Theoretical implications of a classical unitary theory of gravitation and the electromagnetism in the explaining of the planetary perihelion precession and the super-heavy astroparticles

Abstract
The paper is based on the Galilean relativity and on a theory of cold genesis of matter and fields (CGT), which explains the gravitation and the electro-magnetic interaction by a charge model of static type, with spherical distribution of field quanta, compatible with the Fatio/LeSage model of gravitation and with the observations regarding the light beam deviation in the sun’s gravitic field. The planetary perihelion precession is explained as consequence of the dynamogene component of the gravitation force and of the high density of the sub-quantum medium, given by etheronic winds, in CGT, the electro-dynamic Lorentz’ force resulting as quantum Magnus force. It is shown that the principle of physics laws invariance may be maintained by considering also the d’Alember paradox, without the conclusion of the light speed invariance, of the null rest mass of photons/bosons and of the Einsteinian speed –depending mass increasing, resulting also the possibility to explain the super-heavy astro-particles, experimentally detected, by a model of gammonic or mesonic Bose-Einstein condensate forming and pearlitzing, with the non-destructive collapsing of the formed sub-clusters, according to the cold genesis model of astroparticles of CGT.

Keywords: gravitic interaction, perihelion precession, Lorentz’ force, unitary theory, heavy astro-particles, Bose-Einstein condensate

Introduction
According to a cold genesis theory of fields (CGT1,2), the accelerating force \( F_x \), given by repulsion between the charges \( Q \) and \( q \), results from the impulse variation of the field quanta at the quasi-accelerating force \( F = \frac{\partial L}{\partial \dot{q}} \) derived from a Gauss- Ostrogranski relation, which gives the relation (Figure 1), according to the impulse density tensor \( S_{\alpha \beta} \) dependent on the v-speed of quanta relative to the interaction semi-surface: \( S_x = 2 \pi \rho^2 \), of the charge \( q \), the electric charge's sign depending on the helicity of the vectons, (on the vecton’s spin orientation relative to the vector's impulse), obtained by the (pseudo)magnetic interaction with the polarized vectorial photons of the electron’s surface.1,2 In CGT, \( S_\alpha \) is considered as being the interaction section of the electron with the E-field quanta: \( S_x = \pi (a + r)^2 \), with: \( a=0,41 \text{ fm} \) - the radius of an electron with the E-field quanta, \( r=0,41 \cdot a \) - the gauge radius of the vecton, (CGT), which results by the value of gauge constant \( k \), calculated by considering that- at electron’s surface \( (r=a) \), the electrostatic energy density is equal with the kinetic energy density \( \varepsilon(a) \) of the E-field quanta, i.e.:

\[
\frac{1}{2} \varepsilon_0 E^2(a) = \varepsilon_v(a) = \frac{1}{2} \rho_\alpha c^2 = \frac{1}{2} (1/k_1) \cdot E(a), \quad \Rightarrow \quad k_1 = 4 \pi \varepsilon_0 c^2/e = S_\alpha^0/e = 2 S_\alpha^0/e.\]

The magnetic B-field is generated- in this case, by the existence of a spherically-symmetric flow of vectorial photons of the accelerating Q-charge’s field, (“vectons” – in CGT), with the impulse density: \( \rho_\alpha(0) = \rho_\alpha c \) -for a static interaction between Q and q, with an expression of the form:

\[
E_v = k_1 \rho_\alpha(r) \cdot v^2_v = k_1 \rho_\alpha(a) \cdot \frac{4}{e}, \quad \rho_\alpha(r) = \frac{4}{e}, \quad \rho_\alpha(a) = \frac{4}{e};
\]

\[
\rho_\alpha(r) = \frac{4}{e};
\]

i.e.- dependent on the v-speed of quanta relative to the interaction semi-surface: \( S_x = 2 \pi^2 \rho^2 \), of the charge \( q \), of the charge \( n \cdot c \), the electric charge’s sign depending on the helicity of the vectons, (on the vecton’s spin orientation relative to the vector’s impulse), obtained by the (pseudo)magnetic interaction with the polarized vectorial photons of the electron’s surface.1,2 In CGT, \( S_\alpha \) is considered as being the interaction section of the electron with the E-field quanta: \( S_x = \pi (a + r)^2 \), with: \( a=0,41 \text{ fm} \) - the radius of an electron with the E-field quanta, \( r=0,41 \cdot a \) - the gauge radius of the vecton, (CGT), which results by the value of gauge constant \( k \), calculated by considering that- at electron’s surface \( (r=a) \), the electrostatic energy density is equal with the kinetic energy density \( \varepsilon(a) \) of the E-field quanta, i.e.:

\[
\frac{1}{2} \varepsilon_0 E^2(a) = \varepsilon_v(a) = \frac{1}{2} \rho_\alpha c^2 = \frac{1}{2} (1/k_1) \cdot E(a), \quad \Rightarrow \quad k_1 = 4 \pi \varepsilon_0 c^2/e = S_\alpha^0/e = 2 S_\alpha^0/e.\]

The magnetic B-field is generated when the (pseudo)charge: \( q_a = S_\alpha/k \), has a perpendicular \( \theta_0 = \phi_0 \cdot \cos \theta \) –speed relative to the E-field (Figure 1), according to the impulse density theorem for ideal fluids derived from a Gauss- Ostrogranski relation, which gives the relation for the total electrodynamic force (including the Lorentz force), in the form:

\[
F_z = \frac{m a}{r_0} = \frac{S_\alpha}{k_1} (k_1 \rho_\alpha \cdot v^2_v + k_1 \rho_\alpha v \cdot v_0) = \rho_\alpha (E_0 + B \cdot v_0 \cdot v) = F_0 + F_1;
\]

\[
B_0 = k_1 \rho_\alpha v \cdot v_0 = c = \quad \Rightarrow \quad (4)
\]

