproportional with $P_c(R)$. Thus, close to the limit $R = R_u$ – considered as the structured Universe radius, the gravity force and the quantum vortices intensity becomes too weak for forming or conserving vortexial structures. In this case, we may consider that the zone:

$\Delta R_u \leq (3R_u/4 \div R_u)$ represent a zone of "stellar cemetery" (S. C.) in which the stellary structures disintegrates at the distance: $R_d \geq 3R_u/4$ and that the protons and the neutrons disintegrates at the distance close to $R = R_u$ -as a consequence of the decreasing of the nucleonic strong interaction potential, according to the CGT's pre-quantum chiral soliton model of particle.

This conclusion correspond – partially, to the Universe bubble model which conceive the Universe as being contained within a finite sphere which is an expanding bubble of space-time that has attained a radius of 14 billion l.y., considering that nothing exist beyond of this physical existence.

In the field of the Macronucleus, the disintegration of nucleons occurs also because a ultra-high nuclear temperatureclose to the critical value: $T_N \cong 10^{13}$ K, generated periodically by a big black hole -according to CGT.

The disintegration energy of the disintegrated vortexial structures would be emitted in all directions as intense stellary bosonic winds. For a position with $R > R_u/2$ of the cosmic body, these winds, along the radial direction, would exercise a pressure in the sense of slowing the Universe expansion, i.e. – slowing the advancing of the stellary structures towards the "stellar cemetery", (S. C.), case in which we may approximate the Universe expansion law by the equation:

$$v_e = \partial_t R = v_M \cdot \sin(\pi R/R_u);\ v_M \cong k_e \cdot c \qquad (100)$$

in which the maximum value, $v_M \cong k_e \cdot c < c$, was considered as the maximum speed of the Universe expansion, (a value: $k_e \approx 0.5$ corresponding to the redshift of the quasar 3C295: $v_q = 0.46c$).

According to the model, the Hubble law is valid in the zone of the local galaxy super-cluster (Virgo) and its surroundings, because that it may be regained from eq. (100) by the conditions:

$$R \leq R_L = (1/6)R_u \Rightarrow \sin(\pi R/R_u) \cong (\pi R/R_u) \tag{101}$$

which gives:

$$\frac{\pi R}{R_u} = \frac{v_e}{v_M} = \frac{H \cdot R}{k_e \cdot c}; \quad \Rightarrow \quad H = \frac{k_e \pi \cdot c}{R_u}; \quad R \leq R_u/6 \tag{102}$$

With the mean value: H_a =75Km/s·Mps, deduced by A. Sandage in 1958 [94] and by a plausible value: $k_e \approx 0.5$, it results from eq. (102) that: $R_u = 6.28 \times 10^3$ Mps, (27.3×10^9 l.y.) – of two times bigger than those deducted by the Big-Bang cosmological model of Universe, corresponding to an Universe filled with stars.

For a drifted body M_s, the expansion force, F_e, has – by eq. (100), the form:

$$F_e = F_a - F_d = M_s^* \frac{dv_e}{dt} = \frac{\pi \cdot k_e^2 M_s^* \cdot c^2}{2R_u} \sin\frac{2\pi R}{R_u}; \ R < \frac{4}{5}R_u; \ M_s^* = M_s^0 / \left(1 - \frac{v^2}{2c^2}\right) \tag{103}$$

in which F_a represent the accelerating force – given by the pressure of the stellary winds (mainly, sub-quantum winds) coming with the radial mean intensity I_a from the zone of the expansion center and F_d represent the decelerating force, given by the total pressure of the stellary winds coming with the radial meanintensity I_d from the C. S. – zone and by the resistance force to advancing, given by the density o the sub-quantum and quantum medium of the cosmic "vacuum". The mass: M_s^* represent the virtual mass given by the relativistic relation (27b) of the speed-depending mass apparent variation, the eq. (103) being in accordance with the linearized form of Einstein-de Sitter equation:

$$R_{ik} - \frac{1}{2} g_{ik} \cdot R + \Lambda \cdot g_{ik} = T_{ik} = 0$$

We may consider that the intensities I_a and I_d of the stellary winds generating the expansion force are given mostly by the sub-quantum component (by etheronic winds) that acts upon the mass M_s^*, so the expansion force, F_e, results conform to eq. (24) of the gravitation force, resulting that the maximum value of this force is given, for $R = R_u/4$, by the equation:

$$a_e^M = \frac{F_e^M}{M_S^*} = \frac{\pi \cdot k_e^2 c^2}{2R_u} = \frac{S_h}{m_h}(I_a - I_d)_{\frac{\pi}{4}} \cdot \cong \mathrm{k_h} \cdot \Delta \rho_g^M \cdot c^2; \quad \mathrm{k_h} = \frac{S_h}{m_h} \qquad (104)$$

With the gauge value: $k_h \cong 27.4$ [m^2/kg] resulted from the theory, considering that: $k_e \approx 0.5$, ($v_M \approx 0.5c$), it result from eq. (104) a value:

$\Delta\rho_g^M \cong 5.47 \times 10^{-29}$kg/m^3, and because that the mean etheronic density, ρ_s^M, which ensures the gravitational stability of the material structures without the contribution of a gravitomagnetic field, in the intergalactic space must be with at least two size order bigger, it results bigger than the matter mean density:

$$\rho_s^M > 10^2 \cdot \Delta\rho_g^M = 5.47 \times 10^{-27} \text{kg/m}^3 > \rho_m \cong \Omega_m \cdot \rho_c \cong 4 \times 10^{-27} \text{ kg/m}^3,$$

so – corresponding to the mean “dark energy” density value deduced in accordance with cosmological observations [86]: $\rho_\Lambda \cong 1.2 \times 10^{-26}$ kg/m^3.

For a pair of quantons, in our galaxy ($R=R_l$), because the very small quanton radius, the gravitonic component: $\rho_g^h(m_h)$ which gives the G-value by eqs. (25)-(26) may be considered approximate equal to the value $\Delta\rho_g(R_l; G)$, i.e: $\Delta\rho_g(R_{l,} G) = \Delta\rho_g^M \sin(2\pi R_l/R_U) \approx \Delta\rho_g^h(m_h) = 1.24 \times 10^{-29}$kg/m^3, so G_M corresponds to: $G_M(R_U/4) = 4.45G$ and to: $R_l = 3.64 \times 10^{-2} R_U$ -for the position of our galaxy.

The increasing of the expansion force F_e until the maxim value F_e^M is explained in the model by the increasing of R-depending number of dark energy sources which generates the $I_a(R)$ intensity, (i.e. with pulsatory antigravitic charge), contained by the $S_U(4\pi R^2)$ sphere of Universe, (eq. (96)). The recently observed distribution of quasars in the Universe sustains the previous explanation looking the "dark energy" provenience.

The estimated value for ρ_Λ^* gives an important effect of "radiation aging" which may explain the Olbers paradoxe and which contributes to the total redshift effect, according to equations:

$$\Delta E_v = h\cdot\nu_I - h\cdot\nu_f = F_f\cdot\Delta R = ½k_h\cdot m_f\cdot\rho_s\cdot c^2\cdot\Delta R = ½k_h\cdot\rho_s\cdot h\cdot\nu_i\cdot\Delta R \quad (105a)$$

$$\nu_f = \nu_i\cdot(1 - k_h\cdot\rho_s\cdot\Delta R);\ z_a = \Delta\nu/\nu_f = ½k_h\cdot\rho_s\cdot\Delta R/(1-½k_h\cdot\rho_s\cdot\Delta R); \quad (105b)$$

Considering the position of the local supercluster of galaxies (Virgo) at $R_V = R_l \approx 3.6\text{x}10^{-2}R_U$, it results from eq. (105b) the condition to receive photonic radiation from the margin of the stellary Universe considered at $R_M = ¾R_u$, according to the model:

$$\Delta\nu/\nu_i<1 \Rightarrow \rho_s^c<2/k_h\cdot\Delta R = 4.4\text{x}10^{-28}\ \text{Kg/m}^3;\ (\Delta R = R_M-R_V = {}^5/_8R_u;\ k_h=27.4) \quad (106a)$$

