The informational model – Gravity and Electric Forces

Sergey V. Shevchenko[1, *] and Vladimir V. Tokarevsky[2]
[1]***Institute of Physics of NAS of Ukraine, Pr. Nauki, 46, Kiev-28, Ukraine, ret.***
ORCID: https://orcid.org/0000-0003-3370-5536
[2]***Professor ret., Pr. Nauki, 46, Kiev-28, Ukraine***

***Corresponding: sshev1g@gmail.com**

Abstract In the 2007 "The Information as Absolute" concept it was rigorously proven that Matter in our Universe – and Universe as a whole - are some informational systems (structures), which exist as uninterruptedly transforming [practically] infinitesimal sub-sets of the absolutely infinite and fundamental "Information" Set. The conception has enabled to suggest a reasonable physical ("informational") model that is based on the conjecture that Matter is some analogue of computer (more correct – some analogue of a [huge] number of mutually weakly connected automata). This conjecture, in turn, allows introducing in the model the ultimately basic logical elements that constitute the material structures (e.g., particles) and support the informational exchange - i.e. the forces - between the structures. The model yet now solves and makes clearer more 30 fundamental problems in physics; including, enabled to put forward rather reasonable 2007 initial models of the Gravity and Electric Forces in statics. In this paper more detailed and corrected version of the model, including in free fall motion of gravitational test mass in Gravity field, is presented, w here it is shown that at the motion in any field no singularities are created, and so rather probably it is possible to obtain at least first approximation description of motion of masses in extreme gravity fields, including below event horizon in SMBH, etc.

Key words: informational physical model, fundamental Nature forces, free fall, gravity force, electric force, gravitational mass, electric charge, gravitational field, electric field, magnetic monopole, black hole, experimental testing

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1 Introduction

In the 2007 "The Information as Absolute" concept [1 - 3], the recent version of the concept [3a], it was rigorously proven that Matter in our Universe – and Universe as a whole - are some informational systems (structures), which exist as uninterruptedly transforming [practically] infinitesimal sub-sets of the absolutely infinite and fundamental "Information" Set. This informational concept has enabled to propose the informational physical model (more see [4], [5]), which, basing, first of all, on the really outstanding C. F. von Weizsäcker's 1950-54 years "UR" hypothesis [6, 7] and Fredkin-

Toffoli finding [8], adequately to the reality and in complete accordance with all existent reliable experimental data depicts the motion and interactions of particles in spacetime. In the model the ultimate of Matter's base is the Matter's "ether" – the dense lattice of [5]4D elementary logical gates – "fundamental logical elements" (FLE), which are some (essentially distinct, though) analogs of C. F. von Weizsäcker's 1950-54 years "Urs". The FLE's sizes in the spacetime in both – in the space and in the ("coordinate," $c\tau$, and "true", ct) times dimensions – are equal to Planck length, l_P, $l_P = (\frac{\hbar G}{c^3})^{1/2}$, $\hbar$ is the reduced Planck constant – the elementary physical action, G – gravitational constant, c – the speed of light in the vacuum; the time interval of the FLE's state change – "FLE's binary flip" is equal to Planck time, $t_P, t_P = \frac{l_P}{c}$. The lattice is placed in the corresponding Matter's utmost fundamental and universal fundamentally absolute, fundamentally flat, and at least [5]4D, Cartesian spacetime with the metrics ($c\tau$, X, Y, Z, ct), and everything in Matter is/are some specific disturbances in the ether.

The model yet now solves and makes clearer more 30 fundamental problems in physics, see [4], [5]; including, enabled to put forward rather reasonable 2007 initial models of the Gravity and Electric Forces in statics. In this paper more detailed and corrected version of the models, including in free fall motion of gravitational test mass in Gravity field, is presented, where it is shown that at the motion in any field no singularities are created, and so rather probably it is possible to obtain at least first approximation description of motion of masses in extreme gravity fields, including below event horizon in SMBH, etc.

1.1. Particles

Particles are specific disturbances in the [5]4D ether, which are created when some ether's FLE is impacted by some 4D momentum, $\vec{P}$.