The eq. (4) resulting by the impulse density: \( p_i = r_i v_c \) included in the tensor \( \Pi_{ik} \), that is:

\[
F_1 = m \frac{d}{dt} v_c = \frac{1}{2} \rho_\alpha \rho_c v_c d\tau = \frac{1}{2} \Pi_{ik} dS_k
\]

with: \( \Pi_{ik} \) -the impulse density tensor:
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\[ \Pi_{ik} = P_c \delta_{ik} + \rho_c (v_i \cdot v_k) \; ; \quad \text{with:} \; \delta_{ik} = (n_i n_k) - n_j \; ; \quad |n_i| = |n_k| = 1 \; ; \]

\[ dS_k = n_k dS, \; (n_i n_k \text{-unit vectors}) \; ; \quad P_c = \rho_c \cdot v^2_e \; ; \quad v_i = v \cdot n_i \; ; \quad v_k = v \cdot n_k \; ; \]

(6)

**Figure 1** Gravitostatic and gravito-dynamical interaction.

For \( \Pi_{ik} \) = constant and \( \int dS_k = S^0 \cdot n_k \), with: \( S^0 = 4 \pi \eta_0^2 \) for elastic interaction with the field quanta and with: \( \eta_0 = a = e^2 / 8 \pi \eta_0 m_e c^2 = 1.41 \text{fm} \), (i.e. the e-charge in surface), it results that: \( k_1 = 1.57 \times 10^{-10} \text{m}^2 / \text{C} \). Conform to eqn. (3), the expression of the magnetic induction results in CGT, in the form:

\[ B(r) = k_1 \cdot \rho_e \cdot v^i_r \; ; \quad v_r \approx c \]  

(7)

For the elementary electric charge 'c' of the electron, the charge's sign depends on its intrinsic chirality: \( \xi_c \) and the magnetic moment of particles \( \mu_p \) results in CGT from an etherono-quantonic vortex of primordial dark energy: \( \Gamma_\mu = \Gamma_\mu 4 \text{B} \), formed by a component \( \Gamma_A \) of "heavy" etherons (s-etherons, \( m_s = 10^{-6} \text{kg/m}^3 \)), explaining physically the magnetic potential \( A \) and a component of "quantons" (\( m_q = h / c \) and \( m_s = 7.37 \times 10^{-10} \text{kg/m}^3 \)), explaining physically the magnetic induction \( B = \text{rot} \, A \), generates the field lines of the induction \( B \) by the gradient of the impulse density: \( V_F \cdot \rho_A = d \rho_A / dr \) , which induces \( \xi_B \) vortex-tubes of the \( B \)-induction around the vectors of the electric \( E \)-field. 

The argument for a Q-charge model with spheical distribution of \( E \)-field quanta consists in the fact that an atomic charge, for example, may interact simultaneously with \( n \) electrons with the same force as in the case of the interaction with a single electron. The Maxwell’s electromagnetic field equations results in CGT according to eqs. (3)-(4), in a general vectorial form, of a vectorial \( E \)- or \( H \)- field intensity reciprocal generation:

\[ B = \frac{1}{c^2} \nabla \times E \rightarrow E \rightarrow \nabla \times B \rightarrow B \rightarrow \nabla \times E \]  

(8)

another specific field equation resulting also in a general way from the continuity equation:

\[ F^R = m \rho G_k q G dE_G (r, Q_G) = -k_h m_p (\rho_G v^2_g + \rho_p (v_g v_0)) n_i \; ; \quad k_h = S_1 / 2 m_h \; q_G = \frac{S_0}{k_1} \; ; \quad E_G = k_1 \rho G v^2 ; \quad S_0 = k_1 m_p \; ; \quad v_0 \perp v_g \]  

(13a,b)

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The meaning of the sign $\pm$ is that the electrogravitic $q_{M}$-charge generating the $E_{G}$-field is given by an uniform spheric distribution of an etheronic flux with a non-compensated component, i.e. –by the difference between the received etheronic flux and the etheronic flux reflected by the super-dense centers of the inertial $M$-mass structure, in the case of an attractive, gravitic $M$-charge.

Therefore, considering this non-compensated etheronic component as a gravitonic field flux, having the impulse density $\rho_{G}(r)^{\Rightarrow}\rightarrow r$, the generation of the gravitation force, $F_{G}$, complies with the Lesage’s hypothesis\(^{4}\) which presumes the screening of the $m$-mass by the $M$-mass in report with the cosmic etheronic winds that comes radially-symmetrically towards the $M$-mass, (Figure 1). The etheronic flux formed by a $M$-mass with disturbed sinergonic vortex which emits s-etherons, gives an antigravitic pseudocharge, generating a positive, i.e. repulsive $E_{G}$-field. The gauge value of $k_{h}$ is obtained considering for the electron’s case the gauge condition: $q_{e}=-e$, which complies with the expression obtained by M. Agop,\(^{3}\) starting from the acceleration of the electron in an electron to another:

$$a_{e}^{\Rightarrow} = \frac{F_{e}^{\Rightarrow}}{m_{e}} = a_{G}^{\Rightarrow} + \left[\frac{e}{m_{e}}\right] \frac{e}{4\pi \varepsilon_{0} r^{2}} = \left[\frac{e}{m_{e}}\right] (E_{G}^{\Rightarrow}(r) + E_{e}^{\Rightarrow}(r));$$

$$E_{G}^{\Rightarrow} = \frac{m_{e}}{e} a_{G}^{\Rightarrow} \tag{14}$$

which gives by eqn. (13) the gauge values: $k_{e} = (e/m_{e}) k_{h} = 27.4 \text{[m}^{2}\text{/kg]}, \ r_{h} = 1.79 \times 10^{25} \text{m}.$

