THE CONNECTION BETWEEN QUANTUM MECHANICS AND GRAVITY

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Abstract

In the paper, it is argued that the gravitational field is some residual non-linear electromagnetic field.
The equations of gravitation can be perspicuously interpreted as a manifestation of the elasticity of "space-time".
Thus, is derived the Gravity Constant as based on quantum mechanics (QCD), and is verified the theory on Earth Space-time curvature calculation.
Also, is established the nature of Dark matter based on the same vacuum (anti)monopole condensate particles into an weak interaction, that is verified on the calculation of light bending by the Earth.
Also, it is established that the *dark web* around objects (planets) not interacts gravitationally in order to curve the space-time, that, is happen, but only as *weak interaction between anti-monopoles (WIMPS)*, that justifying the light deflection due of this *dark energy* concentration at the surface of a planet. This interaction push the vacuum, it realizing the expansion of Universe.
It was established that *behind* of the Higgs field, can stay the gravitational interaction of two monopoles (Planck particles) situated at Compton wave-length for $W^{\pm}$ bosons, and it was discovered that $v.e.v.$ (Higgs field) is in fact the Schwinger critical field E_{cr} for a pair of $W^{\pm}$ production.

Keywords-Gravity; Quantum mechanics, Einstein Equation; Schwinger effect pairs creation; monopoles condensate; dark matter; light bending.

1. Introduction

In [1] is done a possibility of calculating the gravitation constant from elementary-particle theory. Thus, this approach to the theoretical description of gravity is based on the quantum theory of elementary particles, expressed as a nonlinear form of an axiomatic theory of elementary particles (NTEP). This approach is based on the fact that elementary particles are the primary elements of matter, which generate a gravitational field and are involved in the gravitational interaction. Obviously, the existence of the gravitational field of macroscopic objects (planets, stars, etc.) is the consequence of this fact.
In this case, the "bending" of the field, and not a massless mathematical object, as space-time, produces the matter. At the same time it generates the material gravitational field. It follows that the gravitational field is some residual non-linear electromagnetic field.

Independently of these essential ideas, in our works is advanced a similarly view.

The QCD vacuum can be viewed as a dual superconductor characterized by a monopole condensate. When embedding a static quarks $q\bar{q}$ pair into the vacuum the latter expels by the dual Meissner effect the colour electric flux lines, thus giving rise to color confinement [2-4].

Now, if we consider the idea of [5], when the a charge like the quark is circumvolved by the *quantum fluid* as given by the condensate of monopoles of Plank particle mass, we have:

(1) A quantum fluid has a "quantum rigidity" due to the single-valuedness of the macroscopic wavefunction, which is absent in classical fluids. London called this property "the rigidity of the wavefunction" in the context of superconductivity, and Laughlin called this property in the context of the quantum Hall effect "an incompressible quantum fluid."

(2) A quantum fluid has a "quantum dissipationlessness." The existence of persistent currents, such as those in the electron-vortex system, is evidence for this viscosity-free, zero-loss property of a quantum fluid.

Therefore, in place of quantum fluid (from Chiao model) which has a "quantum dissipationlessness" is considerate a "monopole condensate" with a magnetic monopole current, that this current is a solenoidal (i.e. azimuthally), stabilizing the normal conducting vortex core, and fulfilling the dual Amp`ere Law.

Thus, in place of "each circular puddle which contains a Planck-mass amount of superfluid helium", I have considered a monopole condensate of mass $M_{monop} = 2.15e19[GeV]$, as discussed bellow.

But firstly, to note, that there are analytical examples which show how the monopole condensate appears in compact electrodynamics, also which justifies the monopole confinement mechanism that proves the existence of the monopole condensate. For lattice gluodynamics there are a lot of numerical facts which confirm the monopole confinement mechanism. In [6] the underlying idea is that the QCD vacuum is filled by a chromomagnetic monopole condensate.

Therefore, in following is derived the Gravity Constant as based on particles physics data, and is verified the theory on Earth Space-time curvature calculation.