From eq. (106) it results the conclusion that – because the resulted condition: $\rho_s^M > \rho_M \cong 6\text{x}10^{-28}$ kg/m^3, we cannot receive photonic radiation from the margin of the stellary Universe, with: $\rho_s \cong \rho_\Lambda \cong 1.2\text{x}10^{-26}$ kg/m^{3}resulting that the maximal distance $\Delta R_c$from which we can receive photonic radiation is given by:

$$\Delta\nu/\nu_i = 1 \Rightarrow \Delta R_c = 2/\ k_h\cdot\rho_s = 6.08\text{x}10^{24}\text{m} = 6.4\text{x}10^8\ \text{l.y.} = 2.36\text{x}10^{-2}\ R_u. \quad (106b)$$

Comparing the z_a redshift with the redshift given by relativistic Doppler effect: $z_r = [\sqrt{(1+v/c)}/\sqrt{(1-v/c)}] -1 \approx H\cdot\Delta R/c$, with: $\rho_s \cong \rho_\Lambda \cong 1.2\text{x}10^{-26}$ kg/m^3, for: $\Delta R = 10^{-2}R_u$, we have: $z_a \approx 0.424/(1-0.424) = 0.73$ and $z_r \approx 0.0158$, so it results that the redshift z_a given by the "tired light" effect is much greater than the redshift z_r given by the Universe inflation – in accordance with the conclusions of "sub-quantum kinetics" theory of Paul LaViolette which showed (1987) that the tired-light model fits observational data better than the "expanding Universe" model, as showed also Tolman (1985).

Because that there are many visible galaxies with the red-shift of 1.4 or higher, it exists the tendency to consider that these galaxies are traveling away at speeds greater than the light speed, c. The eq. (105) may explain the phenomenon as "aging radiation" effect, explaining similarly also the high value of the red-shift observed to distant supernovae (of Ia type).

It results also that the high value of some quasars redshift: z =4, (v_m= 0.92c -1986) and z = 6.3, (v_m=0.92c -2001) is given by an intense "tired light" effect generated partially by the density of quantum and sub-quantum medium, increased by the strong magnetic field of a rotational (Kerr – type) "black hole" and by the gravitational attraction of it.

Also, the proposed inflation scenario based on the antigravitic charge model of the theory, eliminates the hypothesis of "inflaton", (quanta-particle which generates the inflation field).

Because that the density of the un-compensed etheronic winds, $\Delta\rho_g$, acts as a gravitic flux: $\Delta\varphi = \frac{1}{2}\Delta\rho_g c^2$, generated by a total mean gravitic charge density: $\rho_{Gt} = (\rho_m + \rho_a)_R$ of the Universe mass $M_u(R)$, by eqs. (97) and (103), neglecting the value of space radiation density ρ_R it results also that:

$$a_u(R) = \ddot{R} = \frac{k_e c \cdot H}{2}\sin\frac{2\pi R}{R_u} = -\frac{4\pi G}{3}(\rho_m + \rho_a)_R \cdot R; \quad \mathrm{R} < \frac{3\mathrm{R_u}}{4} \qquad (107a)$$

The variation of the mean total gravitic charge density of the Universe mass, $M_u(R)$, given by the Universe expansion, result from eq. (107), in the form:

$$\rho_{Gt}(R) = (\rho_m + \rho_a)_R = -\frac{3k_e cH}{8\pi G}\cdot\frac{1}{R}\sin\frac{2\pi R}{R_u}\ ; \quad \rho_a = -\frac{\mathrm{T_u}}{\mathrm{T_G}}\cdot\rho_{\mathrm{m}};\ \mathrm{R} < \frac{3\mathrm{R_u}}{4}; \qquad (107b)$$

Also, because that by eq. (99), for v(R) ≈ H·R, ($R \le R_u/6$) we have: $|\rho_a| = 2\rho_\Lambda^* \approx 6\rho_m$, it results that: $R_l \le R_u/6 \Rightarrow T_u \approx 6\, T_{G(Ru/2)}$, for: $H = H_a$,

the eq. (107a) becoming:

$$a_u(R) = \ddot{R} \approx H_a^2\cdot R = -\frac{4\pi G}{3}(\rho_m + \rho_a)_R\cdot R;\ \Rightarrow\ \rho_{\mathrm{m}} \approx \frac{3H_a^2}{20\pi G} \approx 4.23x10^{-27}\,kg \quad (108)$$

and: $\rho_\Lambda^* \approx 3\rho_m \approx 1.27x10^{-26}$ kg – in accordance with the known estimated value: $\rho_\Lambda \approx \Omega_\Lambda\cdot\rho_c = 1.2x10^{-26}$ kg. The equality: $\rho_m(R_u/2) = -\rho_a(R_u/2)$ resulted from eq. (108) is explained conforming with eq. (86):

$$\rho_m(R) \le -\rho_a(\mathrm{R}) \quad \Leftrightarrow \quad T_u \ge T_G(\mathrm{R_u}/2);\quad \mathrm{R} \le \mathrm{R_u}/2 \qquad (109)$$

The value $\rho_a \equiv 0$ correspond in the model to the “thermal death” of stars.

It results also, from the model, that the existence of “dark matter” in the galactic space may be in the form of zeronic (q- $\overline{\mathrm{q}}$) – pairs which forms the bosonic field of quantum vacuum, explaining the process of bigger mass particle forming by the interaction energy of particles with smaller mass.

Because the proportionality between the matter density and the subquantum and quantum medium density inside a Metagalaxy, it results also that the formation of individual CF-particles by the polarization of quantum vacuum in the form of bosonic (q- $\overline{\mathrm{q}}$) oscillonic pairs is possible only inside a galaxy and is not possible in the intergalactic zones, where the mean value of matter density is too low for this process – according to CGT.

Relative to the Universe structure, a consequence of a1-axiom generalization is the fact that the vortices cascade fractalic organization of the Universe is governed by the similitude principle by which may be argued also the existence of a similitude between the Kant-Laplace genesis mechanism of a planetary system and a vortexial mechanism of the Universe genesis, presuming the formation in a similar way, at a critical vortexial speed of the transformed protomatter, of material rings forming further planets and respective-of meta-haloes ("layers") formed from galaxies assemblies, discovered in the form of a quasi-regular three-dimensional network of superclusters of galaxies and voids [95], with regions of high density separated by a distance of 120Mpc. on a distance of $7\cdot10^9$ l.y., ($\sim{}^1/_4R_U$).

This similitude results from the generality of the vortexial movement also to the Universe scale and may be better understood by the fact that the relation Titius-Bode referring to the distance between Sun and a planet:

$$d = 0{,}4 + 0{,}3\text{x}2^n \text{ (u.a); } (n=-\infty,\ 0,1,2,...7); \tag{110}$$

(u.a. – astronomical unit), can be explained using the Kant-Laplace theory (1755 and 1796) about the genesis of the Solar System, theory which assumes that the planets arises in the vortex cores of some material "rings" separated successively from a rotating proto-planetary nebula, (fig.5).

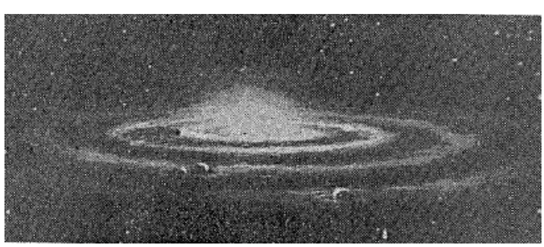


Fig. 14. *The Solar system forming.*

The Kant-Laplace's model of the Solar System forming seems to be confirmed by the discovery in 1992 of a proto-planetary system around the Beta Pictoris star, that is surrounded by a disk of cosmic dust of 360 u.a.

The known explanation of the Titius-Bode relation assumes a specific distribution of the vortex centers which generated the planets. It is well known the theory of Karl Weizsacker (1944) who proposes the empiric relation:

$$r_n = r_0(1{,}894)^m,\ \text{with: } r_0 = 0{,}3\ \text{u.a.};\ m=0,\ 1,\ldots 8 \qquad (111)$$

which was amended by Chandrasekhar (1946), D. der Haar (1950) and by V. Vilcovici (1954) – which used the Kant-Laplace hypothesis completed by V. G. Fesenkan.

