The Generation of Propulsion Force by the Quantum Energy: The "E-M Drive" Case

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Abstract

According to an etherono-quantonic cold genesis theory, based on the Galileian relativity, which sustains the possibility of particles cold genesis by a vortexial nature of the magnetic field, given byan etherono-quantonic vortex: $\mathbf{\Gamma}_M = \mathbf{\Gamma}_A + \mathbf{\Gamma}_\mu$ which explains the magnetic *A*-potential and *B*-induction by etherons with $m_s \approx 10^{-60}$ kg and quantons with $m_h \approx h/c^2$, by a resulted quantum-vortexial particle model, of composite fermion type, the EM-drive case of electromagnetically generated propulsion in vacuum by microwaves emission at 1936.7 MHz is explained by three simultaneous phenomena of EM thrust generating: a) the vibration of electrons inside the inner surface of the conical part of the microwaves antenna, under the action of microwaves; b) the conversion of radiative thermal energy of the environment into radiation of scalar quanta, by the vibrated charges of the microwaves conical antenna, at a critical value of vibration energy which allow the absorption of IR quanta; c) the generating of a propulsive force of quantum pressure gradient produced by electromagnetically vibrated atomic charges of the inner surface of microwave antenna, which increases locally the static etherono-quantonic pressure proportional with the vibration energy. Various realized experiments are in concordance with the considered explicative phenomenological mechanism. Other experiments arguing the possibility of *γ*-quantum conversion into non-ionizing quanta by the vibrating charges, at a critical vibration energy value. There are proposed also some verifying experiments and a drone variant using levitation/propulsion obtained by quantum fields and air ionizing and displacing.

Subject Areas

Theoretical Physics

Keywords

EM-Drive, Etheronic Theory, Quantum Vacuum Energy, Scalar Radiation,

Microwaves

1. Introduction

In a relative recent paper [1], were presented the NASA experimental results of a new type of propulsion in vacuum, obtained by a tapered radio-frequency (RF) cavity excited in the transverse magnetic (TM212) mode, at 1936.7 MHz which generated a unexplained thrust force F_T at a thrust-to-power level of 1.2 - 3 mN/kW (50.1 μN with 16.7 W) until 300 mN/kW (750 mN with 2.5 kW), in vacuum of less than 8×10^{-6} torr, close to those previously obtained by Y. Juan *et al.* and by G. Fetta. This type of electromagnetic propulsion, shortly named "EM drive", was explained as resulting from the dynamics of the zero-point field which generates virtual fermions and virtual photons—according to quantum mechanics, (QM). This phenomenon plays the role of pilot-wave for real particles, and the dynamic quantum vacuum could potentially be modeled at the microscopic scale as an electron-positron plasma, basically, according to a theoretical works of H. White, [2] [3], even if other virtual fermion-antifermion pairs may be generated (**Figure 1**).

But other physicists have objected against the theoretical concept of "vacuum plasma", underlying the fact that the electromagnetic vacuum fluctuations are not like a plasma capable of magneto-hydrodynamic effects [4].

Another possibility of force generating using microwaves is the kinetobaric effect [5], consisting in a dynamic effect over a balance with a body with water and a microwaves antenna in contact with the water, obtained by the absorbed microwave energy of 900 - 1600 MHz, transmitted in pulses of high frequency. But at lower power, the dynamic effect is higher than the consumed power. The effect obtained by the electrogravitic experiments of Zinsser [6] [7] [8] involves the use of a dielectric medium, like water, for greater efficacy and charge density, being obtained in this way forces of ~100 dynes acting over a water-chamber (activator) with a mass of 200 - 500 g, which was mounted on a torsional pendulum [6] [7].

It is also known the effect discovered by John Hutchison (the Hutchison effect,
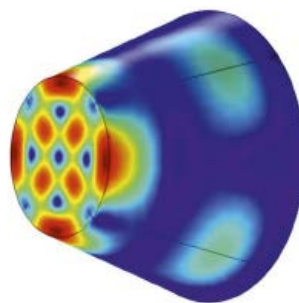

Figure 1. Simulated transverse magnetic modes TM20, (red—high, blue—low) at the wide and narrow ends of a metal tapered cavity differ from each other, forming an anisotropic interference of electromagnetic waves [4].

[9]), which evidenced the levitation of some objects from various materials such as a steel ball or cold breaking of metal under the combined action of radio frequency fields, generated of at least two Tesla coils, particularly—of 455 KHz frequency and a microwave field of 21 - 26 cm wavelength, produced in pulses by a source of at least 75 W—for the levitation of a tennis ball and at least 1.5 kW for metals cold cracking, using a voltage of 120 V in the presence of an electrostatic potential of at least 10 kV, (typically, of about 50 KV), produced by Van der Graaf generator, [10]. The phenomenon is not explained satisfactorily. Some researchers considers that the effect is due to the oscillation of the resonant frequency of the metal network charges under the action of the electrostatic field of high voltage and high frequency.

2. Theoretical Premises

The force acting over water-chamber (activator), which was mounted on a torsional pendulum, when a (very small) high frequency energy was applied by the radiant elements, (**Figure 2**), caused a so far unknown "trigge energy" changing the gravitational characteristic of the activator, observed by thedrive impulse. In the seventies, W. Peschka reproduced the experiment and confirmed R. Zinsser's results.