Also, is established the nature of Dark matter based on the same vacuum (anti)monopole condensate particles in weak interaction, that is verified on the light bending calculation by the Earth.

2. The derivation of Gravity Constant

Thus, in [2-4] it was established that the force $q\bar{q}$ pair flux tube squeezing inside the nucleons due of interaction with induction generated by the monopole condensate (superconductive vortexes), see figures 1a;1b, as to be equally to the Lorentz' force, and this is, also, the force of gravity.

Below we give a breakthrough possible explanation for a such gravity force. Thus, if we look at a very simplified (scalar form) of Einstein's equation after multiplying with curvature radius ζ^2, the radius (object radius) R of curvature of spacetime is given as:

(78)

$$\varepsilon = \frac{2\zeta^2}{R^2} = \frac{8\pi G . p \zeta^2}{c^4}$$

If the pressure p on the surface of the tube is considered to be generated by the gravitation force equal with the *contra- Lorenz' force* $|F_L|$ applied on the curvature of space-time ζ situated in the center of vortex, its role being to counteracted the destruction of superconductivity.

$$4\pi \zeta^2 p = F_L = \frac{c^4}{G}\varepsilon = K\varepsilon$$

With Lorentz' force calculated, see just bellow,

$$|F_L| = K\varepsilon = K\left(\frac{\zeta_{nucleon}}{R}\right)^2 = K\left(\frac{l_p}{R}\right)^2 = 2.25e5[N]$$

$$\rightarrow K = \frac{2.25e5}{(1.85e-39)^2} = 1.21e44$$

, where $\zeta_{nucleon} \cong l_P = \sqrt{\frac{\hbar G}{c^3}} = 1.61e-35$;

$$\varepsilon = \left[\frac{l_p}{R}\right]^2 = \left(\frac{1.61e-35}{3.75e-16}\right)^2 = 1.85e-39$$

,and K -"the vacuum elasticity"
,or

$$K = \frac{c^4}{G} = 1.21e44$$

So, to check this rationale, firstly, we consider the attraction of a nucleon-Earth when Schwarzschild radius

$$|F_G| = K\varepsilon_{Earth-nucleon}^2 = \frac{GMm_p}{R_{Earth}^2} = \frac{6.67e-11*5.97e24*1.67e-27}{6.37e6^2} = 1.64e-28$$

$$\Rightarrow or \Rightarrow \frac{F_G}{K} = \frac{1.64e-28}{1.2e44} = 1.36e-72$$

Or

$$\varepsilon_{eath-nucleon} = \sqrt{1.36e-72} = 1.16e-36$$

Therefore, in the case of a nucleon, if we use in place of the curvature ζ , which is too smaller $4.7e-54[m]$ that of Plank length, we use just it as the lower limit, then is obtained an invariant, a surprising result:

$$l_P = \sqrt{\frac{\hbar G}{c^3}}$$

$$\frac{2}{R^2} = \frac{8\pi G}{c^4}\frac{F_L}{4\pi l_P^2} = \frac{8\pi G}{c^4}\frac{c^3}{4\pi \hbar G}\frac{ec\pi \hbar c}{\pi \lambda^2 ec} \cong \frac{1}{\lambda^2}$$

$$\frac{1}{R^2_{Curv\text{-}nucleon}} = \frac{6.67e\text{-}11 * 2.25e5}{1.6e\text{-}35^2 2.997e8^4} \Rightarrow R_{Curv\text{-}nucleon} \cong 3.75e\text{-}16[m] \cong \lambda$$

$$\lambda = 0.117[fm]$$

Also, we can have in case of earth:

$$(\frac{\zeta_{earth}}{R_{earth}})^2 = \frac{4\pi G F_G}{c^4} = \frac{4\pi G * 5.86e25}{c^4} = 6.e\text{-}18$$;

where

$$F_G = \frac{GM^2}{R^2} = \frac{6.67e\text{-}11 * 5.97e24^2}{6.37e6^2} = 5.86e25$$;