Based on the mentioned similitude, we may consider that the proto-solar nebula had – excepting a little central part, a rotation speed $\omega \cdot r = v_\omega$ – constant, this speed being kept after its dividing into proto-planetary material rings, by the kinetic energy preserving for the nebular particles circulated on the quasi-tangential direction of the rotation: $m_p v^2_\omega/2$ = constant. A constant rotation speed: $v_\omega = \omega \cdot r$ is specific to galaxies, such as M33 or NGC5055, for example, and was observed also to some star swarms with expanding periphery.

We may suppose by CGT the existence of a galactic quantonic vortex and a "dark matter" vortex around of a central super-black hole, but we observe also that if $\rho_m = \rho_M + \rho_{DM} \sim r^{-1}$, the eq. (96) may explain also the galaxy rotation law: v^2_ω =ct., by:

$$M_{(R)} \cong \int 2R_0 \cdot 2\pi R \cdot \rho_m(R) dR \approx 4\pi R_0^2 \rho_m^0 \cdot R \quad M_{(R)} \cong \int 2R_0 \cdot 2\pi R \cdot \rho_m(R) dR \approx 4\pi R_0^2 \rho_m^0 \cdot R$$
$$(\rho_m(R) = \rho_m^0 \cdot (R_0/R);\ \ R >> R_0) \quad \Rightarrow \quad (\rho_m(R) = \rho_m^0 \cdot (R_0/R);\ \ R >> R_0) \quad \Rightarrow \qquad (112)$$

For the solar system, having: k – the proto-planet number in the sense of its distance until the Sun, the material ring of the rank 'k' is stabilized – according to the hypothesis, at a distance R_K given by the dynamic equilibrium between the gravitational attracting force exerted by the nebular rest M_{N-K} (remained after detaching the material ring of rank k) and the centrifugal inertia force:

$$G\frac{m \cdot M_{n-k}}{R_k^2} = \frac{m.\mathrm{v}_\omega^2}{R_k}\text{ ,(Mn – the initial nebulary mass),} \tag{113a}$$

$$R_k = \frac{G}{\mathrm{v}_\omega^2}M_{(N-k)} = \lambda \cdot M_{(N-k)}; \quad \lambda = \frac{G}{\mathrm{v}_\omega^2} \tag{113b}$$

Having k=9, it results $R_9 = \lambda \cdot M_{N-9}$, but: $M_{N-9} = M_0+M_1+M_2+...+M_8$, with λ=constant -according to eq. (112), so -generally:

$$R_K = \lambda \cdot M_{N-K} = \lambda .\ (M_o+M_1+M_2+...+M_{K-1})\ [\text{a.u.}] \tag{114}$$

On the other side, according to the Titius-Bode relation, we may write:

$$R = 0,4+ 0,3 \text{ x } 2^{K-2} = 0,1+ 0,3 \text{ x } (1+2^{K-2})\ [\text{a.u.}] \tag{115}$$

From the relations (114) and (115) it results in consequence that:

$$\begin{aligned}
&R_1 = 0,4 = \lambda \cdot M_0 \\
&R_2 = 0,4 + 0,3 = \lambda \cdot (M_0 + M_1) \\
&R_3 = 0,4 + 0,3 + 0,3 = \lambda \cdot (M_0 + M_1 + M_2) \\
&R_4 = 0,4 + 0,3 + 0,3 + 0,6 = \lambda\,(M_0 + M_1 + M_2 + M_3) \\
&... \\
&R_K = 0,4 + 0,3\,(1 + 1 + 2^1 + 2^2 + ... + 2^{K-3}) = \lambda \cdot \Sigma M_{K-1} \\
&... \\
&R_9 = 0,4 + 0,3\,(1 + 1 + 2 + 2^2 + ... + 2^6)\,[\text{a.u.}]
\end{aligned} \tag{116}$$

i.e: $M_o = \frac{0,4}{\lambda}; M_1 = \frac{0,3}{\lambda}; M_2 = \frac{0,3}{\lambda}; M_3 = \frac{0,6}{\lambda}; ....M_9 = \frac{0,3}{\lambda} x\, 2^7;$

or – generally:

$$M_1 = \frac{0,3}{\lambda}; \quad M_K = \frac{0,3}{\lambda} x\, 2^{K-2} = 2x\frac{0,3}{\lambda} x\, 2^{K-3}\text{ , for: } k \geq 2 \tag{117}$$

The interpretation of eq. (117) is that the protoplanetary material rings were formed by the halving of the nebular mass that remained after the initially forming of the proto-solar mass M_0 (the nebular nucleus).

It is presumed also that from the proto-planetary ring material has been formed more proto-planets or pseudo-planets but after the dissipation of the non-confined matter, remained to stable orbit only those with dynamic equilibrium to the radial direction. In this case, the natural satellites (Moon, Titan etc.) of the planets, might represent independently formed planets, which, meeting the bigger planet (found on an orbit of a stable dynamic equilibrium) have been attracted and kept around it on a stable orbit.

The previous conclusions may be generalized for the expansion of galaxies superclusters and of the Universe by considering an initially rotated proto-supercluster of galaxies of quasi-cylinder form (barrel-like) which was split in annular meta-layers of galaxies assemblies according to eq. (112), forming structures of cosmic, "bubbles" inside our Universe, with galaxies expanded by the antigravitic charge of at least one (super) quasar, (eqn. (95)).

This generalization is in accordance with the Fractal cosmology and with the fact that the polarization of the cosmic microwave background radiation suggests an inflationary model for the early Universe.

1.16.3 Gravistars as Primordial Genesic Structures of the Protouniverse

Relative to the Protouniverse structure, the generalization of a1-axiom permits-by the similitude principle, an anisotropic model of "gravistar" considered as a hard-core rotation ellipsoid of "dark energy" with vortexially generated "dark photons" and "dark particles" formed as Bose-Einstein condensates at distinct levels of density. This possibility is argued also by the model of "gravastar" with very cold core formed by a "dark energy" fluid, which may create Bose-Einstein condensate in the outer core, [55], but which suppose an existent central "black hole". In the proposed model of hard-core gravistar, the "gravitational vacuum" region specific to a "gravastar", not exists, because that the quasi-stability of the hard-core deformed ball of "dark" enery, forming a relativist vortex of quantons:$\Gamma_\mu=2\pi r\cdot v_c$, ($v_c \to c$), is given-in the proposed model, similarly to the electron case, by a quantum potential, $V_\Gamma(r)$, which satisfy the stability condition in agreement with a NLS equation of (33a) – form, in which: $i\hbar\cdot(\partial\psi/\partial t) = 0$, (null variation with time of $\rho_c(r)$ by expansion or contraction), i.e.:

$$V_\Gamma(r)=V_\Gamma^0|\Psi|^2 = -\frac{\delta\upsilon_c}{2}(\rho_c v_c^2)_r = -\frac{\delta m_p}{2}v_{pt}^2\ ;\ \delta m_p = \delta\upsilon_c\cdot\rho_p\ ;\ |\Psi|^2 = \frac{(\rho_c)_r}{(\rho_0)_0} \quad (118)$$

In eq. (118), $p_c(r) = (\rho_c v_c)_r$ is the impulse density of the relativist quantonic component of the "dark energy", forming the gravistar vortex:

$\Gamma_G = \Gamma_\mu + \Gamma_s$ of quantons and sinergons, in which a δm_p – mass of vortexially formed "dark" photons or of "dark" particles, is attracted until a tangential v_{pt}-speed satisfying the eq. (118) for which the δm_p – particle remains at the same r-distance from the gravistar center. This Γ_G-vortex is resulted initially as a small perturbation which may generate electronic neutrinos by quantons confination and thereafter – massive neutrinos with own magnetic moment given by the Γ_G – vortex, at values of the dark energy density: $\rho_c \geq \rho_a^0 = 5.17\text{x}10^{13}\text{kg/m}^3$, (equal to those of a proto-electron).

The force resulted from the V_Γ potential: $F_\Gamma(r) = \nabla_r V_\Gamma(r)$, is given by the dark energy pressure gradient, in accordance with the Bernoulli's law for ideal fluids considered in the simplest form:

$$P_s(r) + ½ (\rho(r)\cdot v_c^2)_r = P_s^0(r); \qquad (119)$$

with $P_s^0(r)$ – pseudo-constant on short δr distances.