Because that the kinetobaric effect was not obtained in vacuum of 10^{-5} torr, this effect and the Hutchison effect were explained by the author in the references [11] [12] [13] [14] presenting a cold genesis theory of particles and fields, (CGT), by the hypothesis of a scalar radiation quanta emission [15], realized according to the energy conservation law applied to the conversion of quasi-simultaneously captured photons into a scalar quanta formed as doublet of two photons with bigger mass coupled in antiphase, at a critical value E_v^0 of charge's vibration energy $\Delta\varepsilon_v$, according to the equation:

$$n\cdot\varepsilon_i + m_p c^2 \rightarrow \left(\text{by } \Delta\varepsilon_v\right) \rightarrow m_p^* c^2 + \varepsilon_w; n\cdot\varepsilon_i \approx \varepsilon_w; \Delta\varepsilon_v > E_v^0 = \varepsilon_w/K_v; \quad (1)$$

where: ε_i; ε_w—are the energy of the captured photons and, respectively, of the emitted scalar quantum generated by electromagnetic vibration with a vibration energy $\Delta\varepsilon_v/\text{per}$ emitted scalar quantum and K_v is a constant which can be
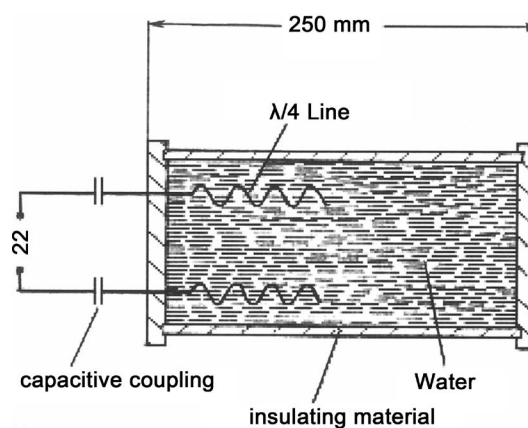

Figure 2. Sample capacitor probe used by Zinsser.

of over-unity value—according to some experiments [9], without contradiction with the energy conservation law.

Equation (1) may explain the kinetobaric effect as a consequence of the ionizing effect of the ε_w—scalar quanta, [11] [12] [13] [14], is in concordance with the effect of γ-rays production into a plasma of gold ionized atoms by laser pulses of ~10^{15} W [16], explained by Equation (1) as effect of photons absorption by the quantum volume of vibrated atomic charges.

In the presence of a gas, the ionizing effect of scalar quanta generates charge separation which—in the presence of a high electrostatic potential, may generate a displacing force of air pressure difference acting over a body.

More relevant in this sense is a particular case of the kinetobaric effect, in which the activator, positioned to an end of the horizontal arm of the torsion balance, after placing a plastic bucket with 6l. hot water of 45.5˚C at approx. 10 cm distance from it, determined a "right deflection" of the torsion balance, as if the water bucket would "attrack" the sample, [6]. The repeating of the effect with hot objects and with ice water showed that the activator is displaced toward the hot object, the effect increasing with the object's temperature and in the opposed sense in report with the ice water, (the ice behaving quasi "repulsively").

This effect may be explained—with Equation (1), by the conclusion that the electromagnetically activated electrons/protons of the activator converted IR photons generated by the hot water of the bucket into scalar ionizing quanta which ionized the air between the activator and the bucket more than in the opposed part (as consequence of the fact that the IR photons absorptions was more intense in the part closed to the bucket with warm water), generating in this way a cold quasi-plasma which reduced locally the static pressure and generated a displacing force of pressure difference between the walls of the activator, with the force sense toward the bucket with warm water (emitting more IR photons) or warmer region (when was used a ice water instead of a hot object).

A relevant particularity of the kinetobaric effect is also the fact that—using electromagnetic radiation frequencies within a range of 30 to 40 MHz, 120 to 130 MHz, 200 to 350 MHz, during a sinusoidal waveform feed, no dynamic effects occured, phenomenon indicating that apparently harmonic wave portions are necessary, [6], in concordance with the conclusion of Equation (1) that—for IR or visible radiation photons absorption, is necessary a charge's vibration with an energy per oscillation period exceeding a critical value, E_v^c, (*i.e.*—vibration "in shocks", as those produced by an instantly generated electric field,)), particularity explained by the quantum-vortexial composite fermion model of charged particle, deduced in the cold genesis theory [11] [12] [13] [14], by the conclusion that photons which normally are reflected on a charged particle surface, may penetrates its quantum volume surface when the surface's vortexiality and density is decreased by the intrinsic vibration of the superdense kernel of the particle, produced by particle's vibration "in shocks", [11] [12] [13] [14].

The emitted bosonic double pairs with a null spin and an energy: $\varepsilon_w = 2\left(m_w - \overline{m}_w\right)c^2 \cong 2 \cdot h\nu_w$, given by the inertial mass, corresponds to the cha-

racteristics of the scalar radiation photons which—as in the theory of Gupta and Bleuler [17], do not contribute to the electromagnetic radiation energy—phenomenon explained with the soliton model of photon [18] by the fact that these bosons represents a pair of two $h\nu$-photons of electromagnetic radiation coupled in antiphase, 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 [19] concerning the emission of scalar radiation obtained by electromagnetic vibration of atomic nuclei, with the ε_w energy of quanta in the violet and ultraviolet spectra:—proportional with the mass of the vibrated nucleus, according to the equation of harmonic oscillator:

$$v \sim \sqrt{(k/M)} \ ; \ (M = m_n.A \ ; \ k\text{—the quasielastic constant}).$$

-It is plausible also the conclusion that the reaction (1) may be extended for the explaining of some observed nuclear transmutations into shot-life isotopes of Cs137 and Sr90 nucley, induced by X-rays, [20], (explained by conversion of X-ray quanta into γ-quanta conform to Equation (1), according to the quantum-vortexial model of particle specific to CGT).