$$U_G^{earth} = F_G R = 5.86e25 * 6.37e6 = 3.73e32[J]$$

Now, in same way as for a nucleon we can derive a similar formula for the Earth, where the effect of gravitational pressure due of two particles on the curvature radius of Earth $R_{Earth} = 6.37e6[m]$, is given as:

$$(\frac{\zeta_{earth}}{R_{earth}})^2 = \frac{4\pi G F_L n_{nucleons}}{c^4} = \frac{4\pi G * 1.8e\text{-}26 * 3.57e51}{c^4} = 6.7e\text{-}18$$

where, the number of nucleons inside the Earth is:
$$5.97.e24 / 1.67e\text{-}27 = 3.57e51 ,$$

and the Schwarzschild radius

$$\zeta = \frac{2GM}{c^2} = 8.86e\text{-}03[m]$$, or

$$\frac{\zeta^2}{R^2} = \frac{0.01^2}{6.37e6^2} = 2.4e\text{-}18$$

, that proves the theory of these monopoles inside the nucleons.

Here, the force F_L between two vortexes which is viewed as "*quantum drops/vortexes*", that interact weakly at large distances $\sim 72\lambda [fm]$ from the axis of the vortex line, like in the frame of the atom's nucleus, this is given by the equation (47) as derived in author' references [2-4]

$$B(x) = \frac{2\Phi_0}{(8\pi x\lambda^3)^{1/2}} e^{-x/\lambda}$$, $x \rhd\rhd \lambda$

and for $x \rhd\rhd \lambda$, we have

$$B(72\lambda) = 3.8e\text{-}16\left[\frac{J}{Am^2}\right]$$, then, the force becomes

$$F_L \cong e * c * B(72\lambda) = 1.8e\text{-}26[N]$$, or in terms of energy

$$\varepsilon_{nucleon\text{-}barrier} = F_L * x = 1.8e\text{-}26 * 72\lambda / 1.e\text{-}15 = 945[MeV]$$

,or the nucleon overall energy (mass).

To note, the superconductive current density decrease is (in SI):

$$j_\varphi = -\frac{c}{4\pi}\frac{dB}{dx}(4\pi c\varepsilon_0) = \frac{2c^2\varepsilon_0\Phi_0}{8(2\pi^3 x\lambda^5)^{1/2}}e^{-x/\lambda}$$

Let us return to the problem of the ratio of the forces of gravity and electricity, but now in the context of two well-separated electron (quark) -vortex composites at a distance r from each other.

Suppose that each circular puddle contains a Planck-mass particle amount of superfluid helium like of Helium from [5],

$$m_{Planck} = \sqrt{\frac{\hbar c}{G}} = 2.14e-08[Kg]$$

where $\hbar$ is Planck's constant, c is the speed of light, and G is Newton's constant.
Planck's mass sets the characteristic scale at which quantum mechanics ($\hbar$) impacts relativistic gravity (c, G)

For concreteness, imagine that these two charged objects are two Millikan oil drops with single electrons attached to them, which are nearby to each other in the same circular orbit.

The ratio of the forces of gravity and between the vortex and the quark flux tube, see figures 1a;1b, now becomes

$$\frac{|F_G|}{|F_{M\_condensate}|} = \frac{\dfrac{Gm_{Planck}^2}{r^2}}{\dfrac{ec\pi\hbar}{\pi ec\lambda^2}} = \frac{G\hbar c}{r^2 G}*\frac{\lambda^2}{\hbar c} = 1 \quad ; \text{for } \lambda \cong r$$

,where the Lorentz force is $F_{M-condensate} = ecB$

$$B\big|_{x\lhd\lhd\lambda} = \frac{2\Phi_0}{2\pi\lambda^2 c}$$

$$\Phi_0 = \pi\hbar c/e \rightarrow usually \frac{\pi\hbar}{e} = 2.07e-15[Tm^2]$$

If we consider only an the electric Coulomb field of the quark dipole in the middle of the condensate, we obtain an another very important result, namely, the value of the fine structure constant α_s:

$$\frac{|F_G|}{|F_{quark}|} = \frac{\dfrac{Gm_{Planck}^2}{r^2}}{\dfrac{e^2}{4\pi\varepsilon_0\lambda^2}} = \frac{G\hbar c}{r^2 G}*\frac{4\pi\varepsilon_0\lambda^2}{e^2} = \alpha_s = 137$$