For the variation of $\rho_{G}(r)$-density of the gravitonic wind, in compliance with eq. (12) of the electrogravtic $q_{M}(M)$-charge of the $M$-mass having the radius $r_{M}$ and for $v_{G} = v_{e} = \frac{p_{e} \cos \phi}{m_{e}} \perp v_{G}$, the gravitonic force results from eq. (12), having the form:

$$F_{v}^{G} = \left[\frac{\rho_{G}(r)}{2} \right] \left[\frac{v_{G}}{r^{2}}\right] = \left[-G m_{m} M_{m} \perp \frac{v_{m}}{r_{m}^{2}}\right] \left[\frac{v_{m}}{r_{m}^{2}}\right] = r_{m};$$

$$\rho_{G}(r) = \rho_{G}^{0} \left[\frac{v_{G}}{r_{G}}\right] = \frac{M_{m}}{m_{m}} \rho_{G}^{h} \frac{v_{m}}{k_{m}^{2}} \tag{15}$$

Where: $\rho_{G}^{0}$ and $\rho_{G}^{h}$ are the density of the gravitonic flux (i.e.- of the uncompensated etheronic wind) at the $M(r_{M})$-mass surface and respectively- at the $m(r_{m})$-quantum surface.

### Particularizations; the planetary perihelion precession case and the Lorentz’ force

In the case of the gravitation force, we may conclude that the force $F_{G}^{\Rightarrow}$ given by eqn. (15) results from a potential:

$$v_{G}^{\Rightarrow}(r) = v_{0}^{\Rightarrow} (1 + \nu_{0}^{\Rightarrow} / \eta) (v \rightarrow \nu_{0}^{\Rightarrow} / \eta).$$

If the $m$-mass represents a photon having the speed $v_{m} = c$, the value of the $F_{G}^{\Rightarrow}$-force, acting as a gravitonic type force, results from the equation (13) as being: $F_{G}^{\Rightarrow}(r,c) = 2 F_{G}^{\Rightarrow}(r,0)$, of a double value comparing to Newtonian static gravitational force, in accordance with the Einstein’s theory of relativity and the astrophysical observations. A form with lorentzian type term of the total gravitation force $F_{G}$, is obtained also in the tensorial theory of gravitation for a weak gravitational field, giving as solutions the gravitational analogs to Maxwell’s equations for electromagnetism,\(^{5,6,7}\) the increasing of $F_{G}$ with the $v$-speed, being equivalent with an transversal relativistic effect of the gravitational mass growth:

$$F_{G} = g_{G} \cdot m_{p}(1 + \beta) = g_{G} \cdot m_{p}^{2} \left(\beta = \nu_{v} / c\right) \tag{16}$$

We observe also that the form (15) of the total (static +dynamic) gravitation force $F_{G}$, for the case of a celestial body with a (quasi) constant value of $v_{G}$ corresponds: by the Kepler’s law: $v_{G} = r \cdot v = \text{const}.$, to the extended expression of the Newtonian law of gravity including an additional term, of the form:

$$F_{G} = -G \cdot m_{p} \cdot M \cdot M \cdot \left(1 + \nu_{v}^{2} / c^{2}\right) \eta \cdot \left|\eta\right| = 1 \tag{18}$$

which for $v_{G} = \text{-(quasi)constant to a short time interval } \delta t$, may be considered as derived from a gravitation potential $V_{G}(r)$ with the same variation with the $v_{G}$-speed.

But the general Einsteinian relativity, even if gives verifiable quantitative results, is a geometrized theory based on transformation relations specific to the special theory of relativity, (on the light speed constancy postulate), which generated also some controversial phenomenological interpretations, such as those of the “twins paradox” or those of the speed- depending mass increasing to infinity at relativist speed $v \approx c$. There were proposed some non-einsteinian explicative models and relations of the total gravitation force which generates the planetary perihelion precession, (Clairaut, Maillard, Bertrand, Tisserand, Lecomte, etc.). Trying a possible returning to a Galilean relativity with the re-interpretation of some experimental results\(^{8}\) such as those of Kaufmann-Bucherer experiments by avoiding paradoxes such as those of the null rest –mass of the photon (conclusion which is in contradiction with the experimentally proven possibility of the photonic Bose- Einstein condensate producing and with the corpuscular model of photon\(^{9}\)), it is raised the question: which phenomenon may determine the variation of the dynamogene term $F_{G}^{\Rightarrow}$ with $v_{G}^{\Rightarrow}$ instead a variation with $v_{m}^{\Rightarrow}$ in the frame of the Galilean relativity?

A plausible suggestion may result from the propose of M Fedri\(^{10}\) which considered a Stokes’ type force as cause of the ppp phenomenon, generated by the planet’s passing with the $v$-speed through the superfluid physical vacuum which is considered as non-newtonian fluid, i.e.- with speed- depending viscosity, being proposed a modified Stokes’s equation for the explaining of the planetary perihelion precession, in the form:

$$F_{G}^{\Rightarrow} = -6 \pi \tau \cdot \eta \cdot \nu = -6 \pi \cdot (r - 1) \cdot k = -6 \pi \cdot \tau \cdot \left(\frac{1}{v_{m}^{2}}\right)\left(\frac{1}{\left|v_{m}^{2}\right|}\right); \tag{19}$$

where: $r$ – the $m$-body’s radius, $\eta$ - the dynamic viscosity, -unitary
constant ($\kappa = 1 \text{ Kg s}^{-2}$). For the obtaining of the pp angle during a rotation period $T$: \[ \delta \rho_g = -\frac{24\pi^2 A^2}{T^2 (1-e^2)^2} = 6\pi \left(\frac{v}{c}\right)^2 \frac{1}{1-e^2} = 6\pi \frac{G(M+m)}{4(1-e^2)c^2} \] (20)

resulted by the equivalence $T^2 = 4\pi^2 a^2/v^2$, with $A=r_\text{s}$ - the major semi-axis and: $v = \sqrt{GM/G\rho}$ the stable second cosmic velocity, is used the Taylor approximation: $2(\gamma - 1)(v/c)^2$. We observe that the correction $(\gamma/v)$ necessary in the relations (13) and (15) for concordance with the relations (18) and (19) is applied only to the dynamogenic term: $F_e^{\text{I}}$ and must have the form:

\[ f_c(v/c) = k_l(v/c)^l \text{ with: } k_l = \{0,1\} \] (21)

where $k_l=1$, while $l=0$ only for a negligible value of the quantum vacuum density and $l=1$ for a high density of the quantum vacuum, the values $k_l$ being given by the fact that the gravitation force given by the eqn. (15) at the limit: $v = c$ is equal with those given by eqn. (18) which explains also the photonics rays bending at the sun’s surface. Equivalating similarly in the relation (13a) of CGT, the dynamogenere pseudo-lorentzian part $F_e^{\text{I}}$ of the total gravitation force with a Stokes’ type force $F_e^{\text{I}}$, with $\eta^2 = \eta(v/c)$ it results that:

\[ F_e^{\text{I}} = -k_l m_p r_g c^2 \left(\frac{v}{c}\right)^2 f_c(v/c) \cdot \left(-6\pi - 6\pi \cdot \left(\frac{v}{c}\right)^2\right) \cdot \kappa; \] (22)

From eqn. (22) it results that the corrective factor $f_c$ must be applied to the viscosity $\eta^2$. However, $\eta = \eta(g, v; (v^2)$ - the kinematic viscosity) and because $\rho_g$ is the uncompensated component of the gravitonic (etheronic) flux $\delta \phi_g$ which generates the gravitation force and $\nu$ must characterize this etheronic flux, the fact that the corrective factor $f_c$ is not applied also to the static newtonian first term, $F_e^{\text{I}}$, better indicating that a true perturbation of the corrective factor $f_c$ may be given by the conclusion that it modify the scattering section $S_k^0 = \frac{S_k^0 S_k n_k}{S_k^0 S_k n_k} = \frac{m_g/m_k}{S_k n_k S_k}$, with $\eta^2 = \eta(v/c)$ given by eqns (6) and (13b) for the limit $v = c$, in the sense that the etheronic flux $\delta \phi_g$ but also the etheronic component of the quantum vacuum, $\phi_g$, has a laminar flow at the level of the surface $S_k^0 = \frac{S_k^0 S_k n_k}{S_k^0 S_k n_k}$ of the quantum and the last component $\phi_k$ - bigger than the etheronic flux $\delta \phi_g$ generates a “screening” effect in report with the action of $\delta \phi_g$ over the $S_k$ semi-surface of the quantum, effect which is diminished with the $v$ speed increasing, possible by the reciprocally compensated etheronic components $\phi_g = -\phi_k$, having laminar flow at the level of the $S_k$-surface and being parallel with the un-compensated etheronic flux $\delta \phi_g$ which generates the gravitation force, the static and dynamogenic forces $F_e^{\text{I}}$ generated by the components $\phi_k = -\phi_g$ being reciprocally compensated. Regarding the compensated etheronic components $\phi_k = -\phi_g$, we may suppose that they have a screening effect in report with the action of $\delta \phi_g$ -etheronic flux but for $\nu - \delta \phi \parallel \nabla$, because the total density of their ethers is constant: $\rho(\phi_k) + \rho(\phi_g) = \text{constant}$, the screening effect is also constant, explaining the fact that the corrective factor $f_c$ is not applied to the Newtonian term of the gravitation force. We may equate the previous conclusions considering the expression (13a) of the gravitation force that the effective value of $\rho_g$, generating the effective value of the gravitonic force, depends to an anisotropic dynamic viscosity, $\eta = \eta(v/c)$; ($n = i, j, k$) in the form:

\[ \rho_g = \rho_g^{\text{I}} = \eta = \eta_0 \left(\frac{v}{c}\right)^2 \frac{\rho_g^{m_i}}{\rho_g^{m_i}} = \eta_0 \left(\frac{v}{c}\right)^2 \frac{\rho_g^{m_i}}{\rho_g^{m_i}} ; \]

\[ \eta = \eta(v/c) = \{0,1\}; \] (23)

in which $v/c$ is the graviton’s speed relative to the $S_k$ -semi-surface on which it acts. The relation (13a) of the total gravitation force for $l=1$ results in this case in the form:

\[ F_i^{\text{I}} = F_i^{\text{I}} + F_i^{\text{I}} = -G \frac{m_p M}{r_i^2} \left(\frac{f_c + v_0}{c} \cdot \frac{v_0}{c}\right) \eta_i = -G \frac{m_p M}{r_i^2} \left(1 + \frac{v_0^2}{c^2}\right) \eta_i ; \] (24)

the index $l=1$ in the eqns (21), (23) and (24) corresponding to the $m_p$-particle passing through a non-newtonian fluid, resulting that the index $l = 0$ corresponds to the action of a newtonian ideal fluid. Considering that the total gravitation force $F_i^{\text{I}}$ obtained by eqns. (13), (15), (21) and (24) results from a gravitation potential $V_{\text{I}}(r)$ with $v_0$ - (quasi)constant to a short time interval $\Delta t$:

\[ V_{\text{I}}^{\text{I}} = -G \frac{m_p M}{r} \left(1 + \frac{v_0^2}{c^2}\right) ; \] (25)

the effective potential $V$ acting over a planet with the reduced mass $m$, in the gravitational field of the sun with the mass $M$, can be re-written in terms of the length $a = h/c$.

\[ V_{\text{I}}^{\text{I}} = -G \frac{m_p M}{r} \left(1 + \frac{v_0^2}{c^2}\right) = m_p \frac{v_0^2}{2} \frac{mv^2}{c^2} \frac{r^2}{r^2} \frac{2}{2} ; \] (26)

with: $r_S = 2GM/c^2$ - the Schwarzschild radius and $a = h/c; h = L/\mu_m = r^2 (d\phi/d\tau) = v_0 r_l L$ - the total angular momentum of the two bodies, which is constant -according to the second Kepler’s law-, the last term being the centrifugal potential. This total potential is the same as those resulted from the Schwarzschild metric.