If the momentum is practically infinitesimal, than in the lattice some straight line of sequentially "this-next" flipping ether FLEs appear, when the "flipping point" moves in the ether [and so in the 4D space with metrics (cτ, X, Y, Z)] with 4D speed of light, and corresponding "particle" has zero inertial mass and zero momentum – as for the case when FLE doesn't flip at all. But after some impact with non-zero momentum $\vec{P}$ in this (or in any direction for non-flipping FLE) direction, since the flipping cannot be with a speed that is larger than c, that results in precessing of the flipping FLEs, the flipping trajectory transforms into some 4D "helix"; and so the flipping transforms in some close-loop algorithm – which is just a created particle, which moves in the 4D space with the 4D speed of light, having momentum $\vec{P} = m\vec{c}$, energy $E = Pc$, inertial mass, m, and the "radius" of the "helix" $\lambda = \frac{\hbar}{mc}$, which is the particle's Compton length. The frequency the algorithm ticks with which is $\omega = \frac{E}{\hbar}$.

Really there exist two main types of particles: – "T-particles" that are created by momentums that are directed along the $c\tau$-axis, which, if are at absolute rest in the 3D XYZ space, move only in the $c\tau$-dimension with the speed of light, and so have "rest masses", that are most of particles; and "S-particles" that are created by momentums

that are directed along some 3D space line, and so always move only in 3D space with the speed of light, having no "rest masses", now that are for sure photons.

That above is a first approximation scheme, more see [4], [5], however in this case, i.e. when we consider what are the fundamental Nature Gravity and Electric forces, that is enough.

2. Mediation of the forces in complex systems

2.1. Fundamental Nature forces and charges

Now four "fundamental" kinds of the interactions (four "fundamental Nature forces") are known – Gravity, Weak, Electric (EM), Strong; which differ by the strength, e.g., for the proton as (approximately) 10^{-36}:10^{-11}:1:10^{3}. Here only two Forces are considered – Gravity and Electric, as the correction and development of the initial 2007 year models [1, 4] of these Forces.

Note here, that in recent physics mediating of Forces proceeds as exchange by Forces' mediators, which are "virtual" particles, in quantum electrodynamics that are virtual photons.

Nonetheless it looks as completely rational to suggest that in Matter there are no "virtual" particles and interactions, and the "virtual particles" really is a mathematical trick, which, for unknown now reason though, is – in QED extremely – effective at elaboration of some physical tasks.

Real interactions in Matter are caused and happen as real interactions of real material objects, and the mediators of the Forces really are not "virtual".

From experimental data it rather convincingly follows at least for Electric force, that the real interactions, at least in statics, are not caused by real "ordinary" photons – just which in QED are introduced as "virtual photons". In this case there is no any experiment, where an exchange by ordinary photon was observed in a static system of charged bodies, nonetheless the charges at statics really do interact.

In this informational model the Forces are some logical marks, that can be, and are in Matter, assigned to, or, more correctly activated in, any FLE. So really FLE has more degreases of freedom at changing its state, and Matter' spacetime has other than the ultimately common and universal "kinematical" dimensions above, i.e. at least that relates to considered below here Gravity and Electric Forces. Thus the real Matter's spacetime is fundamentally absolute, fundamentally flat, and at least [7]4D Cartesian spacetime with the metrics ($c\tau$, X, Y, Z, g, e, ct), "g" and "e" are Gravity and Electric Forces dimensions. Including impacted by corresponding Force way FLE precesses with some precession axis angle analogously/additionally to the 4D universal "kinematical" ($c\tau$, X, Y, Z) precession of particles algorithms' FLE precession (see section D) above.

Now conjecture that if some FLE in the algorithm's FLE sequence of some particle, has some Force's logical mark, then at constant cyclic running of the algorithm, when this FLE flips, it causes flipping of neighbor ether FLE, at that: (i) - in these ether FLE corresponding Force mark becomes be activated, and (ii) – this ether FLE becomes to

flip with “5D”, i.e. including in the Force dimension, precession as well, causing sequential flipping – and also “marked by Force” next ether FLEs.