Therefore, if we consider the string force due of the Coulomb flux tube as given by the quarks $\overline{q}q$ pairs, results

$$G = \frac{\alpha_s F_{quarks} \lambda^2}{m_{Planck}^2} = \frac{137 * 1636 * 3.75e\text{-}16^2}{2.2e\text{-}08^2} = 6.65e\text{-}11\, m^3/kg \cdot s$$

From (4) and (47) of author' references[2-4], the Lorentz' force is:

$$F_L = ecB \cong 2.25.e5[N] \qquad (65)$$

,when B is given by (46) of [2], and $x \cong \lambda$, for the upper limit:

$$B(\lambda) \cong 4.7e15[J/Am^2]$$

Therefore, $F_G = F_{m\text{-}condensate}$, or $G = F_{m\text{-}condensate} \lambda^2 / m_{Planck}^2 = 6.67e\text{-}11$

$$F_{m\text{-}condensate} = \hbar c / \lambda^2 = \frac{1.e\text{-}34 * 2.998e8}{3.75e\text{-}16^2} = 2.25e5$$

This huge results, convince ours to advance the idea that at "confinement" moment of Universe evolution when the temperature it was 200MeV, then, the monopoles condensate around quark pairs, thus, are generated the nucleons. But, it will remains a lot of monopoles outside, which constitutes the dark matter, see bellow.
Therefore, we can not concept the gravitation without Planck mass particles embedded in monopoles.

3. Light bending calculation

In [1], it is assumed that quantum effects alone completely determine the vacuum elasticity. The details of the calculations can be found in the original work of Sakharov[1]. In order to obtain the observed value of the elasticity, one must put the cut-off momentum equal to an enormously large value-a value corresponding to the mass $10^{-5} g$. Sakharov has conjectured that the gravitational constant is entirely determined by vacuum polarization. The equations of gravitation can be perspicuously interpreted as a manifestation of the elasticity of space-time". If we talk about the fields of the particles, the critical value of the external field is a field, in which the particle has simultaneously an electric and gravitational fields.
In classical optics a light ray can be bent if there is a gradient in the refractive index. However in QED it is possible by the vacuum polarization that allows the photon to exist as a virtual $e^- - e^+$ -pair via which the external field can couple. The first study on nonlinear effect in the presence of an external electromagnetic field was performed by Euler and Heisenberg.
Thus, the total bending angle can be obtained with Kim's formula [7]

$$\varphi_{mag} = -\frac{41\pi a \alpha^2 \varepsilon_0 c\hbar B_0^2 r_0^6}{3 * 2^7 e^2 B_c^2 b^6}$$

, where: a=8; $b \cong r_0$
It is known that the curvature angle is given by:

$$\varphi_{grav} = \frac{4GM}{bc^2} = 1.39e\text{-}09[radians] \qquad ; \text{and} \qquad \frac{4\pi\varepsilon_0 \hbar c}{e^2} = 1/\alpha = 137$$

In the following is determined the value of critical magnetic field for pair creation [8]. Thus, the magnetic moment of the electron results from equations (A.33-A.44) of [8].

$$m_s = -\frac{g_s \mu_B S}{\hbar}$$ (A.33)

where

$\mu_B = 9.27 \times 10^{-24} [JT^{-1}]$, μ_B is the Bohr magneton, $S = \hbar/2$ is electron spin,

and the g-factor g_s is 2 according to Dirac's theory, but due to quantum electrodynamic effects it is slightly larger in reality: 2.002, for a muon $g = 2$.