Circular orbits are possible when the effective force is zero:

\[ F_0^\mu = \frac{dV}{dr} = 0 \] (27)

The precession of the planetary orbit per revolution period $T$ resulting in the known way:

\[ \delta \phi = T(\omega_\mu - \omega_0) \approx 2\pi \left(\frac{3\pi^2}{4a^2}\right) = 3\pi \frac{m^2 c^2}{2L^2} \approx 6\pi \frac{G(M+m)}{A(1-e^2)c^2}; \]

\[ \omega_\mu \approx \omega_0 \left(1 - \frac{3\pi^2}{4a^2}\right) \] (28)

(c- the elliptic orbit’s eccentricity; $m = m_p a T; a = h/c = L/\mu_m; A$: the major semi-axis).

b) Even if the general relation (4) permits the deducing of the microphysical gauge expression of the magnetic induction $B$, it must be observed that the Lorentzian force $F_e^{\text{I}}$, in the case of interaction with an external E-field, results only for charges $q$ composed of n elementary charges e, as consequence of the fact that the Lorentzian force is generated by the roto-activity of the electron’s surface, resulting that- without this particularity of the $e$-charge, i.e. for $q=0$,
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... of the etheronic quantum vacuum, as in the case in which the energy, \( v = c \), th... with the vectorial photons of the e-charge's surface ("vexons"- in CGT) and not by mechanical interaction with the electron's surface.

**Other theoretical consequences**

In the absence of the action of electrical or gravitational fields, the advancement through the sub-quantum medium of a particle with relativist speed \( v \rightarrow c \), particularly- a photon, is obtained in the laminar regime and the specific drag force is of Stokes type.\(^6\)

The approximation value of the drag force can be equated by exchanging the action of the quantum vacuum etheronic quanta with the action of some omnidirectional etheronic winds of the same mean impulse density: \( \rho_s = \rho_s v_c \cdot q P \), in which the \( m_p \)-particle is stationary. If the \( m_p \)-particle will receive an impulse \( m_p \cdot v \) in a direction \( x-x' \), by the Galilean relativity we may obtain the expression of the drag force in accordance with the expression (17) of the Stokes force, by the relation:

\[
F(m_p \cdot v) = k_s \cdot m_p \cdot \rho_c \cdot (\text{cte} v^2) \cdot (\text{cte} v)^2 = 4f_s \cdot k_s \cdot m_p \cdot c \cdot v \approx
= 6f_s \cdot (m_p/m) \cdot \rho_c \cdot v \cdot v
\]  

(29)

In which: \( f_s \approx 1,8 \times 10^{-13} \text{m}^{-1} \cdot \text{the quantum's calibration radius (CGT, [2])}, \( v = \eta \cdot \rho_c \) - the kinematic viscosity (\( \eta \)-the dynamic viscosity), and \( f_s \cdot 1 \) - particle's form factor, which takes into account also d'Alembert paradosse.\(^9\)

From the relation (29) it results the approximation:

\[
v_s = \left(\frac{2}{3}\right) r \cdot c \approx 3,6 \times 10^{-17} \text{m}^2 / \text{s}.
\]

Identifying- for the case of the interstellary space, the sub-quantum medium with the dark energy, we can take: \( \rho_s = 1,2 \times 10^{-26} \text{kg} / \text{m}^3 \), resulting- to the limit: \( v \rightarrow c \), that: \( a_s M = F_s M / m_p = 3,31 \times 10^{-8} \text{N/kg} \) - a value comparable to the terrestrial gravitational force, for example. We observe that- if the form factor \( f_s \) is very small by taking into account also d'Alembert paradosse, \( (10^{-13}) \) according to CGT, for concordance with the action radius of the electrostatic force\(^4\), the drag force \( F_s \) is almost negligible for a photon –for example, as in the case of a null rest-mass, and the first Newton's law may be considered as respected on non-quantum distances. We may observe also that- in the einsteinian relativity, as consequence of the light speed constancy postulate and of the einsteinian formula of the speed composing, the drag force given by eqn. (29) is of null value even at very high density \( \rho_s \) of the etheronic quantum vacuum, as in the case in which the mean speed of the etheronic winds acting over a particle is the same in each point, in each direction and for each speed of the particle. So, it results that the postulate of the light speed constancy is not antagonistic with the concept of ether and may be replaced with the postulate of the constancy of the etheronic winds mean speed on each direction and in each point of the space, which maintains un-changed the Newton's laws but avoids the paradoxical conclusions of the null rest-mass of photon and of the relativist mass increasing with the speed in the Einsteinian form.\(^6\)

Another consequence of the return to the Galilean relativity is the possibility to explain without the paradoxical einsteinian hypothesis of speed-depending mass variation the astrophysical particles of ultra-high energy \(-10^{17} - 10^{20} \text{eV} \), recently evidenced,\(^12\) considered as being protons or iron nuclei with relativist speed \((v \rightarrow c)\) and increased relativist mass,\(^3\) emitted by some unknown physical process and which were not predicted by the Standard Model of particles.

The argument for the conclusion that the mass of an elementary particle like the electron or the proton cannot increase really until values much higher than the rest-mass of the particle may be given by the law of (matter +energy) sum conservation, analyzing two hypothetical possibilities of speed-depending mass increasing:

1. **Classical**: The increase of the intensity of the relativist etherono-quanta vortex \( \Gamma_s(v) \) which is generated around the (super)dense centroid(s) of the elementary particle at its passing through the quantum and sub-quantum vacuum; by the condition of sub-solitons forming condition, which require that the energy of the forming vortex must be at least double than the energy of the formed mass, this mechanism, for the explaining the highest mass of some astroparticles \((-10^{20}\text{eV})\) imply the existence of a value of the etherono-quanta density of the quantum vacuum much higher than the dark energy density, in contradiction with the possibility to receive photons from far galaxies.

