The Theory of vacuum and some practical results

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Vacuum, where matter exists is an objective reality of Nature. It has a structure consists of electrical massless dipoles. This structure is responsible for gravitation, inertia and propagation of light (EMW). The structure can be influenced by the electrical, magnetic forces and by radiation and thus control the gravitation and inertia.

Void is only void and nothing more. Void cannot have any physical properties. For example, vacuum has physical parameters, i.e. dielectric and magnetic penetrability. That's why vacuum cannot be a void or empty space of the Universe. Let's consider the structure vacuum in details. At first we'll remove a blunder of physics presented by Coulomb's formula. It lies in the fact that permittivity of vacuum were put to the denominator of formulas for electric and magnetic forces. We'll introduce inverse values:

$$\eta = \frac{1}{\mu} = 1.0000000028 \cdot 10^{7} [a^{2} kg^{-1} m^{-1} s^{2}]$$

It is a magnetic constant of vacuum equal to inverse value of magnetic permeability. $\xi = \frac{1}{\varepsilon} = 8.98755179 \cdot 10^{9} [a^{-2} m^{3} kg \cdot s^{-4}]$ is a dielectric constant of vacuum equal to inverse value of dielectric permittivity. Newton's and Coulomb's formulas get an identical view. Speed of light gets more logical idea $c = \sqrt{\eta\xi}$.

Experimental physics presents necessary data for the study of vacuum. We mean the data on photoeffects in vacuum, on nuclei and nucleons [Karjakin N.I. and others, 1964]. Let's remind the values of gamma-quanta energies: 1, 137, 1836, 3672 MeV ($2m_e c^2$, $137*2m_e c^2$, $1836* 2m_e c^2$, $1836* 4m_e c^2$). This series of energy gives a valuable information for the physical ideas about the structure of vacuum and matter [Rykov A.V., 2001].

Gamma-quanta of frequency ν deforms the structure of cosmic vacuum. Being within the size of r_e between its elements, gamma-quanta creates a deformation Δr_e. The deformation energy will be $e_o E \Delta r_e$, where e_o is an elementary charge, E - is electrical intensity of the structure. Equation of the energy will be:

$$h\nu = e_o E \Delta r_e \quad (1),$$

where h - is a Plank's constant. Deformation is function of time:

$$\Delta r_e = \Delta[r_e \sin(2\pi\nu t)] = 2\pi\nu r_e \Delta t \cdot \cos(2\pi\nu t) \quad (2).$$

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Let's define the intensity of electrical field, where N is some coefficient of proportionality:

$$E = N\xi\frac{e_o}{r_e^2} \quad (3).$$

Let's put the obtained expressions, amplitude from (2) and intensity from (3) to (1):

$$h = 2\pi N e_o^2 \xi \frac{1}{r_e / \Delta t} (4).$$

We can assume quite naturally that $r_e / \Delta t$ - is speed of light. Let's find an unknown quantity:

$$N = \frac{h}{2\pi e_o^2 r_q} = 137.035990995 \quad (5).$$

We have got a well known $\alpha^{-1} = 137.035990995$ and formula of Plank's constant:

$$h = 2\pi e_o^2 \alpha^{-1}\sqrt{\xi / \eta} = 6.626755(40)\cdot 10^{-34} (6).$$

On this stage we should clear a situation with chose of numerical values *h* or α. All next values are calculated on the base *h*. But the α is in reality more fundamental then *h*, because the last one is derivative from e_o, α, ξ, η - vacuum parameters. The choice made here is based upon this procedure of quite new study of vacuum.

Gamma--quantum of energy $w \geq 1\ MeV$ interacting with vacuum changes a "virtual" electron-positron pair to the real ones. The energy equation of this change is:

$$w = h\nu_{rb} = \xi\frac{e_o^2}{r_e} \quad (7),$$

where r_e - distance between charges (+) and (-) of vacuum structure, $\nu_{rb} = 2.48921263\cdot 10^{20}$ - "red border" for frequency of gamma-quantum . The last exact value is determined below. Let's find r_e :

$$r_e = \frac{\xi\alpha}{2\pi r_q \nu_{rb}} = \frac{c\alpha}{2\pi\nu_{rb}} = 1.398763188\cdot 10^{-15} m \quad (8).$$

We have from (2) $\Delta r_e = 2\pi\nu_{rb} r_e \Delta t = \frac{2\pi\nu_{rb} r_e^2}{c} = \alpha r_e$ under assumption $\Delta t = r_e / c$. In other words, it is the limit of the vacuum deformation above what a rupture of structure ties occurred:

$$\Delta r_e = \alpha r_e = 1.020726874\cdot 10^{-17} m \quad (9).$$

The exact value for $\nu_{rb} = \frac{c}{2\pi r_e \alpha^{-1}} = 2.48921263\cdot 10^{20} Hz$.

Deformation of structure lower than the given value has electroelastic character. Let's find the coefficient of elasticity *b* from a forth equation:

$$f = b\Delta r_e = \xi\frac{e_o^2}{r_e^2}, \quad b = 1.15521983\cdot 10^{19}[kg\cdot s^{-2}] \quad (10).$$

Another useful parameters of vacuum will be next:

$$E_\sigma = \sqrt{\gamma\xi} = 0.77440463\ [a^{-1}m^3s^{-3}]\ \ (11)\ \ \text{and}$$

$$S = \alpha^{-2}\frac{e_o}{4\pi r_e^4} = 6.25450914\cdot 10^{43}[Q\cdot m^{-4}]\ (12).$$

The names for this parameters are not yet known. To that stage we get the main parameters of the vacuum structure.