The Bohr magneton is defined in SI units by

$$\mu_B = \frac{e\hbar}{2m_e}$$ (A.34)

The vector potential of magnetic field produced by magnetic moment m_{Mo} is

$$A(r) = \frac{\mu_0}{4\pi} \frac{m_{Mo} \times \vec{r}}{r^3}$$ (A.35)

and magnetic flux density is

(A.36)

$$B(r) = \nabla \times A = \frac{\mu_0}{4\pi}\left(\frac{3\vec{r}(m_{Mo} \cdot \vec{r})}{r^5} - \frac{m_{Mo}}{r^3}\right) \cong A/r \qquad j_e = -\frac{c}{4\pi}\frac{dB}{dr}(4\pi c\varepsilon_0) = -\frac{c^2\varepsilon_0 A}{r^2}$$

(A.37)

We can calculate the observable spin magnetic moment (a vector), $\vec{\mu}_S$, for a sub-atomic particle with charge q, mass m, and spin angular momentum (also a vector), $\vec{s}$, via:

$$\vec{\mu}_S = g\frac{q}{2m}\vec{s}$$

Therefore, for a monopole $\mu_{Mo} = \frac{gQe\hbar}{2m_{Mo}}$, $Q = 68.5$, $\vec{s} = \hbar$, $g \cong 2$ (A.38)

And $m_{Mo} = -\frac{\mu_{Mo}S}{\hbar} \cong \mu_{Mo}$ (A.39)

Numerically, results: $\mu_{Mo} = 2.7e-25[J/T]$, $A = 0.6[N/A]$, $r = 2.11e-16 \cong 0.2[fm]$

$B = A/r = 2.86e15[J/Am^2]$, (A.40)

Therefore, the critical magnetic field is:

$B_{cr} = 2.86e15[T]$

And the magnetic field of monopoles condensate outside of the object (planet) is

$B_0(67.4 * \lambda) = 3.9e-14[T] \cong 4.e-5[nanoT] << 0.25 \div 0.65[T]$ which is much smaller than the magnetic field of Earth as induced by the internal causes (movement of internal melted core). Here, the distance $67.4\lambda = 7.88 fm$ results from an inverse calculation as beginning from the known Earth curvature, as to be the distance of free anti-monopoles as the constituents of dark matter, at all viewed as a *web* of theirs weak interacting (WIMP).

With these values, and with $r_0 \cong b$, the deflection of light viewed as the refraction of $\gamma \leftrightarrow e^+ - e^-$ due of interaction with the dense population of these *anti-monopole* or *dark matter* (vortex) condensate which surround the object (Earth) to compensate the monopoles (see the insertion in figure 1a.) condensate embedded in mater (nucleons), becomes:

$\varphi_{deflection} = 1.02e-09 \cong \varphi_{grav} = 1.39e-09$ [radians]

Now, the total energy of the condensate of *anti-monopoles* which surround the object (planet) it could be obtained as bellow.

In our approach is considered that the number of *anti-monopoles* (like the negative electrons of Dirac sea) corresponds to the number of *monopoles* embedded in mater (i.e. nucleons), and that surround them.

4. The nature of Dark matter

The interaction between vortexes at distance x and of separation $d = x - \lambda \cong 7.8\,fm$ (being in the category of *weak interactions* –QCD; QED) is given by using equation (72.1) from [2], see figure 1a; 1b.

$$\varepsilon_{int-pair} = c^2 \varepsilon_0 \frac{4\Phi_0^2}{2^{7/2}\pi^{3/2}\lambda^2}\left(\frac{\lambda}{d}\right)^{1/2} e^{-x/\lambda} =$$

$$\frac{1.e17*8.82e-12*4*2.06e-15^2}{2^{3.5}3.14^{1.5}0.117e-15*0.117}\left(\frac{\lambda}{67.4*\lambda}\right)^{1/2}EXP\left(-\frac{(67.4-1)*\lambda}{\lambda}\right)=$$

$$1.02e-38[J/fm]$$

In terms of force between two *anti-monopoles* $F = \varepsilon_{inter-pair}/67.4\lambda = 1.36e-24[T]$, near the same value could be obtained if we consider the above value of induction $B_0 = 3.9e-14[T]$, thus, $F = ecB_0 = 1.87e-24[T]$.

The most widely accepted explanation for these phenomena is that dark matter exists and that it is most probably composed of weakly interacting massive particles (WIMPs) that interact only through gravity and the weak force. It also cannot interact with ordinary matter via electromagnetic forces.