Quantum: The mass increasing by the attraction of already formed neutral bosons, particularly- of "dark photons" and/or Higgs bosons from the polarised quantum vacuum, by hypothetical gluonic quanta; this hypothesis supposes a high probability to meet dark photons and/or Higgs bosons in the quantum vacuum , in contradiction with the astrophysical observations regarding the possibility to receive astroparticles with \(-10^{20}\text{eV}\) from far celestial bodies. Also, the considered hypothesis imply the necessity to exists dark photons or other quantum vacuum bosons (particularly-Higgs bosons with parallel trajectory and relativist speed as those of the accelerated (astroparticle), for the possibility to explain phenomenologically the speed-depending mass variation of the relativist particle. In some previous papers of the author,\(^1\) the discovered elementary particles were explained by a vortexial model, of composite fermion type, as Bose –Einstein Condensate of N gammons considered as thermalized pairs: \( \gamma^* = (e^- e^+) \) of axially coupled electrons with opposed charges.

It was argued that the particles cold forming from chiral quantum vacuum fluctuations is possible at \( T \rightarrow 0\text{K} \) by already formed gammons, in a "step-by-step" process, by two possible mechanisms:

I. **by clumping**, with the forming of cold protons: \( z^* = 34 \text{m}_s \) and of basic z bosons: \( z^*_p = 7 \text{m}_e \); \( z^*_q = 2 \text{z}_e^0 \), with hexagonal symmetry and thereafter- of cold quarks \( q^0 \) and pseudo-quarks \( q^* \), by a mechanism with a first step of \( z^*(q^0/q^*) \)-pre-cluster forming by magnetic interaction and a second step, of \( z^*(q^0/q^*) \)-collapsed cluster forming , without destruction, with the aid of magnetic confinement given by residual magnetic moments \( \mu \), of the clustered gammons, which gives a superficial tension \( \sigma \), and:

II. **by pearlitizing**, by the transforming of a bigger Bose-Einstein condensate of gammons or other light bosons, formed in a gravitational field of a black-hole or in a strong magnetar-like magnetic field, into smaller gammonic clusters which may become particle-like collapsed BEC clusters by the non-destructive collapse of the gammonic BEC secondary clusters, the pearlitizing of the BEC resulting by the temperature oscillation.

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around the equilibrium temperature $T_\text{e}$ of the initial BEC.

III. The model allows the conclusion that a part of the dark matter may be formed by cold astro-particles. Some experimental arguments for the proposed model, are:

It was argued that while the a)-mechanism explains the known elementary astroparticles, the second, b)-mechanism of particle-like collapsed cluster forming, may explain the super-heavy astroparticles of $\sim10^{16}\text{eV}$, by a gammonic or mesonic BEC pearlitizing and non-destructive collapsing of the formed sub-clusters. For example, considering a radius $r_\text{G}$ of meta-stable equilibrium of a drop of BEC formed by the BEC’s pearlitization and maintained by the quantum interaction between the force generated by the internal vibration (thermal) energy $F_{\gamma}(r_\text{G})=\gamma \cdot N \cdot k \cdot T_{\text{e}}$ and the force generated by the surface tension, $\sigma$:

$$\frac{dE}{dr} = -R_0 \frac{dV}{dr} + \sigma \frac{dS}{dr} = 0; \quad V = \frac{4\pi}{3} r^3; \quad S = 4\pi \cdot r_2;$$  \hspace{1cm} (30)

Because $\sigma = \gamma \cdot R_0 \cdot 1$, (the force rectangular on unit length), for: $N_p \cdot a_1 \approx 3.57 \cdot 10^{14}$ f - the meta-stable equilibrium inter-distance between gammons, the equilibrium radius is:

$$r_p = \frac{2\sigma \cdot \gamma \cdot a_0}{4\pi \cdot r \cdot \gamma \cdot a_0^2} \cdot \left(\frac{1}{N_0 \cdot k \cdot T_{\text{e}}} \right) \left[ \text{fm} \right]$$ \hspace{1cm} (31)

in which $d_\text{G}$ is the meta-stable equilibrium inter-distance between adjacent electronic gammons and $l_\text{G}$ is the length of a linked gammon of the B-E condensate (BEC), for which we may approximate that: $d \approx l \approx a_1 \approx 1.41 \text{ fm}$.

The equality: $d = \gamma \cdot a_1 \approx 4 \cdot 4 \cdot \frac{10^{14}}{10^{14}}$ , from the quasi-equality between the magnetic $V_{\gamma}(d)$ potential and the electric potential between the Cooper pairs of electrons, $V_{\text{e}}(d) \approx e^2/4 \cdot 4 \cdot \pi \cdot d^2$ , for $d = a_1$, as consequence of the electric permissivity increasing: $\varepsilon(a_1) = \varepsilon_0 \cdot \varepsilon_0 \cdot a_1^2 \cdot 0$ - for $d = a_1$ , the refraction index depending on the quanta density at electron' surface:$^{11}$

$$n(a) = (c/a) \approx \sqrt{eV/a} \sim \rho c \cdot a \sim d - a = a - 2; \quad (\mu a \approx 1),$$

The refraction index depending on the quanta density:

$$n(a) = (c/a) \approx \sqrt{eV/a} \sim \rho c \cdot a \sim d - a; \quad (\mu a \approx 1),$$