Such marked flipping propagates in the FLE-ether as the Force mediator and when this mediator meets another particle algorithm’s flipping FLE that has this Force mark, the some momentum, $\vec{p}$, is transmitted to the other – “irradiated” – particle. This scheme is possibly not unique; for example, in nuclear physics nuclear force acts, as that is postulated in physics now, as an exchange by virtual particles (mesons), however that is not essentially principal and the scheme above seems rather effectively applicable at least for Gravity and Electric Forces.

So the charge of a Force is, first of all, a set – a part – of Force-marked FLEs in the particle’s algorithm. However, that is not complete, the Force strength – and so “charge” also depends on the frequency at which this algorithm runs.

In the Forces’ models [1, 5a] some non-existent in physics now as real Electric force mediators “circular photons”, which are not observed by detectors of ordinary photons, including human eyes, are proposed. Gravity Force doesn’t exist in recent physics since the general relativity theory is standard theory of Gravity. However, because of GRT is based on fundamentally wrong postulates, where some fundamentally incorrect (see definitions of the fundamental phenomena/notions “Space" and “Time” in [4]) properties to space/time/spacetime are postulated, so Gravity, practically for sure is nothing else than the “fourth” fundamental Nature force, which in a number of traits is similar to the Electric Force, and in this initial model the Forces mediators are similar, more see below.

Note, though, that the studies of the problem – why the QED virtual photons simulate the real interactions of the real circular photons with charges adequately to the reality? – will rather probably result in new information about how Matter is constructed on the QM scale, and that will be useful at further development of this model as well.

2.2. Initial model of Gravity Force, statics

Remaining in this informational concept it is possible to put forward [1] rather reasonable conjecture: since the gravity force is universal (regardless to the kind of particles) - then the gravitational potential energy of a system of some bodies is proportional to the *accidental coincidence rat*e of random interactions of Gravity mediators with every particles of these bodies. Such coincidences always exist since the FLE’s flip-time [Planck time] is not equal zero. Secondly suppose, that in gravity interaction only one FLE in particles’ algorithms take part – i.e. every particle’s algorithm has only one Gravity-marked FLE, and that happens in the 3D (XYZ) space, by three conditions:

(i) - the frequency at which a particle’s algorithm runs if particle is at absolute rest (in statics), is $\omega = E / \hbar = m_0 c^2 / \hbar$, where m_0 is the inertial rest mass, c is the speed of light, $\hbar$ is the Planck’s elementary physical action;

(ii) - in the model every particle's algorithm has only one fixed gravitationally marked FLE[1], (which, rather probably, is the "start FLE" in a particle algorithm) and so the gravitational charge is proportional to the same algorithm's frequency ω, as the corresponding particle's energy above;

(iii) at every algorithm cycle, the G-marked FLE of a particle initiates in the 3D space radial propagating of 2D rim "circular graviton" of flipping the FLE-lattice FLEs, which are G-marked also, and at hitting in flipping G-marked FLE of other particle, that transmits to this particle the momentum $p = -\frac{\hbar \vec{r}}{r^2}$, r is the radius-vector from the radiating to the impacted particle.

Since the G-marked FLEs flip independently in both particles, and particles practically are not oriented specifically in the space at gravitational interactions, the elementary interactions above are random. That is not essential in Matter on macro scale, *however it allows to observe the quantum nature of Gravity* at interactions of lightest particles, first of all photons in macro fields [1, 9].

A couple of additional important notes: (i) - first of all from the existent experimental data follows that all/every particles have the gravitational charges, and (ii) - that the Gravity mark is completely symmetrical at particles and antiparticles algorithms running, and so everything in Matter attracts everything.

For two bodies at rest having *gravitational* masses m_1, m_2, that are placed on the distance between the particles, r, "Newtonian" gravitational potential energy and force are equal

$$E_{gN} = -G\frac{m_1 m_2}{r}, \tag{1}$$

$$F_{gN} = -G\frac{m_1 m_2}{r^2}, \tag{1a}$$

where G is Newtonian constant of gravitation.