The total mass of this veritable "*dark wool*" as composed of these *anti-monopoles,* that surrounds the objects (planets, stars, etc.) is:

$$M_{dark-wool} = \varepsilon_{inter-pair} * n_{pairs}\frac{0.25}{c^2} = 1.e-04[kg] \rightarrow 5.7e22[GeV]$$

These *anti-monopoles* which in fact are superconductive vortexes around Plank particles

interact gravitationally as $E_G = \frac{GM_{dark-wool}^2}{R} = 1.8e-27[J] \rightarrow 6.7e-18[GeV]$, or as *weak*

interaction: $\left(\frac{\zeta}{2R}\right)^2_{dark-inter-mag} = \frac{4\pi\,GF_{inter-pair}*n_{pair-dark\_wool}*0.25}{K} = 1.2e-16 \approx 6.e-18$

Or, $$\left(\frac{\zeta}{2R}\right)^2_{dark\text{-}int\text{-}gravit} = \frac{GM_{dark\text{-}wool}}{2Rc^2} = 5.9e-39$$

Therefore, it result that the *dark wool* not interact gravitationally in order to curve the space-time, that, is happen, but only as *weak interaction*, that justifying the light deflection due of this *dark energy* concentration at the surface of a planet. This interaction push the vacuum realizing the expansion of Universe.

Now, the sum of total dark vortexes energy is given by using eq. (71.1) from [2] as:

$$\varepsilon_{\Sigma\,vortex} = Vc^2\varepsilon_0 B_{cr}^2/8\pi * n_{nucleons}^{Earth} * 0.25 = 3.5e41[J]$$

Here, is supposed $V = 1.e-45[m^3]$ the volume (~ of nucleon), and the number of nucleons as calculated above being $3.57e51$, and 0.25 is the fraction of this *dark matter*.

The correspondent sum of *dark mass* is $M_{\Sigma\,dark} = 3.5e41/c^2 \cong 3.93e24[kg] \cong 75\%M_{Earth}$.

This gives the curvature $$\left(\frac{\zeta}{2R}\right)^2_{Mdark\text{-}int\text{-}gravit} = \frac{GM_{\Sigma\,dark}}{2Rc^2} = 5.22e-20 \approx 6.e-18$$.

This mass, that not accounts as a physical mass, since the monopoles interaction is small, i.e. only that givens by B_0, otherwise it appears as a new mass, that not respect the gravitational laws.

We understand by vortex as to be around of a Planck particle (monopole), as it was established above.

Now, the cosmological constant is $\Lambda = 1.e-47GeV^4$ or $\Lambda = 1.77e-12GeV$

The interaction energy of the "*dark wool*" around the planet is given by eq. (71.1) when $B_0 = 3.9e-14[T]$. $\varepsilon_{\Sigma\,vortex} = 6.61e-17[J] \rightarrow 4.13e-07[GeV]$ near Λ. In terms of mass $\varepsilon_{\Sigma\,vortex}^{mass} = 7.35e-34[Kg]$ which is neglectable.

5. What it could be behind the Higgs field!

At distances around 10^{-18} meters, the weak interaction has a strength of a similar magnitude to the electromagnetic force; but at distances of around 3×10^{-17} m the weak interaction is 10,000 times weaker than the electromagnetic.

An interesting aspect of virtual particles (in vacuum) both theoretically and experimentally is the possibility that they can become real by the effect of external fields [8]. In this case, real particles are excited out of the vacuum. In the framework of quantum mechanics by Klein, Sauter, Euler and Heisenberg who studied the behavior of the Dirac vacuum in a strong external electric field, if the field is sufficiently strong, the energy of the vacuum can be lowered by creating an electron-positron pair. These makes the vacuum unstable (it polarizes).