The sinergonic component of the primordial energy, forming a pseudo-vortex: $\Gamma_s = 2\pi r\cdot w$, ($\sqrt{2}c \geq w > c$), gives a gravito-magnetic force: $F_{gm}= \nabla_r V_{gm}(r)$ acting over quantons, but for maintain the quanton with the speed $v_{ct} \approx c$ to a vortex-line $l_r = 2\pi r$ without other forces, is necessary – according to eq. (118), a sinergonic density of Γ_s: $\rho_s \approx \rho_h = \rho_c^M = 8.8\text{x}10^{23}$ kg/m^3, (i.e-impossible), so the force which ensures the gravistar forming is given by a stronger force, as in the electron genesis case, i.e: as those generated by the quantum pseudomagnetic potential given by eq. (47): $Q_G = -\mu_c\cdot B_S(r) = -\mu_c\cdot k_1\cdot\rho_s^* c$, which maintain the quanton with $v_{ct} \approx c$ to the vortex-line at: $\rho_s^* \rightarrow \rho_a^0 = 5.17\text{x}10^{13}$ kg/m^3 and $Q_G = -h/2$, according to CGT.

The forming of the sinergonic Γ_S-vortex (fig. 15) is given by the gravitic force $F_{gs}=\nabla V_{gs}$ of the gravistar core M_0 of R*-radius, acting over sinergons.

According to eq. (14), the gravitic force F_{gs} necessary for maintain sinergons to a given vortex-line, l_v, in particular -at the surface of the star hard-core considered as compact cluster of neutrons of m_n-mass, for which:

$$\rho_g(R^*) = \rho_g^0(a)\cdot(M/m_n)\cdot(a/R^*)^2 = 1837\rho_g^e\cdot(R^*/a) \approx 1.61\text{x}10^{-11}\cdot R^*[\text{kg/m}^3] \qquad (120)$$

is given for a gravitation constant $G^* \approx G$ and $\rho_g^e(a) \approx 1.24\text{x}10^{-29}$ kg/m^3, (CGT), according to equation:

$$F_{gs} = -2\cdot(4\pi\, r_c^2\cdot\rho_g c^2) = -2G^*(m_c M_0/R_e^2) = -m_c c^2/R_e;\ \rho_g = \frac{m_e}{8\pi R_e r_c^2} = \frac{\rho_c^M r_c}{6R_e} \qquad (121)$$

With $m_c=m_s$ and the values: $r_c=r_s \approx 10^{-28}$m and $r_h/r_s \approx 10^3$, obtained in CGT, it results according to the theory, that $\rho_g^0(R^*)$ necessary by eq. (121) for maintain vortexed sinergons is smaller than $\rho_g^{0\prime}(R^*)$ necessary for maintain quantons to the M_0-core surface, for which eq. (121) with $r_c=r_h$ and $m_c= m_h$ gives:

$$\rho_g^{0\prime} = 1/(2k_hR^*) \approx 1.8\cdot 10^{-2}/R^*, \ (\rho_g^{0\prime} \approx (r_h/r_s)\ \rho_g^0). \qquad (122)$$

So, the M_0 hard-core is formed gradually, by quantons and thereafter by "dark" photons confining, the vortex Γ_c of quantons being formed after the pseudovortex Γ_s of sinergons, with the contribution of the Q_G -potential.

It results also that the growing of the M_0 hard-core increased also the density of vortexed sinergons and quantons at its surface until values of "dark" photons and electrons cold genesis: $\rho_{\Lambda v} \approx 3.7 x 10^4 Kg/m^3$, respective: $\rho_{\Lambda e} \approx 5x10^{13} Kg/m^3$, which corresponds by eq. (25) to specific values of ratio:$(M_0/R^{*2}) = \rho_g^0 \cdot (k_h c^2/G^*)$, depending on the gravitation constant, $G^* \geq G$.

At $\rho_s^* \rightarrow \rho_{\Lambda e} \approx \rho_a^0$, as gravistaric "seeds" it could be also cold clusters of individually formed electrons by Γ_G – vortexes, in accordance with eq. (47).

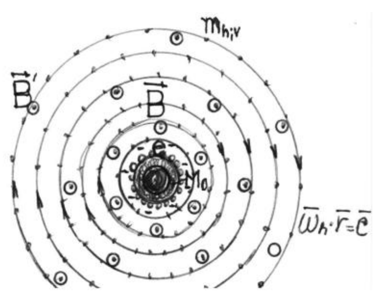


Fig. 15. *Gravistar model.*

Considering a zone $\Delta R = R_0 \div R_G$ of quantum equilibrium, i.e having the entropy per quanton:

$$\varepsilon_h(r) = \gamma \cdot (k_B/\hbar) \cdot S_h(r), \ (S_h(r)=2\pi r \cdot m_c c) \qquad (123)$$

the variation of the “dark energy” impulse density results-in our model, by the similitude principle, as in the electron’s case, (eq. (32)), i.e with exponential variation of the quantons energy forming dark photons in the gravitic and pseudomagnetic field of the gravistar, with: $\rho_c \sim e^{-(r-R^*)/\eta}$ in the zone with formed dark photons of the formed gravistar having the effective R_G radius, and $\rho_c' \sim r^{-2}$ in the outer zone, $r > R_G$.

The dark photons are formed vortexially, according to the model, by the ξ_B vortex-tubes of the hard-core magnetic induction $\mathbf{B}_\mu(r) \sim k_1 \nabla \rho_s c$, in form of vectorial photons (initially-vectons) and these ξ_B vortex-tubes favored the negatrons and other particles forming – being vortexially more stable than theirs antiparticles, explaining the spontaneous symmetry breaking in the particles genesis process and theirs magnetic moment anomaly: $\left(\mu_m - \mu_{\bar{m}}\right) \sim m$, [96].

It results also that the formed electrons gives a negative electric charge to the gravistar’s kernel.

The dynamic equilibrium between the pseudomagnetic and the centrifugal potential, i.e:

$$Q_G = Q_G^0 \cdot e^{-\frac{r-R^*}{\eta}} = -Q_{CF}\,; \Leftrightarrow \mu_v \cdot B_c(r) = \mu_v \cdot k_1 \rho_c^* c = ½ \cdot m_v v_f^2\,;\ \ \mu_v \rho_c^* = \mu_v^0 \rho_c^0 \cdot e^{-\frac{r-R^*}{\eta}}\,;\ Q_G^0 = -½ \cdot m_v c^2 \quad (124a)$$

is realised for vortexially formed vectorial photons with $\boldsymbol{\mu}_c \uparrow\uparrow \mathbf{B}_S$ and a square tangential speed: $v_f^2 = v_0^2 \cdot e^{-(r-R^*)/\eta}$. For: $\rho_c^* = \rho_c^0(R^*) \rightarrow \rho_a^0(a) = 5.17 \times 10^{13}$ kg/m^3, it results:

$$\mu_v = 3 \cdot 10^{10} \mu_h = 4 \times 10^{-36} \text{A/m}^2. \text{ Generally, } (v_f^2)_e = 2\mu_v k_1 \rho_c^* c/m_v.$$

Also, the r^*-value of forces equilibrium results by eq.:

$$F_{GM} = \nabla Q_G(r^*) = -\eta^{-1} \cdot Q_G(r^*) = m_v v_f^2/r^* = -2Q_G(r^*)/r^*; \Leftrightarrow r^* = 2\eta \quad (124b)$$

r^* being a pseudomagnetic equivalent of the gravitational Schwarzschild radius.

The proportionality $\mu_{v(w)} \sim m_{v(w)}$ until the semigammon ($m_w = m_e$), results by the conclusions of eq. (4) that in a vectorial photon all quantons are circulated in the same sense. Also, eq. (124b) explains the gravistar hard-core gradual growing.