-There are some experimental arguments also for a reaction in the form (1) but of inverse sense, *i.e.*:

$$\varepsilon_\gamma + m_p c^2 \to \left(\text{by } \Delta\varepsilon_v\right) \to m_p^* c^2 + n \cdot \varepsilon_i \ ; n \cdot \varepsilon_i \approx \varepsilon_g \ ; E_v^0 = \varepsilon_g / K_v \ ; \qquad (2)$$

by which a gamma –quantum with energy: $\varepsilon_\gamma = h\nu_\gamma$ is converted into n X-ray quanta or non-ionizing quanta (of visible or/and infrared radiation), by the atomic particles vibration with a vibration energy $\Delta\varepsilon_v/\text{per}$ received γ-quantum, as consequence of its vortexial etherono-quantonic structure, reaction which may explain the next experimental results:

-The reducing with ~50% in ten minutes of the γ-radioactivity of a Co60 or A241 sample maintained in a Brown gas torch (HHO) [21];

-The neutron emission by a nucleus with giant dipole resonance, by absorption of a gamma photon with an energy greater than the nucleon's binding energy [22], (the resulted n photons with lower energy—in accordance with Equation (2), acting as quanta of a scalar repulsive pseudo-charge and generating the neutron's separation);

-The fact that—during 10 hours in a 5-kilowatt cavitator, was measured a 20% decrease of radioactivity in the activated liquid and around the cavitator; the explicative theory consider that a controlled disturbance of aether density influences radioactivity decay, [23].

At the 3rd Russian Conference on Cold Fusion and Nuclear Transmutation in October 1995, Dr. Yuri N. Bazhutov announced the surprising discovery of C_{14} in the water used in the vortex cavitation machine (YUSMAR) invented by Dr. Yuri S. Potapov (Kishinev, Moldova), [24].

The Jack Keller's catalytic process which reduces by 60% - 70% the radioactivity of some radioactive substances by mixing the radioactive material with a pyro-chemical fluxing compound, the mixture being ignited with a propane torch;

the catalytic reaction turns the mixture into a boiling, sputtering molten liquid looking like it might erupt magma, [23].

According to the theory and by Equation (1), the nuclei which presents nuclear self-resonance and giant-resonance, are natural emitters also of scalar radiation quanta, and—according to a vortexial, cold genesis model of nucleon, of nuclear interaction and of deuteronic self-resonance [11] [12] [13] [14], it is possible to generate quanta emission and even pseudo-antigravitic (pseudo) charge of a vibrated nucleon or electron, not only in the form of photons emission but also in the form of a flux of quantons ($m_h = h \cdot 1/c^2 = 7.37 \times 10^{-51}$ kg) and of sinergonic etherons ($m_s \approx 10^{-60}$ kg) released by the magnetic vortexes Γ_μ^* of a number N^p of degenerate electrons (quasi-electrons, $m_e^* \approx 0.8 m_e$) which forms the nucleon coupled in pairs: $\gamma^* = e^{*+} - e^{*-}$, according to a Bose- Einstein gammons condensate model of mesonic or baryonic particle.

According to this model of nucleon, the cold genesis of electrons and of nucleons is possible also in the actual Universe, but in the vortexial field of a gravistar or a magnetar with a very strong magnetic field: $B_s \rightarrow 2 \times 10^{12}$ T , which may generate the confining of photons into electrons and positrons which thereafter forms γ^* —gammons of the quantum vacuum, which may be magnetically confined into a N^m, N^p or N^b neutral cluster of cold mesons or nucleons or other baryons, [11] [12] [13] [14].

From this cold genesis model of particle, it result also that it may be realized a weight decreasing for a metallic sandwich of 1 - 5 mm with an upper strong magnetic layer, a median thin layer and an inferior layer of lead strongly doped with nuclei with giant resonance: U, Zr, Pb excited with gamma rays or with relativist electrons, which—by the induced deuteronic resonance, will increase the local static quantonic pressure which will generate a quantum pressure gradient ΔPs corresponding to a quantum pseudo-antigravitic (levitation) force, which—acting over a nucleon, has the value:

$F_a = k_h \cdot m_p \cdot \Delta Ps$, ($k_h = 27.4$ m^2/kg; $m_p = 1.67 \times 10^{-27}$ kg –the proton mass, [12] [13]).

3. A New Explicative Model of EM-Drive Force Generation

3.1. The Proposed Explicative Model

We observe that it exists some relative similarly explicative hypothesis between the explanation given by H. White for the EM-drive force generation, according to which the dynamic quantum vacuum could potentially be modeled at the microscopic scale as an electron-positron plasma, and the cold genesis theory of nucleons, (CGT), which consider the existence—in the quantum vacuum, of real bosons in form of $\gamma^* = e^{*+} - e^{*-}$ "cold" gammons and other pairs of degenerate fermions, including also ($\mu^{*+} - \mu^{*-}$) pairs, with very low vibration of constitutive particles ($h\nu_v \rightarrow 0$) in the interstellar space, which are a part of the quantum vacuum "dark" matter, according to CGT, with quantum-vortexial structure.

According to the model, in the interplanetary space, in conditions of a tem-

perature $T > 0$ K, the intrinsic vibration of this bosons of quantum vacuum with a mass lower than those of a π-meson, increases by the relative vibration of the constitutive degenerate fermions (e^*, μ^*), but without total separation. The sum of these leptonic bosons with intrinsic vibration may be considered—in this case, as a pseudo-plasma (or "virtual" plasma) in the sense that it contains electric charges but with a periodic and small separation distance between the negative and the positive charge.