$\mu = m_0 \cdot \gamma \cdot a_1 \approx 1$ for $d \geq 1.5a$, the correlation: $d = 1.5a \rightarrow T_{\text{e}} \approx 1$, resulting as consequence of the relation:

$$E_\gamma = 2m_e \cdot c^2 = V_{\gamma}(d) + V_{\text{e}}(d); \quad V_{\text{e}}(d) = \mu \cdot B(d) \approx \frac{c^3}{8\pi \varepsilon_0} \cdot \gamma \cdot a_1;$$

$$(d \leq 1.5a)$$  \hspace{1cm} (32)

the value: $d = 1.5a$ being specific to the hard $\gamma$-quantum and the value $d = a_1$ -to the gammon.$^{15}$ The expression (32) of $V_{\gamma}(d)$ results in CGT by eqn. (7), because the magnetic moment radius, $r_\mu$, represents the eleronic, quantum-vortextual model of magnetic moment, the radius until which the B-field quanta have the light speed, $c$, and because -for $d < r_\mu = h/2m_e \cdot c^2 = 386 \text{ fm}$, for $c$ -electron interaction is maintained the relation: $B = E/c$, resulting that:

$$B(d) = \frac{E(d)}{c} = \frac{\frac{e}{4\pi \cdot d^2 \cdot c}}{\gamma \cdot a \cdot d^2} = \frac{\mu_a \cdot \gamma \cdot a_1}{2\pi \cdot d^2} \cdot \frac{e \cdot r_{\mu} \cdot \gamma}{2\pi \cdot d^2},$$

$$a \leq d < r_\mu; \Rightarrow \quad r_{\mu} = d$$ \hspace{1cm} (33)

resulting -in consequence, that at inter-distances $d \leq r_\mu$, we have:

$$\mu = \mu_a(d / r_\mu), \text{ with } \mu_a = \mu_{BB}.$$

Inside the gammonic BEC, the metastable equilibrium inter-distance between gammonic electrons: $d = a$ corresponds -at a quantum temperature $T_{\gamma}$ specific to the $\gamma$-quantum, to a mean value between the values: $d_i = \eta \approx 0.96 \text{ fm} \text{ and } 1.5a = 2.11 \text{ fm}$ (which are values of unstable, respective- of stable equilibrium, at the quantum temperature $T_{\gamma}$ specific to the $\gamma$-quantum, which determine a gammonic self-resonance). The electric interaction between gammons results as negligible inside the gammonic BEC. Considering the correspondence with the quantum mechanics for the linking energy of the gammonic electrons, in the form (32), and approximating that for $d = a_1 = 1.41 \text{ fm}$, $l \approx a$, it may be shown$^{14}$ that the residual magnetic potential is: $V_{\gamma}(a) = \mu_a \cdot B(a) = \gamma /r_\mu$, $E_\gamma = m_a c^2$, and -neglecting the variation of $V_{\gamma}(d)$ with the temperature, the values: $F_r$, $F_\gamma$, and $r_\mu$ have the expressions:

$$F_{\gamma}(a) = \frac{\gamma \cdot B(a)}{a} = \frac{2\sigma \cdot \gamma \cdot a_0}{4\pi \cdot r \cdot a_0} \cdot \left(\frac{1}{N_0 \cdot k \cdot T_{\text{e}}} \right) \left[ \text{MeV} \right],$$

$$\text{resulted by the neglecting of the contribution of the electrostatic interaction force between adjacent gammons. The mass of the gammonic BEC may be approximated in this case by the relation:}$$

$$M_{\gamma} = \frac{4\pi \cdot r_{\gamma}^3}{3} \cdot \frac{m_a \cdot c^2}{k \cdot T_{\text{e}}} - \pi \cdot \frac{3}{4} \cdot m_\gamma \cdot \left[ \text{kg} \right], \text{ (mp = me)}$$ \hspace{1cm} (35)

It results that- at a metastable temperature $T_{\gamma} > 1 \text{K}$ of the gammonic BEC, for example, the mass of the gammonic cluster may be form $= 800 \text{ g}$ -to eqn. (35), corresponding to a radius of $\approx 8 \mu \text{m}$, (comparable with the mass of a hypothetical primordial micro-“black hole, i.e. $> 5 \cdot 10^5 \text{ g}$). For an exponential variation of the electron’s quantum volume density, with the mean variation radius: $n_{\gamma} \approx 10^{16}, \text{ fm}$, the repulsive force $F_r(d)$ of quantum disturbance, produced by “zeroth” vibrations of the electron’s super-dense kernel, corresponding to a quantum temperature $T_i$, is given by a quantum static pressure and a quanta density $\text{pr}(d,T_i)$, according to an equation of static equilibrium with the residual magnetic force, resulting that the cold collapsing of the gammonic BEC is stopped at an interdistance $d ~ T_{\gamma}$ between the gammonic electrons, the metastable equilibrium radius $d = a$ a corresponding -at a quantum temperature $T_{\gamma}$ specific to the $\gamma$-quantum, to a mean value between the values: $d_i = \eta \approx 0.96 \text{ fm} \text{ and } 1.5a = 2.11 \text{ fm}$ (which are values of unstable, respective- of stable equilibrium, (CGT)$^{14}$).

The temperature oscillation around the metastable equilibrium value $T_{\gamma}$ will generate the pearlitisation of the gammonic BEC according to the model, the formed sub-clusters resulting enough stable at $T_{\gamma} > T_{\text{e}}$ for the initiation of the cold non-destructive collapsing of the gammonic sub-cluster, according to eqns (34) and (35). The mass of the formed super-heavy particles depends on the pearlitising temperature.

For example, for the super-heavy astro-particles of $10^{17} \cdot 10^{20} \text{eV},(\approx 2 \times 10^{-16} \cdot 10^{-19} \text{kg})$, the metastable temperature results of values: $10^4 \text{ to } 10^5 \text{ K}$ -according to eqn. (35), so a gammonic BEC with bigger mass cannot be stable formed at such a temperature. At a transition temperature $T_{\text{beq}} \approx 1 \text{ K}$, with the known relation: $T_{\text{beq}} = 3.312 \cdot (h/m_k \cdot N^{1/3})$, it results as necessary an initial concentration of gammons: $N \approx 10^{14}$, for the transition to a gammonic BEC, which
appears as stable at T << T_{neff} (when \( \mu(r) = \mu B(r) >> k_B T \)).