The vectorial photons with $\boldsymbol{\mu}_c \uparrow\downarrow \mathbf{B}_S$ or higher $v_f(r)$, are removed from the gravistar volume with a speed given by the Γ_s -pseudovortex, the parallely oriented vectons generating an E-field correspondent to a q-charge of the rotated M_0-hard core which generates a strong magnetic $\mathbf{B}_\mu$-field with quantonic field-lines $\boldsymbol{\xi}_\mathbf{B}$. At the same time, the pseudoscalar "cold" photons and the vectorial photons with lower speed, will be attracted with oriented $\boldsymbol{\mu}_c$to the M_0 – hard-core surface where will generate-at specific ρ_Λ-density, by the ξ_B vortex-tubes, cold electrons and thereafter-ultracold nucleons formed as Bose-Einstein condensate of photons and respective-of quasi-electrons, generating nuclear quasi-crystalline networks which ensures the growing of the M_0 – hard-core which becomes a rotational "black hole" with (super) dense neutronic shell of "magnetar" type. By the gravitostatic F_{gs} force, the formed "black hole" will generate in the neutronic shell, nucleons destruction with γ-ray emission, at: $\rho_c = \rho_s^* > \rho_n^0 = 4.68 \times 10^{17} kg/m^3$, transforming the gravistar into a (micro) quasar or into a supernovae by the antigravitic pseudocharge which is generated conform to eq. (22b)-according to the theory – conclusion which is in accordance with the concept of 'Hawking radiation' which show that even a black hole evaporate slowly radiating energy. But –at the same time, the model show that the black hole density cannot grow to values close to $\rho_c^M = 8.8 \times 10^{23}$ kg/m^3. So it results that a cosmic "singularity" as state with infinitely concentrated mass-energy, cannot exist, in accordance with the Abhas Mitra's conclusions that a black hole cannot be a true "black" hole and that the Big bang scenario is illusory.

Also, it results by the model that a black hole may be formed-in gravistars forming conditions, and "at cold", as in the ECO model of A. Mitra). According to the model, the magnetic moment of the M_0 hard-core of the gravistar and of a resulted magnetar star, have exponential densities variation.

The continuity of its $\mathbf{B}_\mu$-magnetic field is ensured by the evanescent part: $\rho_c' \sim r^{-2}$, of the gravistar field, by a quantonic vortex:

$$\Gamma_\mu'(r) = 2\pi r v_c = \Gamma_\mu'(R_G).$$

The maintaining of the formed photons inside the gravistar's volume is conditioned also by a dynamic equilibrium equation on the tangential direction, similar to eq. (b), with $w = \sqrt{2}c$, i.e:

$$\rho_r(r)\cdot v_f^2 = \rho_s^*(r)\cdot(w - v_f)^2;\ \text{with: } \rho_s^*(r) = \rho_s^0\cdot e^{-(r-R^*)/\eta};\ v_f^2 = v_0^2\cdot e^{-(r-R^*)/\eta} \quad (125)$$

where ρ_r represents the density of unvortexed (brownian) sinergons.

For $r \gg R^*$ eq. (125) imply: $\rho_r(r) \approx 2\rho_s^0$, i.e – a condition which may not be satisfied, according to the sub-solitons forming condition [22]. It results that the condition (125) is realised only at M_0 hard-core surface, when: $\rho_r(R^*) = \rho_s^0(w/v_0-1)^2$, resulting also the condition of M_0 hard-core growing:

$$\rho_s^0(R^*) \geq \rho_r(R^*) > \rho_s^0(w/c-1)^2 \approx 0.17\cdot\rho_s^0(R^*) \quad (126)$$

The transformation of the gravistar into a "black hole" results when the pseudo-lorentzian force F_l generated by the Q_G-potential acting over quantons becomes equal-at the gravistar hard-core surface, with the gravitostatic force F_{gs} given by eq. (121), so-when the hard-core radius becomes almost equal to the Schwarzschild radius:

$$\rho_g^0 = 1/2k_h R^* \approx 1.8x10^{-2}/R^*, \text{ with: } R^*=R_0=2G^*M_0/c^2; M_0 \approx (4\pi/3)R_0^3 \cdot \rho_n \quad (127a)$$

If: $\rho_n \approx m_n/\upsilon_n \approx 1.5x10^{17}$ kg/m^3 and $G^* \approx G$, it results from eq. (127a) that: $R_0 \approx 33$ km; $\rho_g^0 = 5.4x10^{-7}$ [kg/m^3] and for: $\rho_n^* = \rho_h \approx 8.8$ x10^{23} kg/m^3, it results that: $R_0 \approx 1.3$ m; $\rho_g^0 = 1.4x10^{-2}$ [kg/m^3], (corresponding to a mini-black hole).

In consequence, for the M_0 hard-core forming and for the gravistar's genesis, the pseudomagnetic Q_G potential was essential.

The value $\rho_g^0 = 5.4x10^{-7}$ [kg/m^3] resulted by eq. (125) for $R^* = R_0 \approx 33$ km is approximate equal with the value resulted by the equation (120):

$$\rho_g(R^*) = 1837\rho_g^e \cdot (R^*/a) \approx 1.61x10^{-11} \cdot R^* \text{ [kg/m}^3\text{]}. \quad (127b)$$

So, according to the model, if $G^* \geq G$, the gravistar hard-core which is transformed into black hole may be initially a neutronic rotational star growed initially from a superdense "seed-core" with density $\rho_n^* \to \rho_h \approx 8.8x10^{23}$ kg/m^3 and $r^* \leq a=1.4$fm, which is grown according to eqn. (124), by the ρ_c^0, η and r* increasing. After its transforming into black hole, it may obtain also a pulsatory antigravitic charge, by matter⇒energy conversion (~10%M_0 – for supernovae), with pulsatory emission of light and gamma quanta, which may generate also laser emission, as a known Eta Carinae supernova, according to CGT.

So, according to CGT, it is also possible that pulsatile magnetars exsit.

The conclusion of electron/proton genesis as B-E condensate of 3K-photons is sustained also by the fact that the confining temperature for the electron forming, results by B-E equation in the form:

$$T_c \cong 3.31 \cdot \hbar^2 n^{2/3}/(m \cdot k_B) \quad (128)$$

of value: $T_c^e \approx 6x10^{-10}$ K for n $\approx\rho_e/m_v$, i.e. – bigger than the quantons temperature: $T_h \approx 5x10^{-11}$ K.

The gravistars forming in the Protouniverse's period of time, may explain-by the ultracold particles genesis mechanism, also the supposed "Big-bang" of the formed matter, by a fractalic process of multi-gravistars forming and theirs transformation into supernovae and quasars with "black hole" of "magnetar" type which may transform it into super-quasars.

It results that the cold genesis of "dark" photons and of elementary particles was possible in the Protouniverse's period by gravistar forming which – in this case, may explain also the supposed "big-bang" scenario of the material Universe genesis by a fractalic process of multi-gravistars forming and by theirs transformation into supernovae and (micro) quasars containing a rotational "black hole" of "magnetar" type, in the first stage, transformed into normal – and super-quasars in the second stage.

In a similarly way may be explained also the Multi-universe with structure of expansionary pseudo-bubbles, for example.

So, according to the theory, the Protouniverse's period had some Eras specific to:

1. the gravistars forming from gravistaric "seeds": $\nu_{\mu;}\nu_{\tau}$-heavy neutrino with Γ_G-vortex; electronic centrol clusters with Γ_μ-vortex, etc.

2. the dark photons confining and the formation of "dark electrons";

3. the "dark particles" forming and confining; -the "atonium" states forming;

4. the "black holes" and the micro-quasars forming from micro/mini-black holes.

The forming of supermassive particles, ($m_P > 10^{10}$GeV/c^2), in the primordial Universe is deduces also by unified gauge theories of elementary particles [92], but as formed "at hot". For very low temperatures, it requires a unique quantum statistics with a Boltzmann partition function according (also) to Infinite statistics deducted by the Cuntz algebra, which sustain the chiral particle model of CGT.

The possibility of supermassive particles cold genesis in the magnetar-like star field, deduced from the theory, may explain also the origin of the zetta-particles (10^{20} -10^{21} MeV) detected by AGASA ("Akeno Giant Air Shower Array", Scientific American Rev., January, 1999) and the observed excess of blue (young) stars.

Extrapolating the eq. (2) of the theory for bigger m-mass of stable/quasi stable particles, it results two supermassive quasistable particles, formed in a very strong magnetic field as clusters of ½K^v pairs of degenerate (electrons-antielectrons) or (protons-antiprotons):

$$m_Y = m_e \cdot K^v \approx 5x(10^{14} \div 10^{16})\text{ eV and } m_Z = m_P \cdot K^v \approx 9.4x(10^{17} \div 10^{19})\text{ eV} \quad (129)$$

This theoretical result, for $m_Z' \approx 9x10^{19}$eV, explain the zetta-particles detection.