Identifying these leptonic bosons of quantum vacuum with "zerons" of ,dark matter' with low self-resonance (oscillons, $m_b = 2m_c$), their phononic intrinsic vibration energy, E_v, of paired fermions results lower than their rest energy, *i.e.*:

$$E_n \cong \left(\Delta p \cdot \Delta x_v / \Delta \tau\right) < E_q, \left(E_q = m_b c^2 = 2m_c c^2; \Delta x_v \leq A_v\right) \tag{3}$$

($\Delta \tau$; Δx_v—the self-resonance period and amplitude),

This self-vibration results in a classic sense in CGT, by a strong potential, $V_s(r, l_v)$, generated by the superposition of the N^m magnetic moment vortices Γ_μ^* of constitutive quasielectrons: $V_s(r, l_v) = (N^m) \cdot V_e(r, l_v)$ which—at a quantum temperature $T > 0$ K, by $\left(e^{*+} - e^{*-}\right)$ or $\left(\mu^{*+} - \mu^{*-}\right)$ collision, is transformed partially, for a very short time, by mass→energy conversion, into a repulsive potential, V_r, of the quantum impenetrable volume (kernel) of the e^{*-} or μ^{*-} constituent, the self-vibration being maintained by the periodical generation of this repulsive V_r–potential as consequence of the value of attractive electric and magnetic potential: $V_a \approx V_e + V_m$ which determine—at $T > 0$ K, the value of the kinetic energy of the vibrated e^{*-}/μ^{*-} constituents and the vibration amplitude which—according to the quantum mechanics, has the maximal value:

$$A_v^* = \Delta(x_A)_M \approx \hbar / 2\Delta p^* = \hbar / 2m_c \cdot c \; ; \hbar = h / 2\pi \tag{4}$$

The A_v^* value of Equation (4) corresponds to an impact energy of the components: $E_c^M = m_c c^2$, *i.e.*—with a speed: $v_M = c$, which determines their separation, and to a vibration frequency:

$$\nu_v^M = 1 / \tau^* = E_c^M / \hbar = m_c c^2 / \hbar \tag{5}$$

For the degenerate electron of a gammonic pair, ($m_c = m_e^* \approx 0.8 m_e$), the value given by Equation (5) is: $\nu_v^M \approx 6.16 \times 10^{20}$ Hz and it corresponds to a temperature: $T_e^* = m_e^* c^2 / k_B \approx 4.8 \times 10^9$ K, (characteristic to an electrons plasma of a white dwarf).

Extrapolating Equation (5) for lower temperatures, $T_e \ll T_e^*$, it results that a vibration frequency ν_v in the domain of microwaves frequency of: $\nu_v = 1.93 \times 10^9$ Hz, correspond to a impact energy of the degenerate electrons of quantum vacuum gammons: $\gamma\left(e^{*+} - e^{*-}\right)$, of value:

$$E_c(\gamma) = m_e^* v_e^2 = 2E_c(e^*) = 2 \times 10^{-25} \text{ J}, \left(v_e \approx 5 \times 10^2 \text{ m/s}\right), \tag{6}$$

and to a temperature: $T_e \approx 1.45 \times 10^{-2}$ K, which is much under 1 K, *i.e.*—it correspond to a mass of low thermalized bosons (gammons—in this case) of the quantum vacuum, with a specific vibration amplitude of the intrinsic vibration,

A_v.

But even if we use the classic relation of the harmonic oscillator: $v_M = \omega \cdot A$, for estimate the value of the vibration amplitude A_v corresponding to the frequency: $v_v = 1.93 \times 10^9$ Hz, with the resulted value of v_e we obtain a value much higher than those given by Equation (4), which correspond to a plasma of free electrons mixed with positrons, *i.e.*—of non-paired electrons.

Also, for a gammonic pair: $\gamma\left(e^{*+} - e^{*-}\right)$, the possibility of a A_v-vibration amplitude value higher than those given of Equation (4) is physically excluded for the degenerate electrons m_e^*, because the value of the attractive potential, $V_a \approx V_e + V_m$ generated between the separated components: $e^{*+} - e^{*-}$, which limitates the vibration to an amplitude value: $A_v \leq A_v^*$.

We have in this case two physical possibilities:

a) the attractive potential $V_a \approx V_e + V_m$ has a degenerate value on fermionic distances: $d < 4a_c$, ($a_c = 2.82$ fm—the classical radius of the electron).

b) the vibrated charges which generates the EM-drive force are not contained by gammonic pairs $\gamma\left(e^{*+} - e^{*-}\right)$ of the quantum vacuum;

-The first possibility was indicated as probable in CGT, [18] [25], as consequence of the variation of the electric permittivity ε and of the magnetic permeability μ with the local density of etherons and quantons, ρ_l—which explain the magnetic field by an etherono-quantonic vortex: $\mathbf{\Gamma}_M = \mathbf{\Gamma}_A + \mathbf{\Gamma}_\mu$, and which modify also the light speed, according to relation:

$$n_l = c/v_l \approx \sqrt{(\varepsilon\mu/\varepsilon_0\mu_0)} \approx \rho_l/\rho_0 \qquad (7)$$

in which ρ_0 is the quantum vacuum density in the absence of matter, (corresponding to $v = c$).

Because that we must conclude that the photon released by the quantum volume of an electron has the light speed, c, when get out from the volume of classic radius: $r_c = 2.82$ fm, it results that the variation with a fermionic distance "r" from the degenerate electron center, of the local density of quantum vacuum, is too small for explain the EM-drive experiment. In the same-time, by the previous conclusion is excluded also the hypothesis of electronic Cooper pairs existence in the quantum vacuum.

-The second possibility, b), imply the conclusion that the vibrated charges which generates the EM-drive force in vacuum, are electrons of the conical antenna of microwaves, used for generate the E-M propulsion force.

The explanation for the effect of EM-drive refers—in this case, to the consideration of three simultaneous phenomena of E-M thrust generating:

a) the vibration of electrons inside the inner surface of the conical part of the microwaves antenna, under the influence of microwaves;

b) the conversion of radiative thermal energy of the environment into radiation of scalar quanta, by the vibrated charges of the microwaves conical antenna, at a critical value of vibration energy, E_v^0, according to Equation (1); —the impulse of generated scalar quanta parallel with the antenna's axis will generate propulsion force by their radiative pressure, respective—according to

the impulse conservation law;

c) the generating of a propulsive force of quantum pressure gradient produced by electromagnetically vibrated atomic charges of the inner surface of microwave antenna, at a critical vibration energy; this quantum pressure gradient acts as a pressure difference force over the atomic nucleus of the exterior surface of microwave antenna.