Some consequences from the vacuum structure

1. Dielectric vacuum media has a tied charges. The moving charge generate a Maxwell's displacement current *j*. This current in turn generate magnetic strength $d\overline{H} = \frac{1}{c}\overline{j}$ where $\overline{j} = \frac{1}{4\pi}\frac{d\overline{E}}{dt}$. The *H* is necessary magnetic component to the E for the Electromagnetic wave (light). The vacuum structure is natural media for light excitation and propagation in space.
2. Nature of quantum mechanic's (QM) are defined by the vacuum structure. Compton's length of an electron is equal $\lambda = \frac{h}{m_o c} = 4\pi(r_e + \Delta r_e)\cdot\alpha^{-1} = 2.4263105757\cdot 10^{-12}\,m\,(13)$. This expression completely defined by parameters of vacuum. Another words - the permitted electron orbits in atoms are defined by structure of vacuum (the nature of QM).
3. De Broil's wave is $\lambda = h/mV$. Plank's constant is completely defined by the parameters of vacuum - formula (6). This leads to the sin-way of a particle trajectory in structure of vacuum what confine the diffraction appearance in a nature.
4. Electron mass can be produced by exited vacuum $m_e = \frac{e_o^2}{2\eta(r_e + \Delta r_e)} = 9.1093897427\cdot 10^{-31}\,kg$.
5. Gravitational constant is defined by parameters of vacuum $\gamma = \xi\frac{e_o^2}{m_x} = 6.67259049725\cdot 10^{-11}[kg^{-1}m^3s^{-2}]$ where $m_x = \sqrt{\alpha}m_{Pl} = 1.8594480544\cdot 10^{-9}\,kg$, m_{Pl} - the Plank mass. It is indirect evidence of electrical nature of gravitation. The vacuum has a very small superiority one charge respect to other. Correctly one is in 21 sign of electron charge. On the law of Faraday induction a charged media attracts all bodies to each other. Ratio of mass attraction and vacuum Coulomb repulsion in Universe forms Λ - coefficient in Einstein's theory.
6. Acceleration of mass or of gravity force creates a vacuum deformation and the last one can be calculated by formula:

$$\Delta r_{a,g} = \sqrt{\frac{a,g}{4\pi E_\sigma S}}\ \ (13)$$

For instance the deformation under Earth gravity would be $\Delta r_g = 1.2703\cdot 10^{-22}\,m$. A force of accelerated mass is determined by $f = am = b\cdot\Delta r_a$ and is an elastic force of resistance to accelerated motion.

7. Maximum of a gravity acceleration is defined from $g_{\max} = 4\pi E_\sigma S\cdot(\Delta r_{rb}) = 6.3414723\cdot 10^{10}[m\cdot s^{-2}]$. It defines "horizons of events" and

evaporation of "Black Holes" discovered theoretically by Hawking when electrons and positrons born from vacuum.

8. The laws of Newton and Coulomb can be united by next way. Force of gravity and electricity $F = \gamma\frac{m^2}{R^2} = \xi\frac{q^2}{R^2}$ and $\rho = \sqrt{\frac{\gamma}{\xi}} = 8.6164135164 \cdot 10^{-11}[Q \cdot kg^{-1}]$ - the electrical charge of one kg of any mass. The same value may be presented thorough a micro parameters - $\rho = e_o\sqrt{\frac{2\pi\gamma}{ch\alpha}} = 8.6164135 \cdot 10^{-11}[Q \cdot kg^{-1}]$.

9. Indirect evidence of reality of all represented hire consideration we get from next correlation: $b \cdot \Delta r_{rb} = m_x g_{\max}$, $m_x = 1.859480544 \cdot 10^{-9}\, kg$ (14). We are already met this mass at point (5). What does it mean? First of all this mass can be a smallest "black hole" with size $r_x = \sqrt{\gamma\frac{m_x}{g_{\max}}} = 1.39876319 \cdot 10^{-15} m$. Secondly we find a remarkable coincidence $\rho m_x = 1.6022 \cdot 10^{-19} Q = e_o$ - very close to the electron charge. Again we get indirect evidence in behalf of the represented vacuum paradigm. All values like ρ, e_o, m_x, α, m_{Pl} appears to be very close tightened each with other.

10. And now there is the most fantastic a practical outcome: as we see gravitation and inertia forces are connected with a deformation of vacuum structure. And because of this circumstance we can control those forces, for instance, by electrical intensity. However, to compensate the Earth gravity it is necessary to applied $E = 1.1402 \cdot 10^{10} V/m$ That is impossible. The experience conducted by russian scientist Roschin V.V. and Godin S.M. [Roschin, Godin, 2000] shows that alternative magnetic intensity H may reduce the gravity and inertia vacuum deformations. Strong magnets rotated up to velocity 550 rpm. After achieving that velocity the rotor was speeding rotation without any outer power supply (decrease the momentum of inertia). It is needed to add power consumption about 6 KWatt from rotating magnets to brake the accelerated rotation to keep it steady. The weight of rotor decreases on 35 % in average. The reduction of the vacuum deformation is possible to estimate by formulas. According to Maxwell's we have $E_z = l\frac{dB_x}{dt}$. Approximately $E_z = VB_x = V\eta H$ where V - the velocity of rotation. Eventually we get $\Delta r_E = \frac{e_o E_z}{b} = \frac{e_o \eta H}{b} V$ m. Thus we can compensate the gravity acceleration as $\Delta r_{ng} = \Delta r_{gEarth} - \Delta r_E$ and reduce the gravity force of Earth.

Conclusion

It is discovered the structure of vacuum - the necessary media for Universe to live in. The light (EMW), gravity, inertia, atoms of matter etc. may not to exist without the media - structured vacuum. The structure of vacuum has many applications in different fields of science.

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