The existence of magnetars as neutronic stars converting rotational energy into magnetic energy to more than 10^{11} tesla [98] and of microquasars: sources of high energy with only 10^3km diameter [99], sustain indirectly the previous conclusions regarding the particles cold genesis in the Protouniverse's period by gravistars forming, which indicates that the electric charge of magnetars is a negative charge, given by electrons and not by positrons.

The hypothesis of an Universe Macronucleus forming, having a macro-vortex of "dark energy", may be also sustained by the conclusion that – locally, the biggest gravistars from a high number of locally formed gravistars determined the attraction of the others in its magnetic field, forming a super-magnetar with super-black hole, after the transformation of gravistars into micro/mini-quasars and thereafter – into super-quasar, by matter attraction and particles destruction.

Also, the resulted model of expanding Universe not exclude the possibility of the multi-Universe existence and is in accordance with the conclusions of the Fractal cosmology looking the fractalic large scale structure of the Universe, (L. Pietronero, 1987, [111]).

1.16.4 The "Dark Matter" as Bosons of the Polarised Quantum Vacuum

The actual physics consider the existence of a "polarized quantum vacuum", resulted by non-excited pairs ($p-\bar{p}$) of virtual particles, with very short lifetime ($\Delta\tau \to 10^{-23}$s).

An important conclusion of the theory identifies the bosons named "zerons" as being "dark matter" bosons of "quantum vacuum" which may be considered as bosonic m_z-particles with low self-resonance (weak oscillons), with a phononic intrinsic vibration energy, E_v, of paired quarks:

$$E_v \cong (\Delta p \cdot \Delta x_v / \Delta\tau) < E_q, \ (E_q = m_z c^2; \ \Delta x_v \leq A_v) \tag{130}$$

($\Delta\tau$; Δx_v-the self-resonance period and amplitude), which explain the existence of pseudo-virtual paired quarks and fermions in the "quantum vacuum". This possibility results in a classic sense by similitude with the deuteron self-resonance given by the nucleonic potential, $V_s(r, l_v)$, generated by the superposi tion of the strong interaction potential of (N^p+1) quasielectrons of a nucleon, i.e:

$$V_s(r, l_v) = (N^p+1)\cdot V_e(r, l_v) = (m_p/m_e^*)\cdot V_e(r, l_v); (m_p=(N^p+1)\cdot f_d\cdot m_e).$$

which show that the acceleration: $a_p=\nabla V_s^p(r)/m_p=\nabla V_e(r)/m_e^*$ not depend on the m_p – value, for the strong interaction between two particles with the same mass. For conformity with the quantum mechanics, we must take:

$$\Delta x_A=A_v\approx \hbar/\Delta p=\hbar/m_p\cdot v_p;\ A_v^* = \hbar/m_p\cdot c \tag{131}$$

where $A_v^*=\hbar/m_p\cdot c$ is the vibration amplitude necessary for particles separation. Approximating the M_b-boson self-resonance as being given by a quasi-elastic maximal force: $F_k^* = k_v\cdot A_v \approx m_p\cdot a_p$, it results also the pulsation: $\omega_v \approx\sqrt{(k_v/m_p)} \approx\sqrt{(a_p/A_v)}$, for an oscillonic M_b – boson at a given quantum temperature of the quantum vacuum, T_c, corresponding to a self-resonance period, τ_v. Considering for the maximal relative speed of the particle relative to its charged antiparticle the conditions: $v_p\leq v_M\approx c$, with: $A_v\approx \hbar/\Delta p$, it results for the critical vibration necessary for separate the M_b-boson particles, the equation:

$$½\cdot m_p c^2 = ½\cdot k_v A_v^{*2};\quad \omega_v^M = m_p c^2/\hbar = k_v A_v^{*2}/\hbar;\quad a_p^*(A_v^*) = k_v A_v^*/m_p = m_p c^2/\hbar = c^2/A_v^* \tag{132a}$$

where $m_p = m_p^0/\beta' = m_p^0/(1-v_M^2/2c^2) = 2m_p^0$ – according to eq. (27b) of CGT.

Taking for the oscillon: $\gamma^*(e^-e^+)$ the value: $A_v^e = \hbar/m_e c = 3.86\text{x}10^{-13}$m, it results that:

$$a_p^*(A_v, m_p) = a_p^*(A_v^{*e}, m_e)\cdot\frac{A_v^{*e}}{A_v^*};\quad a_p^*(A_v^e, m_e) = \frac{c^2}{A_v^{*e}} \tag{132b}$$

Also, it results that – according to QM, the bosonic particles may be separated by a radiation quantum of frequency: $\nu = \omega/2\pi$ and an energy: $E_s = h\cdot\nu$:

$$E_s = \hbar\omega = \hbar\sqrt{(a_p^* / A_v)} = m_p c^2 = 2m_p^0 c^2; \quad \hbar = h/2\pi \qquad (132c)$$

in accordance with the conclusion of Quantum Mechanics.

We observe from eq. (132b) that: $a_p^*(A_v^e; m_p) = a_p^*(A_v^e; m_e)$ – in accordance with the conclusion of the theory that the acceleration: $a_p = \nabla V_s^p(r)/m_p$ of a p-particle attracted in the strong field of its anti-particle, not depend on its m_p-value.

The “darkness” of the vacuum M_b-boson is given by $\Delta x_v << A_v$, $(T \to 0K)$.

Also, the variation with x^{-1} for $x \geq 2a = 2.82$fm of the Γ_e^*-vortex density of M_b-boson degenerate electrons, with self-resonnance mechanism (partial destruction and regeneration of quantum vortexes), may explain-in CGT, the variation with x_v^{-1} of $a_p(A_v, m_p)$, according to (132b), in concordance with QM.

In consequence, we may identify the missed mass of the Universe (of a galaxy – particularly, estimated as being of ten times bigger than the visible mass, approximately) with the baryonic mass of the “polarized quantum vacuum”, considered also in the quantum mechanics (QM) as being formed as pairs of virtual particles, but which – in our CG theory, are real components of low temperature oscillons, with the intrinsic temperature: $T_i \leq T_i^c = \hbar \cdot \omega_v / k_B$.

Also, the critical value: $T_i^c \approx \hbar \cdot \omega_v^M / k_B$, for bosons with $m_p = 1837 m_e$, is equal with the critical temperature $T_N \cong 10^{13}$K of the phononic intrinsic vibration which produces the proton’s disintegration – conform to CGT. So the temperature $T \to T_N$ of a supernova, for example, may transform also M_b-boson of quantum vacuum, which are (quasi) stable at low and very low temperature, into pairs of specific particles, in particular-with quark→fermion transforming, ($q^{+2/3} \to p^{+1}$; $q^{-2/3} \to p^{-1}$).

According to the theory (eq. 82), it results also the possibility of massive bosons forming in the quantum vacuum, as pairs of (H-$\overline{H}$) – hexaquark particles in the magnetic field lines of a magnetar star, i.e:

$e(H^{-})=(6\cdot \frac{2}{3}-5)$; $e(H^{0})=(6\cdot \frac{2}{3}-4)$; $e(H^{+}) = (6\cdot \frac{2}{3}-3)$, for example: $H^{+} = 3(p+v)$;

$H^{-} = p+2n+2\lambda+s = 4527.87m_e$; $H^{0} = 2p+n+\lambda+s+v = 4797.13m_e$;

$$H^{+}= 3p+n+\lambda+v = 4421.26m_e.$$

It results also the possibility of electronic and neutronic "strings" forming as electrons chains and p_r – n_e-chains forming inside the ξ_B vortex-tubes which materialize the magnetic field lines, by the collinear alignment of the fermion's magnetic moments and by the magneto-gravitic force generated by the gradient of the ξ_B vortex-tubes density, $F_{MG}\sim\nabla\rho_s c^2$, [90]. This possibility is sustained also by the discovery of electrons cloud with 0,8mm diameter and 1012 charges in an ultra-pure semiconductor at 2K temperature, [102].