The explaining of E-M force generation by paired-photons production was proposed also by Grahn, Annila, and Kolehmainen, [26], but by a different phenomenological mechanism.

3.2. Arguments for the Proposed Explicative Model

-An argument for the b)–phenomenon existence may be also the results of the photons-electron interaction experiment, (Stanford, 1997, [27]), of γ-rays emission by interaction with green laser pulse and the observations of γ-rays emission generated by thunderstorm, (italian group, 2000, [28]), these observed phenomena being explained—according to the model, by Equation (1) in which the converted photons into scalar quanta, identified as gamma-rays quanta, are luxons.

-Another argument for the b)–phenomenon existence is given by some experiments made with the so-named "caduceus coil". Thephysicists Elizabeth Rauscher, Glen Rein, and associates have investigated the interactions of Co60 with non-hertzian, scalar energies such as the scalar fields generated by the "Smith coil"—a caduceus-wound coil invented by Wilbur B. Smith in the 1960 s, [29]. When was energized (3 mA/5W), the non-inductive Smith Coil (8.2 ohms) reduced the background radiation by 97% (from 0.5 mR/hr to 0.0015 mR/hr) and when applied to Co60, the radioactivity increased from 150 to 250 mR/hr, [30].

-Caduceus coil basically consists of ordinary insulated copper wire wound in a double-helix around a ferrite core, (Figure 3) and has zero impedance, so—the signal pumped into the coil cannot be detected) by a standard RF (radio frequency) detection apparatus. Because that the oppositely wound wires of the double helix, when the high frequency current flows in opposite directions through the two wires, the magnetic fields are mutually canceled, (excepting the
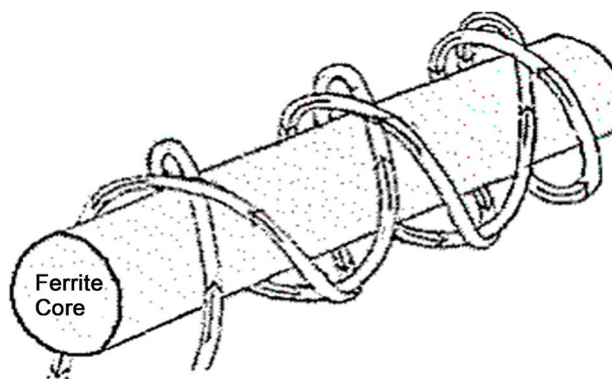

Figure 3. The caduceus coil.

extremities of the coil), but-according to the superposition principle, the effect is equivalent with the superposing of two electromagnetic waves which are identical but in antiphase and generates scalar waves which—according to the vortexial photon model specific to CGT [18], consists in paired inertial masses of two pseudo-scalar photons which are lost their evanescent vortexial part contained in the volume of Compton radius.

One radio amateur found that with two such coils, one used as a transmitter and the other as a receiver, the second would not pick up the signal from the first unless they were precisely aligned for the signal to be transmitted the alignment had to be as critical as that of a laser beam.

It was mentioned also the fact that a few investigators have also reported unexpected bizarre inertial effects in conjunction with these coils. One researcher activated his caduceus coil with pulsed bursts of microwave frequency whereupon it appeared to lift itself up by its own bootstraps executing a periodic series of little hops off the ground-phenomenon which has no explanation under electromagnetic theory, being attributed to the field effect produced by the coil winding, [29].

According to the considered b) –mechanism, the charges electromagnetically vibrated at the ends of the caduceus coil may absorb easily the generated scalar quanta producing—according to Equation (1), other scalar quanta with bigger mass and energy, *i.e.*—which are air ionizing quanta, the air ionizing above the coil explaining the small lifting force observed in the previously mentioned experiment, the reducing of the background radiation by the caduceus coil being explained by the Equation (2), according to the proposed explicative model.

-Another argument for the b)—phenomenon existence is given by an experiments of air ionizing with high power microwave pulse overlapped with a high energy laser pulse, [31].

-It may be explained by Equation (1) also the "phantom leaf" effect (the Kirlian image of a cut leaf) and the electric field of the plant "phytologica electrica" which actions by a discharge of 100 - 200 V until ~2 m, but only under the sunlight, [13].

-Also, the Equation (1) may explain better the lightning phenomenon, which is generated between a cloud and the earth even if the dielectric properties of the atmosphere not explain the electric charge conduction, existing also an explicative theory which postulates that showers of relativistic electrons are created by cosmic rays and are then accelerated to higher velocities via a process called "runaway breakdown", [32] [33]. According to Equation (1), the lightning is generated first between two closed parts with opposed electric charges (inter-clouds or intra-cloud), more probable, in a relative wet air, the hit atomic charges converting the infrared and visible radiation photons into ionizing scalar quanta which generates more free electrons and ionized discharge channels which will generates discharge streamers, permitting the continuity of the electric discharge process by the phenomenon's repetition, in the sense of the generated electric field.

-An argument for the c) –mechanism existence may be—according to CGT, [25], an un-desired enigma of the Tchernobyl's reactor accident, consisting in the fact that it is not known the nature of the force which had pushed the cover of almost 2000 tons of the reactor called Elena, moved without the distortion of the reactor walls in the accident, being formulated the hypothesis of the generation of an un-known anti-gravitic force, [34].