As that was assumed above, the FLE's sizes are equal to Planck's length, l_P. Besides assume that:

(i)- at every "tick" of a particle's algorithm a "rim" ("circular graviton", further "graviton") of FLEs flips starts to expand *in the space* with radial speed that is equal to the speed of light, c, so the rim's area is equal $2\pi r l_P$, see Figure 1,

(ii) - the time intervals of the "radiating" particle's G-marked FLE's, of the graviton's FLE and other particle's G-marked FLE, flips are the same and are equal to Planck time; and

(iii) – at the interaction of a graviton and a particle's flipping G-marked FLE, the particle is gravitationally impacted.

[1] In earlier papers with this model "G-marked FLE" is called "us-FLE"

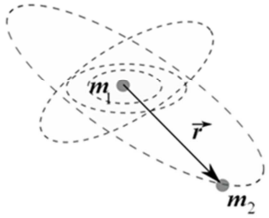

Figure 1. A sketch of a spreading of the circular gravitons in the space. The directions of the spreading rims' planes are random since in reality any particle is impacted by some forces and isn't oriented in the space constantly.

It is evident, that interactions of gravitons and particles' G-marked FLEs are accidental events – coincidences of independent processes of "radiation" and spreading of gravitons of "radiating" particle and of G-marked FLE flipping of other one. In previous papers the coincidence rate in a particle was estimated in suggestion that both – the number of "gravitons" in a point, where a particle's G-marked FLE flips, and the number of these G-marked FLE flips, are random; at that both numbers are distributed under Poisson law with the averages n_1 and n_2. Then, if both [average] rates of coincidences inside Plank time interval, τ, (note that isn't, of course, "τ" in the spacetime metrics above) aren't too large, then it is well known that the coincidence rate is equal

$$N_c \approx 2n_1 n_2 \tau \qquad (2)$$

In reality the particle's G-marked FLEs flip very regularly; nonetheless the equation (2.10) remains be true, if one suggests that the interaction of graviton and particle's G-marked FLE happens in any time moment when the both Plank times intervals overlap (Figure 2).

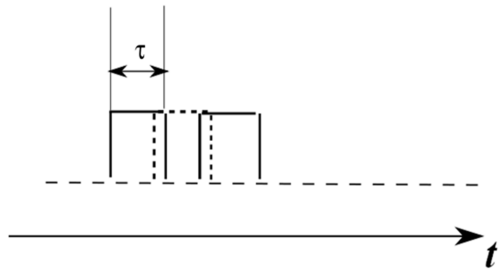

Figure 2. Overlapping of circular gravitons and G-marked FLE

Thus the coincidence rate in a particle for the time when the "irradiated" particle's G-marked FLE flips again is

$$N_c = \psi_r n_p 2\tau \qquad (3)$$

where ψ_r is the flow [s^{-1}] of gravitons through the particle's G-marked FLE; n_p is the particle's G-marked FLE's flip rate (is equal to the particle's algorithm tick rate/ frequency ω).

From the suggestions above obtain that the average gravitons flow, which is produced by a body having a mass m_1 on a distance r is equal

$$\psi_r = \frac{m_1 c^2}{\hbar}\frac{2\pi l_P r}{4\pi r^2} = \frac{m_1 c^2 l_P}{2\hbar r} \ , \qquad (4)$$

and the coincidence rate in a "irradiated" particle is

$$N_{c12} = \frac{m_1 c^2}{\hbar}\frac{l_P}{2r}\frac{m_p c^2}{\hbar} 2\tau \cdot P_G = \frac{m_1 c_2}{\hbar}\frac{l_P}{2r}\frac{m_p c^2}{\hbar} 2\frac{l_P}{c}\cdot P_G = \frac{m_1 m_p c^3 {l_P}^2}{\hbar^2}\cdot P_G \ . \qquad (5)$$

P_G is some probability of interactions. if some other physical effects act. Since the Plank length is equal $l_P = (\frac{\hbar G}{c^3})^{1/2}$, from Equation (5) obtain, that if the probability P_G =1 the coincidence rate in the particle is equal

$$N_{c12} = \frac{G m_1 m_p}{\hbar r} \qquad (6)$$

It is evident, that if a body having mass m_2 contains not extreme number of particles (and the "radiating" body as well, of course), then the coincidence rate in the body is equal

$$N_{c12} = \frac{G m_1 m_2}{\hbar r} \qquad (7)$$

Note that the masses m_1, m_p, and m_2, in the equations (5) - (7) above are the *inertial masses*. It is evident that Gravity action is in this case symmetrical, and so $N_{c12} = N_{c21}$