We may suppose –en consequence, a cold forming mechanism for the super-heavy astroparticles of \( 10^{19} \text{–} 10^{20} \) eV, experimentally detected, by a gammonic or mesonic BEC forming and pearlitzing, for example- at the surface of a neutron star, particularly- of magnetar-type or even in the gravitational field of a black hole with material accretion disk around it, the escaping of the formed astro-particles from the black hole’s field being possible by the matter→energy conversion process which may generate also a pulsatory (temporary) anti-gravitic pseudo-charge of the BH star, according to CGT,12 i.e- by the releasing also of the energy of etheronic vortexes (of heavy, “sinergonic” etherons) of the magnetic moments of the degenerate electrons which composes the nucleons, according to CGT, phenomenon which may explain also the large temperature variation around \( T \_0 \) necessary for the gammonic BEC pearlitzing and the source of gammons, generated as components of destroyed \( z^e \)-preons which composes the nucleonic quarks- according to the model.13-17 It is also plausible –according to CGT, that the conversion: matter→energy in the field of a BH star with accretion disk, at \( T \rightarrow 10^{15} \) K, is generated by partial releasing of mesons and of component \( z^e \)-preons, which- after the restoring of the initial value of the black hole’s gravitic charge M, may generate, in the next period, new and heavier astroparticles by clusterizing and B-E condensate forming/pearlitzing and the non-destructive collapse of the formed BEC clusters/sub-clusters.

In the case of mesons \( (m_\pi = 2 \pi = 2 \pi \approx 272 m_e; m_K = 2 \pi + 3 \pi = 29 \pi \approx 986 m_e(CGT)) \) and of \( z^e \)-preons \( (\sim 34 m_\pi) \), because the eqn. (33), it results that the formed Bose-Einstein condensate is characterized by the same metastable equilibrium inter-distance \( (\delta \_s a) \) and the same expression of the meta-stable equilibrium radius, \( r_e \) (eqn. (34)) and of the B-E condensate mass, (eqn. (35)), but with \( m_\pi = m_e; m_K \) or \( m_\pi \) instead of \( m_p \). We may suppose also that a gammonic or mesonic BEC formed near the metastable equilibrium temperature \( T_0 \) could collapse by a temperature decreasing, forming ultra-heavy particles identifiable as primordial micro–“black holes” supposed in a hot forming scenario (as products of the “Big Bang”) by Zel’dovich and Novikov in 1966 and studied in 1971 also by Stephen Hawking, which considered a inferior limit of \( 10^8 \) kg for the possibility of micro-BH forming,18 considering also their “evaporation” by the emission of Hawking radiation.

The main experimental arguments for the proposed model of astroparticles cold forming are:

I. The experimental obtaining of a BEC of photons, (a super-photon- in 2010, by a German team)

II. The experimental evidencing of a 34m neutral boson, (cold genesis preon- in CGT), by a Hungarian team, but interpreted as quantum of a fifth force, of leptons to quarks binding.

III. The almost same size order of the radius of scattering centers determined inside the electron and inside the nucleon, (\( 10^{-18} \) m19–value considered also for quarks,20 but being the radius of a superdense electronic kernel, in CGT,22)

IV. The producing of mesons at interaction of high energy between protons,21 (arguing the existence of differentiated mesonic dense kernels inside the protonic quarks, according to CGT)

V. The \( \gamma \)-quantum splitting into a pair: \( e^+\cdot e^- \) in the electric field of an atomic nucleus; (argument the existence of the repulsive field of the electronic vibrated centroids, which impede the annihilation)

VI. The Cooper pair of electrons forming inside a superconductor; (argument for the \( \varepsilon \) permittivity increasing for: \( d<1.5a \), in connection with eqns. (33) and (32).)

**Conclusion**

By the Galilean relativity and in the frame of a Cold Genesis of Matter and Fields (CGT) which explains the gravitation and the electro-magnetic interaction by an electric charge model of static type, with spherical distribution of field quanta, compatible with the Fatio/LeSage model of gravitation and with the observations regarding the light beam deviation in the sun’s gravitic field, the planetary perihelion precession is explained phenomenologically as consequence of the dynamogene component of the gravitation force- resulted by the use of impulse current density tensor and as consequence of the high density of the sub-quantum medium, given by etheronic winds- in CGT, which generate an interaction of the etheronic winds with the material components of the leptonic, mesonic or baryonic particles in a non-newtonian hydrodynamic regime, imposing the necessity of a corrective factor: \( f = f(v/c)^{\varepsilon/2} \) to the dynamogene, pseudo-lorentzian part of the total gravitation force. Even if the resulted phenomenological relation for the gravitation force is not more general than the relation of the general relativity (based on the Einsteinnian special relativity but considering non-inertial systems), it permits the explaining of the gravitation force generating by avoiding the conclusion of the photon’s null rest–mass, which is in contradiction with the experimentally obtaining of a super-photon as Bose –Einsteinn condensate of photons.21 In the case of electrodynamics, the Lorentz‘ force results as quantum Magnus force. It is shown that the principle of physics law invariance may be maintained by considering also the d’Alembert paradoxe, without the paradoxical conclusion of the light speed invariance, of the null rest mass of photons/bosons and of the Einsteinnian mass increasing with the speed. It results also the possibility to explain the super-heavy astro-particles, experimentally detected, by a model of gammonic or mesonic Bose-Einsteinn condensate forming and pearlitzing, with the non-destructive collapsing of the formed sub-clusters, in the gravitic field of a neutron star, particularly- of magnetar type or in the field of a black hole star with material accretion disk, i.e- by the matter→energy conversion process which may generate also a pulsatory (temporary) anti-gravitic pseudo-charge of the BH star but also mesons, \( z^e \)- preons \( (\sim 34m_\pi) \) and gammons- according to CGT, considered as pairs of electrons with opposed charge, magnetically and axially coupled. Particularly, it results that- by the collapsing of the heavy gammonic or mesonic BEC by the temperature decreasing under the metastable equilibrium temperature \( T_0 \), could be formed ultra-heavy particles identifiable with the considered primordial micro- black holes in a hot forming scenario.

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**Conflicts of interest**

The author declares there is no conflict of interest.

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