4. Possible Verifying Experiments

In accordance with the theoretical explanations given for the EM-drive force, it may be proposed an verifying experiment, made by placing a plaque of microwaves absorber material, (magnetic absorber—with magnetic particles or foam absorber—with carbon particles) in the proximity of the circular wall of the microwaves cavity (rectangular on its axis).

-According to the explicative model, the propulsion force will be maintained to at least the same value if the microwave absorbing plaque is placed inside the conical antenna cavity in an antinode position.

Also, conformed with Equation (1), the propulsion force may be increased by the simultaneous action of a microwave field and a photonic field or flux of infrared or visible radiation and by using terawaves instead of microwaves.

It results also—according to Equation (1), that it may be generated propulsion force also by an electrons flux emitted by an electron gun in vacuum, between two metallic plaques with increasing distance between them (similar to a horn antenna of microwaves), forming an electric capacitor included in a high frequency and power circuit and heated by induction currents, or by generating the multipactor effect with microwaves of high energy between the considered metallic plaques.

It results also that the effect of scalar quanta producing according to Equation (1) is more intense by the electromagnetic vibrating of light or heavy nuclei of a solid body or of an ionized gas.

-Relating to the initial explicative hypothesis of H. White [1], it results—by Equation (4), that for the generating of resonant oscillations of the gammonic degenerate electrons in the quantum vacuum, are necessary coherent gamma-rays (specific to a graser emission) of $v_\gamma \approx 6 \times 10^{20}$ Hz or with a frequency equal to a sub-multiple of v_γ, *i.e.*—with $v_r = v_\gamma / n; n = (1, 2, \cdots, 10)$.

-Because of the ionizing property of the scalar quanta generated according to Equation (1), the previous proposed experiment may explain better the possibility to generate plasma filaments in air, with electrons density of $10^{17}/cm^3$, by a high power microwave pulse overlapped in time and space with a high energy laser pulse, on a small localized region, [31], using a pulsed Nd:YAG laser beam (8 ns, 600 mJ, repetition rate 10 Hz) and a microwave pulse of maximum power of 400 MW, frequency of 10.1 GHz, and energy of 6.8 Joules. This possibility may be important also for the generation of ionic propulsion and levitation force in the Earth's atmosphere, by air ionizing and the acceleration or—respective—simple repelling of the generated ions, by an adequate electrostatic E field.

For example, for sustain in levitation a body of $S = 50$ cm^2 surface and with a mass $M \approx 1$ kg, is necessary—at the Earth's surface, an atmospheric pressure difference: $\Delta p_a \approx 2 \times 10^3$ N/m$^2 \approx 0.02$ p^o, (p^o—the atmospheric pressure).

Considering that this pressure difference Δp_a is obtained by the expelling of a number: $\Delta n_a \approx 0.02$ $n^o \approx 4.8 \times 10^{23}$ positive ions/m^3, with the aid of a separating electric E—field higher than those generated by the microwaves field, ($n^0 \approx 2.4 \times 10^{25}$ molecules/m^3—corresponding to the air mean density: 1.3 kg/m^3), we observe that the necessary ions concentration: $\Delta n_a \approx 4.8 \times 10^{23}$ ions/m^3 = 4.8×10^{17} ions/cm^3 is of the size order of those of the electrons density in the air plasma generated by the mentioned experiment with high power microwave pulse overlapped with a high energy laser pulse, [31].

But for the generation of the same levitation effect only by non-ionizing primary radiations including a microwaves radiation and an electrostatic field, *i.e.*—by the Hutchison effect [9], is necessary a microphysical mechanism according to Equation (1) of secondary ionizing scalar radiation generation, in our opinion.

-Also, the air ionizing effect obtained by high energy pulses of microwaves or terawaves and photonic radiation may be used for levitating and driving in a selected direction of an airship, for example—a levitation drone in form of flying disk, (**Figure 4**), with a metallic frusto-conical part, c' continued to the bottom with a discoidal metallic "skirt", s' which will be positively ionized, with a circular negative electrode, r' to the margin of the "skirt", formed by corresponding segments, electrically isolated between them with an isolator, i', which will attract selectively the positive ions formed by the air contact with the frusto-conical part and the "skirt" part—with role of positive electrode of very high potential (of at least 100 KV), under the simultaneous action of high energy pulses of microwaves or terawaves and of laser radiation, emitted by generators, a' and, b', (preferably masers and—respective—lasers).

In another variant, the frusto-conical part, c' may be continued with a cylindrical bottom part, d' connected with the "skirt" part, c' by electric isolators which may sustain also a circular electrode, e' with negative charge on the superior part, positioned under the frusto-conical part, c', which will attract the positive ions created by the air contact with the frusto-conical part, generat-
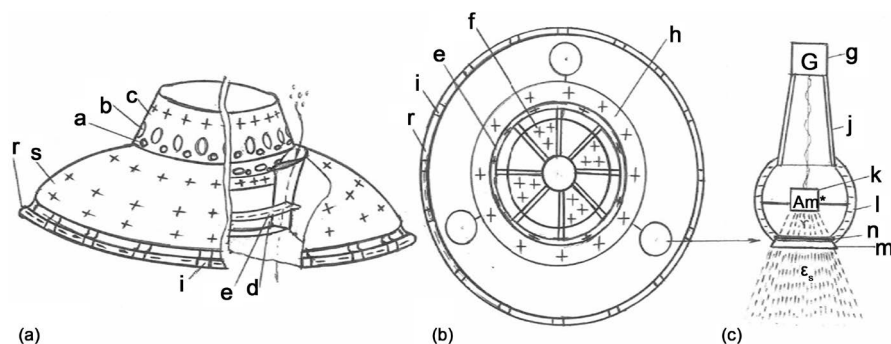

Figure 4. Drone variant using levitation/propulsion realized by air ionizing (a) and pulsatory ions repelling (b), (c).

ing levitation and ionic propulsion.