1.16.5 The Hard Gamma-rays Emission of Pulsars

Another consequence of the theory it refers to the pulsars radiation emission. It is known (VERITAS collaboration) that was observed pulsed of gamma-rays emerging from the Crab pulsar at energies above of 100 GeV emitted from the polar parts of pulsar, along the magnetic field lines. It is believed that these rays are emitted by the mechanism of inverse Compton scattering and by synchrotron mechanism, from plasma gaps of magnetosphere created in form of domes in the polar region of ~140m radius, for a ~10km pulsar radius, and in form of torus in the equatorial region. Another hypothesis assumes the existence of the shocks which can accelerate protons to high energies (Shemi, 1995), producing γ-rays due to inelastic p-p collisions: $p+p\rightarrow\pi^0+X$; $\pi^0\rightarrow2\gamma$, these shocks being produced by plasma accretion, during the inflow of gas towards the N-S magnetic poles, at $B = 10^9$-10^{10}Gs to the star surface, [108].

According to our theory, hard gamma-rays of light speed may results also by thermally excited neutrons at the neutronic star surface in the zones with plasma gaps, as gammonic (e^-e^+) pairs: $\gamma^*(e^-e^+)$, according to reaction (79):

$p + n \to M_n^* + \gamma^0 + \bar{\nu}_e$ and by K-electron capture, (reaction (77)), for $E_\gamma \to 2m_ec^2$.

The fact that these γ^*-rays are emitted by the polar zones may be explained by a more intense attenuation of γ^*-rays emitted from the equatorial surface part, especially – by conversion in $(e^-$-$e^+)$-pairs, by passing rectangular to the strong magnetic field lines [109], in accordance also with the theorists conclusion that the wind of pulsars is probably an electron/positron plasma wind, [110]. The previous conclusion is sustained by the oscillon model of $(p$-$\bar{p})$-boson which leads to the conclusion that the Lorentz force resulted from the **B**-field of the pulsar: $\mathbf{F}_l = e\cdot\mathbf{c}\mathrm{x}\mathbf{B}_p$, determines the intrinsic vibration of γ^*-gammon until the critical pulsation: $\omega_c = 2m_ec^2/\hbar$ which allow the component electrons separation.

For example, if the plasma is confined at the equatorial part in a region of radial distance Δx_1 and the plasma of the polar part is confined in a region of radial distance $\Delta x_2 \approx ½\cdot\Delta x_1$ we have:

$$I_1 / I_2 = e^{-\mu\cdot(\Delta x_1 - \Delta x_2)} \approx e^{-\mu\cdot\Delta x_2} \tag{133}$$

for the same attenuation coefficient μ and the same initial intensity, I_0.

According to CGT, it is possible also the transforming of excited $z_4(713.13\ m_e)$ bosons of quantum vacuum, forming “dark matter”, into its neutral components:

$z_4 + \in_e \rightarrow z_2(237.13\ m_e) + z_3(476\ m_e)$, detected as hard gamma rays of high energy, observed also as halo around our galaxy, (D. Dixon, D. Hartmann).

This possibility result by the z-zerons confining with the gravitic field and a smaller gravitomagnetic field, (eq. (40, 41)), acting over quantonic centrols:

$$V_{GM} = -\frac{1}{2}\frac{m_Z}{\rho_M}(\rho_s c^2)_j \ ; \ \nabla_r(\rho_s c^2) \approx \nabla_r(\rho_c c^2) = 2\frac{B_{kc} c}{k_1 r_\mu} : \quad B_k(r) = B_k^0\left(\frac{r_\mu}{r}\right)^3 \qquad (134a)$$

For example, for $B_k = B_k^0 \approx 10^6$T and $r = r_\mu \approx 10$km, it results:

$$a_{GM} = \nabla(V_{GM})/m_Z \approx 2.2\text{x}10^{-3}\ \text{m/s}^2.$$

Also, it results that in a very strong magnetic B – field, the bosonic pairs of charged leptonic and mesonic fermions ($e^{\pm}$; $\mu^{\pm}$; $\pi^{\pm}$) may be transformed by magnetic separation of the coupled (p- $\overline{p}$) particles, by forced parallel orientation of the μ_p-magnetic moments at a critical value B_c^0 lower than those resulted from the ($p^- p^+$)-pair transforming, (~$3.2\text{x}10^7$ T instead of $4{,}3\text{x}10^9$ T, for e^+e^-), given by:

$$\mu_p x B_c \geq \frac{\mu_0}{2\pi}\frac{\mu_p^2}{d_p^3} \ ; \Rightarrow B_c \geq B_c^0 = \frac{\mu_0}{2\pi}\frac{\mu_p}{d_p^3} \quad \text{with: } d_c \approx A_\nu = \hbar/m_p c \ \geq \ a = 1.4\text{fm} \qquad (134b)$$

1.17 Conclusions

The necessity of the galilean relativity to the microphysical level, also for speeds $v \rightarrow c$, result conform to a cold genesis theory (CGT) and is evidenced also by some experiments as the OPERA experiment, which evidenced tachyonic neutrinos [100], well explained in our CGT.

Also, Ole Roemer (1644-1710) found that the speed of light coming from Jupiter's satellite was lower when an observer on earth was moving away from it and higher on approach, and James Bradley (1693-1762) determined that the speed of light from a star was higher when an observer on earth moved towards its perpendicular incident, and lower on recession.

The use of a galileian relativity for explain the photons and the particles cold genesis is in concordance also with the "stopped light" experiment, (L. V. Hau, 2001, [101], A. A. Savchenkov et al., 2007, [103], [104]) which evidenced the possibility to reduce the speed of a light beam which is passed by a small cloud of ultracold atoms of sodium forming a B-E condensate, magnetically suspended inside a vacuum chamber, to a value of 17÷0 m/s, by compressing a light pulse of more than 1 km long in vacuum, to a size of ~50 μm, completely contained within the B-E condensate, phenomenon which sustain the C. F. electron model of the CG theory. This phenomenon may be used for verify partially the theory, which predicts a deviations of slowed light in a very strong magnetic B-field, with an angle depending on the magnetic potential, $\varphi \sim \mathbf{A}(\mu)$.

A suggestive link with the quantum mechanics result also by the interpretation of Nina Sotina, [105], which consider that the de Broglie's wave of an atomic electron, for example, is associated with the electron's spin precession given by an associated quasi-particle generated in the physical vacuum by the electron movement and having an energy equal to the electron intrinsic energy – identified in our theory with the quantonic vortex Γ_{μ}^{e} of the electron magnetic moment, having the same density variation as the electron, (eq. (30)).

The possibility to explain all fundamental fields and the elementary particles by equations of ideal fluids applied to the subquantum and the quantum medium, may be considered an strong argument for the CF-prequantum model of particles of the theory, describing the particle as chiral CF-soliton cluster in the ground state: $T\to 0K$, i.e. -formed "at cold", as a stable or metastable Bose-Einstein condensate of gammonic (e^+-e^-)-pairs confined by a very strong magnetic field corresponding to those of a magnetar type star or of gravistar type, with determined parameters in a Galileian relativity-like in the scale relativity theory of Nottale [106], which predicts, like in our theory, the natural apparition of some structures by self-organizing of adispersed matter system.

At T>0K, in perturbative conditions, the prequantum particles becomes quantum, as in the case of chiral soliton electron, (pseudo-cylindrical – at $T\to 0K$), which at T>0K becomes pseudosperical by spin precession, without changing of spin value, or as in case of atomic nucleus which is quasi-crystallin at $T\to 0K$, or as in the case of vortexial atom which only at $T\to 0K$ forms a state of Bose-Einstein condensate, becomingquantum systems at T>0K.

The classic CF model of nucleon of the theory, with neutral cluster of quasielectrons and incorporate electron(s), explain also the values of spin and of magnetic moment by the conclusion of a density-dependent electron's magnetic moment degeneration, conclusion which is not contradictory because that the soliton-like particle is an open system in the quantum and subquantum vacuum and which explain the fact that – at the proton transformation by K-electron capture, the electron spin is not transmitted with the μ_B-value to the formed neutron. At the same time, this conclusion permit to explain the nucleon and the nuclear field whithout the Yukawa's mesonic theory, which has no phenomenological correspondence in a prequantum model of particle, according to CGT.