Now, if we consider the gravitational interaction of two monopoles (Planck particles) we have

$$\varepsilon_{Higgs} = \frac{Gm_{monop}^2}{r} = 4.27e-08[J] \rightarrow 267[GeV]$$

Where, the mass of monopole is $m_{monop} = \dfrac{E_{monopol} * 1.e9 * 6.25e18}{2.9987e8^2} = 3.84e-08[kg]$, and

$E_{monop} = 2.15e19[GeV]$

$r = \hbar/m_{W^\pm} c = 2.3e-18[m]$ as the Compton wave-length for $W^\pm$ bosons [8]

In [8], it was discovered that $v.e.v.$ (Higgs field) is in fact the Schwinger critical field E_{cr} for a pair of $W^\pm$ production.

$E_{cr} = m_W^2 c^3/e\hbar = 3.5e+28[N/C] \leftrightarrow v.e.v = 267 GeV$

Therefore, to realize this interaction it needs either to apply a external field like that of the pp impact obtained at LHC, or to apply the monopoles field as existing inside the nucleon [8].
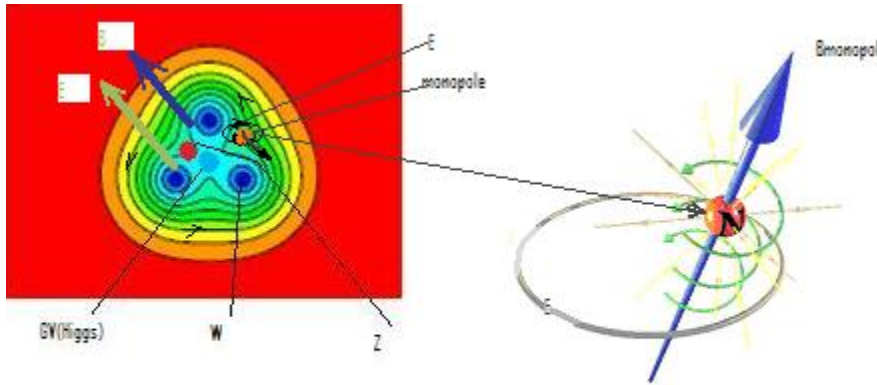

Fig.1a. The monopoles embedded in the Giant-Vortex [2] that could be also the arrangement for the nucleon (only illustration). A spin-orbit nonabelian field is shown.
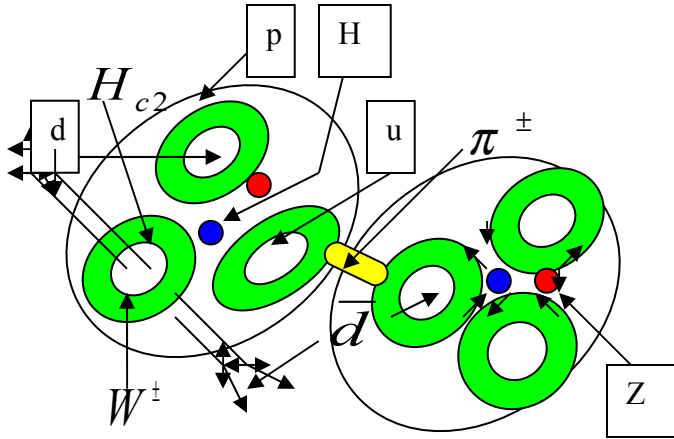
Fig.1b. Abrikosov's triangular lattice for a nucleon [2]

6. Conclusions

The constant G seems to be an intrinsic physical constant that characterizes the entropy of the electromagnetic quantum fluids confined in matter particles.

It is demonstrated that the gravitational field is some residual non-linear electromagnetic field.

The equations of gravitation can be perspicuously interpreted as a manifestation of the elasticity of "space-time".

The Gravity Constant was derived as based on quantum mechanics (QCD), and is verified the theory on Earth Space-time curvature calculation.

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It was established that *behind* of the Higgs field, can stay the gravitational interaction of two monopoles (Planck particles) situated at Compton wave-length for $W^{\pm}$ bosons, and it was discovered that $v.e.v.$ (Higgs field) is in fact the Schwinger critical field E_{cr} for a pair of $W^{\pm}$ production.

Finally, one can say that exists a firm connection between Gravity and Quantum Mechanics.

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