The proposed mechanism for ionic levitation is relative similar with the electro-hydrodynamic variant of the Biefeld-Brown effect [35], (the "lifter" variant of the used device).

The circular horizontally bottom part of the drone may be also used for create levitation force, by pulsatory charging with positive charge of an annular zone, h' and by similarly and alternately charging on some metallic sections, f' of a central circular zone, (the charging of the sections with odd number in a half of period and of those with even number—in the second half of period—Figure 4(b)), the ionized circular zone acting in this case as a propeller. The effect may be intensified by heating the metallic sections "f" with induction electric micro-currents of high frequency, (few hundred of MHz), according to Equation (1).

For the air ionizing may be used also the reaction (2) by converting into scalar ionizing quanta a flux of γ-rays produced by the Barker effect [36] of γ-radioactivity increasing by subjecting γ-radioactive materials such as Am241 or Cs137 to a high negative electrostatic potential (50,000 to 500,000 volts) of a metallic sphere "l" with a large hole, (Figure 4(c)), in which is placed the γ-radioactive substance which can be stimulated also with high pulses of microwaves (generated by a magnetron or a maser "g") —according to Equation (1) and the proposed drone variant, the produced γ-rays activating a plaque placed under the metallic sphere in its hole, formed by a microwave absorbing material "m" with positive gradient of absorbance, which will emits more scalar ionizing quanta (with energy comparable with those of X-Rays quanta)—according to Equation (2), coated to the superior part with a ceramic material "n" permeable for γ-rays and for microwaves/terawaves, (with low magnetic permeability) and with property of electric isolator, the quantum pressure gradient generated by electromagnetic vibration of atomic charges acting over the atomic nuclei as an antigravitic force of levitation, according to the explicative model.

For the plaque part of microwave/terawaves absorbing material "m" with positive gradient of absorbance, may be used also meta-materials filled with microwaves absorbing particles, (ferrite, magnetic particles carbon powder, etc.). This plaque part may be electrically connected to the positive charged annular zone "h" and may be activated also with an infrared radiation (generated by an iraser (IR-maser), for increasing the effect of γ-rays absorbing, according to Equation (2).

-Of course, the electric energy source for driving the considered drone variant is a problem, but which may be solved in the future by the progress in obtaining free energy devices using the space quantum energy by magnetic fields, usually [37], for example—by a homopolar generator with a plate magnet and a thin disk of copper with carbon superconductive graphenes or fullerenes oriented on the direction of the trajectoy of electrons deplaced under the action of the electric field generated by the disk rotation with a magnetic motor and with the conversion of the obtained electric power into high potential power with a Tesla

coil and/or by capacitive electric batteries such as a nuclear beta-voltaic battery formed by a metallic two-plates capacitor disposed on the internal wall of the drone, electrically insulated of it, with a negative plate doped with a beta-active nuclear material and disposed opposed to the drone's wall, for use the internally generated electric field of its positive charge.

A nuclear battery may be obtained—according to Equation (2) of the explicative model, also by the ionizing effect of scalar ionizing quanta and of γ-rays acting over a metamaterial activated with microwaves for generate more free electrons, circulated by an electric field of an electret, for example.

It may be mentioned that some serious studies for verify the Biefeld-Browne effect were made also by NASA, [38], which confirmed the validity of the effect produced with air ionizing and displacing. Looking the obtaining of the effect in vacuum, it was observed only in a particular case, when at the charged capacitor—with a plaque of cylindrical form and another with circular form, at the applied voltage increasing to 44 kV, a large electric arc was observed and—at the same moment, the device was seen to move about an eighth of a rotation and stop. The effect was explained as consequence of atoms deplacing, but— according to Equation (1), it is possible also the contribution of a flux of scalar radiation quanta to the deplacing force, generated by the electrons involved in the electric arc producing.

5. Conclusions

According to an etherono-quantonic cold genesis theory, based on the galileian relativity, which sustains the possibility of particles cold genesis by a vortexial nature of the magnetic field—given by an etherono-quantonic vortex: $\Gamma_M = \Gamma_A + \Gamma_\mu$, which explains the magnetic A-potential and B-induction, by a resulted quantum-vortexial particle model, of composite fermion type, the EM-drive case of electromagnetically generated propulsion in vacuum by microwaves emission at 1936.7 MHz is explained by three simultaneous phenomena of EM thrust generating:

a) the vibration of electrons inside the inner surface of the conical part of the microwaves conical antenna, under the action of microwaves;

b) the conversion of radiative thermal energy of the environment into radiation of scalar quanta, by the vibrated charges of the microwaves antenna, at a critical value of vibration energy which allow the absorption of IR quanta;

c) the generating of a propulsive force of quantum pressure gradient produced by electromagnetically vibrated atomic charges of the inner surface of microwave antenna, which increases locally the static etherono-quantonic pressure proportional with the vibration energy.

Various realized experiments are in concordance with the considered explicative phenomenological mechanism. Other experiments argue the possibility of γ-quantum conversion into weaker ionizing or non-ionizing quanta by the vibrating charges, at a critical vibration energy value.

There are proposed also some verifying experiments and a drone variant using

levitation/propulsion obtained by quantum fields and air ionizing.

References

[1] White, H., *et al.* (2016) Measurement of Impulsive Thrust from a Closed Radio-Frequency Cavity in Vacuum. *Journal of Propulsion and Power*, **23**, 12 p. https://doi.org/10.2514/1.b36120

[2] White, H. (2015) A Discussion on Characteristics of the Quantum Vacuum. *Physics Essays*, **28**, 496-502. https://doi.org/10.4006/0836-1398-28.4.496

[3] White, H., Vera, J., *et al.* (2015) Dynamics of the Vacuum and Casimir Analogs to the Hydrogen Atom. *Journal of Modern Physics*, **6**, 1308-1320. https://doi.org/10.4236/jmp.2015.69136

[4] Modanese, G. (2014) Theoretical Limits on the Efficiency of a Quantum Vacuum Thruster. *International Journal of Astrophysics and Space Science*, **2**, 39-45.