The possibility to explain the cold genesis of "dark" photons and of elementary particles considered in a CF-chiral soliton model by a coherent model of primordial gravistar is another argument which sustain the theory.

Also, the possibility to obtain a coherent cold genesis prequantum model of particles and of fields, leads to the principle that the quantum models of particles must have a prequantum correspondent at the limit: $T \to 0K$ that completes the image of the matter genesis, explaining also the physical cause of the cosmic expansion by an antigravitic charge of the vibrated particles, which explain also the "dark energy" nature.

It results also some specific conclusions comparative with some theoretical conclusions of relativistic Quantum mechanics, according to CGT:

1. about the magnetic monopole hypothesis: according to CGT it results as impossible to separate the magnetic poles, because the vortexial nature of the magnetic field;
2. about the correspondence between the mass of field quanta and the field action radius: even if phenomenologically the proportionality: $r_\lambda \sim m_q$ has reason, the known relation: $r_\lambda = h/m_q c$ of QM and its generalisation for the strong and weak interactions results as formal, according to CGT, with no phenomenological sustaining and giving contradictory phenomenological result especially for the weak and the superstrong interactions; also, it results that the specific interactions are realised by a specific density of specific quanta corresponding to the field energy density and not by a small number of virtual quanta;
3. the conclusion of particles generating from radiation energy is sustained also in CGT but as a cold genesis result and not as a hot genesis process, the photonic radiation resulting from the confinement of primordial "dark energy", according to CGT;

4. about the fundamental forces unifications at $T \geq 10^{28}$ K – this phenomenon results as impossible, according to CGT, because that over 10^{13} K it result nucleons destruction inside specific stars (inside a supernova having a "black hole" type kernel, for example), the relativistic mass of particles being at most of two times bigger than the rest-mass, according to CGT;

5. about the probability to find quarks in the free state at T>>0K: this probability issmall because the possibility (with probability depending on T) of quark→particle transforming, resulted by the relative detaching and moving in the quark interaction quantum volume (Δa), of the un-paired quasielectron e^* which gives its charge $e^{*\pm 2/3}$ and which is auto-transformed in this case in degenerate electron with e-charge (and degenerate magnetic moment and spin), if T>>0K, according to CGT.

The possibility to retrieve classically in CGT the exponential form of nuclear potential, in accordance also with the Schrödinger's equation written in the simplest form (71a), suggests that all basically classic forms of field potential, $V_p(r)$: electric, magnetic, gravitic or nuclear, are compatible phenomenologically with equations derived from a Proca-type equation, i.e. by the Seelinger's equation of the static approximation, by a degeneration function f_D, in the form:

$$\left(\nabla^2 - \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - k_\lambda^2\right)\Phi = g\cdot\delta[\bar{r} - \bar{r}'(t)];\ V_p(r) = f_D\cdot\Phi(r), \qquad (135a)$$

and by particular values of k_λ, f_D and g, corresponding-for the nuclear potential, to eq. (71). For the electro-magnetic and the electro-gravitic field, by the Lorentz gauge: $\vec{\nabla}\cdot\vec{A} = -\frac{1}{c^2}\cdot\frac{\partial\phi}{\partial t}$ the field equation may be written taking: $k_\lambda \approx m_{v;(g)}\cdot c/\hbar$; $g = -Q/\varepsilon$, in the Maxwell-Proca form:

$$\left(\nabla^2 - k_\lambda^2\right)\Phi + \frac{\partial}{\partial t}(\vec{\nabla}\cdot\vec{A}) = g\cdot\delta\left[\bar{r} - \bar{r}'(t)\right] \tag{135b}$$

expressing the **E**-type field generating by a **B** =rot**A** type field.

Also, for a mean value: $k_\lambda \approx m_c c/\hbar \approx 2\pi c^{-1}$, we may approximate the total potential $V_q(r) = V_E + V_G$ acting over a charged particle with the impulse $p_p = m_p v_e$ and an electrogravitic q_G^* -charge, by an equation in the static quasi-unitary form:

$$\Delta V_q^* - k_\lambda^2\cdot V_q^* = \frac{\sum_i (q^*.Q^*)}{\varepsilon_o\cdot m_p}\delta(r); \quad k_\lambda = \frac{1}{r_a} \approx 2\pi c^{-1}; \quad V_q^*(r) = \frac{\sum_i (q^*.Q^*)}{4\pi\,\varepsilon_o.m_p}.(\frac{e^{-\frac{2\pi}{c}\cdot r}}{r}); \tag{135c}$$

with $q^* = (q_e^*;\ q_G^*)$; $Q^* = (Q_e;\ Q_G)$; $q_e^* = q_e = n\cdot e$; $q_G^* = m_p(e/m_e)\cdot(1+v_e/c)$; $Q_G = -4\pi G\varepsilon_0(m_e/e)\cdot M$and $v_e = v_p \sin(\mathbf{v_p}, \mathbf{r})$, by considering the m_p-particle speed: $v_e \approx$ constant, with $v_e \perp r$.

The induction of a magnetic-like field results – according to eq. (135c), in the form:

$$\vec{B}_q^*(r) = -\frac{1}{c^2}\vec{E}_q^*(r) x \vec{v}_p = \frac{\mu_0 Q^*}{4\pi}\cdot\frac{e^{-\frac{2\pi}{c}r}}{r^2}(\frac{1}{r} + \frac{2\pi}{c})\cdot(\vec{v}_p x\, \vec{r}) \tag{135d}$$

For the nuclear potential $V_n(r)$, $k_\lambda \approx m_\pi\cdot c/\hbar$ and $q^*_n = \sqrt{(-4\pi\varepsilon_0 m_p)}\cdot[q_n + \mathbf{q_n'}]$; with: $q_n = (5\div 6)e$, (the nuclear charge) and $\mathbf{q_n'} = q_n\cdot\boldsymbol{\tau_n}$ or $\mathbf{q_n'} = q_n\cdot\boldsymbol{\tau_n}\cdot\boldsymbol{\nabla}$, (charge operator, applied to the exponential part), for the pseudoscalar or the tensorial nuclear interaction.

Looking the ether energy density, the theoretical evaluations of vacuum energy density (ρ_s) varies from 10^{44} J/cm^3 up to an incredible value: 10^{120} J/cm^3, [107].

By CGT we may consider that the intensity of magnetar's magnetic field gives indications about the upper limit of this ρ_s – mean density in space with matter concentration, by eqs. (16) and (30), ($B=k_1\rho_c c$; $\rho_s \approx \rho_\mu$). So, if exists magnetars with $B_S \approx 2.4 \times 10^{12}$ T, (which may generate electrons – in the CGT), it results that: $\rho_s \approx \rho_a^0 = 5.17 \times 10^{13}$ kg/m^3, (~4.6×10^{24} J/cm^3), corresponding to the proto-electron mean density, ($\rho_s \approx m_e/2\pi a^3$).

Also, from eq. (30), based on the sub-soliton forming condition, it results a particle mass decreasing with the ether density decreasing, i.e. in the inter-galactic space and in the "stellar cemetery" zone of the Universe, in CGT.

Concerning the gravistars forming as a cold genesis beginning of the Protouniverse, this scenario has partial correspondence with the G. Lemaître's (1927) and D. Layzer's (1966) Cold Big bang model of Universe's genesis, considering a primordial cold state of nuclear density and it is also in accordance with the James Jeans and Fred Hoyle's theory of a continuous matter creation. In this sense may be mentioned also the Larmor's intuition considering that all matter is formed by electrons, (not true but in relative concordance with the degenerate electrons cluster model of mesons and baryons, proposed by CGT).

Concerning the "black hole" density, from eqs. (88)-(89) of CGT it results that a density which exceed the size order of nuclear density, i.e. – of 2…n times bigger, will determine the forming of quarks clusters of more than three quarks, which will be un-stable at high temperature, so – in this case, only a rotational "black hole" of magnetar type, with cooling effect given by its strong magnetic field, can increase the "black hole" density over the size order of nuclear density (2.3×10^{17} kg/m^3), but cannot exceed the density of the electronic centrols: $\rho^m = \rho_e^0 \approx 10^{19}$ kg/m^3, according to CGT.

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