[5] Peschka, W. (1974) Kinetobaric Effect as Possible Basis for a New Propulsion Principle. *Raumfahrforschung*, No. 18.

[6] http://www.goede-stiftung.org/en/images/IGF/Experiments/KinetobaricEffects/E_Zinsser_final.pdf

[7] Zinsser, R.G. (1981) Mechanical Energy from Anisotropic Gravitational Fields. 1*st International Symposium on Non-Conventional Energy Technology* (*FISONCET*), Toronto, 21-23 October 1981.

[8] Valone, Th. (2005) The Zinsser Effect: Cumulative Electrogravity Invention of Rudolf G. Zinsser. Integrity Research Institute, Beltsville, Maryland, USA, 130 p.

[9] Hutchison, J. (1994) The Hutchison Effect Apparatus. *Proceedings of the* 1*st Symposium on New Energy*, Denver, 13-15 May 1994, 199.

[10] Hathaway, G.D. (1990) The Hutchison Effect—A Lift and Disruption System. *New Energy Journal*, 77-103.

[11] Arghirescu, M. (2006) The Genesis of Material Structures and Field Effects. MatrixRom SRL, Bucharest.

[12] Arghirescu, M. (2011) The Cold Genesis. INVEL Multimedia SRL, Bucharest. viXra: 1104.0043

[13] Arghirescu, M. (2015) The Cold Genesis of Matter and Fields. Science PG.

[14] Arghirescu, M. (2015) A Quasi-Unitary Pre-Quantum Theory of Particles and Fields and Some Theoretical Implications. *International Journal of High Energy Physics*, **2**, 80-103.

[15] Meyl, K. (2001) Scalar Waves: Theory and Experiments. *Journal of Scientific Exploration*, **15**, 199-205.

[16] Norreys, P.A. (2003) Laser-Driven Photo-Transmutation of ^{129}I—A Long-Lived Nuclear Waste Product. *Journal of Physics D: Applied Physics*, **36**, L79-L82. https://doi.org/10.1088/0022-3727/36/18/L01

[17] Bleuler, S. (1950) Theory of Longitudinal Photons in QDE. *Proceedings of the Physical Society*, **63**, 46.

[18] Arghirescu, M. (2015) A Revised Model of Photon Resulted by an Etherono- Quantonic Theory of Fields. *Open Access Library Journal*, **2**, e1920.

[19] Patent No. US2482773.

[20] Nelson, R.A. (2000) Transmutations of Nuclear Waste. http://jagahost.proboards.com/thread/16895/transmutations-nuclear-waste

[21] Haley, D. (1993) Transmutation of Radioactive Materials with Brown's Gas. *Plane-

tary Association for Clean Energy Newsletter, **6**, 8-9.

[22] Brown, P. (1999) Transmutation of Nuclear Waste Using Giant Dipole Resonant Gamma Rays. *Infinite Energy*, **4**, 44-46.

[23] Vesperman, G. (2014) Radioactivity Neutralization Methods. www.padrak.com/vesperman

[24] Nelson, R.A. (2005) Adept Alchemy. Part II, Chapter 9.

[25] Arghirescu, M. (2016) A Correspondence with the Bag Model of a Pre-Quantum B.-E. Condensate Model of Nucleon. *International Journal of High Energy Physics*, **3**, 10-17. https://doi.org/10.11648/j.ijhep.20160302.12

[26] Grahn, P., Annila, A. and Kolehmainen, E. (2016) On the Exhaust of Electromagnetic Drive. *AIP Advances*, **6**, Article ID: 065205. https://doi.org/10.1063/1.4953807

[27] Burke, D.L., *et al.* (1997) Positron Production in Multiphoton Light-by Light Scattering. *Physical Review Letters*, **79**, 1626-1629. https://doi.org/10.1103/PhysRevLett.79.1626

[28] Brunetti, M., Cecchini, S., Galli, M., Giovannini, G. and Pagliarin, A. (2000) Gamma-Ray Bursts of Atmospheric Origin in the MeV Energy Range. *Geophysical Research Letters*, **27**, 1599-1602. https://doi.org/10.1029/2000GL003750

[29] Smith, W. (1993) Caduceus Wound Coil Experiment. KeelyNet.com.

[30] Rauscher, E., *et al.* (1992) *Bulletin of the American Physical Society*, **37**.

[31] Ehsan, V., Sarita, P., *et al.* (2012) Microwave Triggered Laser Ionization of Air.

[32] Gurevich, A.V., Milikh, G.M. and Roussel-Dupre, R. (1992) Runaway Electron Mechanism of Air Breakdown and Preconditioning during a Thunderstorm. *Physics Letters A*, **165**, 463-468. https://doi.org/10.1016/0375-9601(92)90348-P

[33] Uman, M.A. (1986) All about Lightning. Dover Publications Inc, Mineola, 103-110.

[34] Grandazzi, G., Ackerman, G. and Lemarchand, F. (2006) Les silences de Tchernobyl: L'avenir contaminé.

[35] Brown, T. (2002) Electrokinetic Apparatus. US2949550/1960.

[36] Barker, W. (1989) Electrostatic Voltage Excitation Process and Apparatus. EP0313073 (A2).

[37] Kelly, P. A Practical Guide to "Free-Energy" Devices. www.sites.google.com/site/aferlab/home/patrick-kelly---a-practical-guide-to-free-energy-devices

[38] NASA CR-2004-213312. Asymmetrical Capacitors for Propulsion.