The number of elementary momentums that are transmitted to the "radiated" masses is $\frac{dP}{dt}$, i.e. the force that acts to the masses, absolute value of which so is equal

$$F_g = N_{c12}\frac{\hbar}{r} = N_{c21}\frac{\hbar}{r} = \frac{G m_1 m_2}{r^2} \qquad (8)$$

$$\vec{F}_{g12} = -\frac{G m_1 m_2 \vec{r}}{r^3} = -\vec{F}_{g21} \qquad (8a)$$

- i.e. the force in Newton Gravity law, where the masses are gravitational masses.

The potential gravitational energy of the system of two bodies, defined here in the informational model, E_{gs}, is as

$$E_{gs} = -\frac{1}{2}\hbar(N_{c12} + N_{c21}) = -\frac{G m_1 m_2}{r} . \qquad (9)$$

- i.e. the energy is the gravitational mass defect, which in the statics is equally divided between the bodies:

$$\Delta E_{gs1} = \Delta E_{gs2} = -\frac{Gm_1m_2}{2r} \ . \qquad (10)$$

Note that from Eqs. (5) and (8) it follows that at statics *the gravitational and the inertial masses of a body are completely equivalent*, since both "are created" by the same algorithms tick rates, ω, of particles that compose the body.

Note, however, that in this case some "1/2" problem appears, i.e. – the condition that to obtain true value of the gravitational mass defect in every body is necessary for the coincidence rate in the body to be twice lesser then for the corresponding gravity force (Eqs. (8) and (10), however in this – the statics – case this problem really doesn't exist, since in statics the gravitationally coupled bodies are impacted also by other forces, which fix the bodies in their static positions.

From the above we can again – as that was noted earlier relating to the fundamental in physics now speed of light constant, $c = l_P / t_P$ – conclude that not the gravity constant, *G*, but Planck length, Planck time, and elementary action, $\hbar$, are indeed fundamental constants in Matter. Note also, that at least for the statics the circular gravitons of a particle transmit at gravity interaction to any another particle all information about the localization of the radiating one in the vector value of elementary momentum $\vec{p}_0 = -\hbar\vec{r}/r^2$; though with practically 100% QM uncertainty of the distance.

From above follows that the intrinsic processes in both bodies become be slowed on the half binding energy/gravitational mass defect (divided by $\hbar$, of course). If the mass, M , of one of the bodies is much greater than the other mass, m, the relative decrease of the lesser body's algorithm frequency is

$$\delta\omega = \frac{GMm}{2\hbar r}\frac{\hbar}{mc^2} = \frac{GM}{2rc^2} \qquad (11)$$

Correspondingly, if the body-2 is a clock, the clock's showing becomes be slowed down on $\frac{GM}{2rc^2}$ times, what *is two times lesser* then that is predicted in the general relativity theory.

If a pair of clocks are placed on different radii from M , r and $r + h; h << r$ in a gravity field (Figure 3)

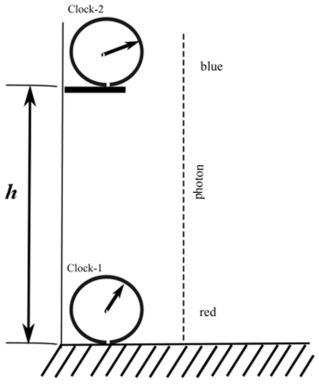

Figure 3. Two clocks are in a [let – Earth] gravity field. Dotted line – a photon beam.

then their relative tick rates differ as

$$\delta\omega_1 - \delta\omega_2 = \frac{GM}{2c^2}\left(\frac{1}{r} - \frac{1}{r+h}\right) \approx \frac{GMh}{2r^2c^2}. \qquad (12)$$

For Earth surface $\delta\omega_1 - \delta\omega_2 \approx \frac{gh}{2c^2}$, where g is the free fall acceleration. In the GR the clocks' rates difference is two times more [10]: $\delta\omega_1 - \delta\omega_2 \approx \frac{gh}{c^2}$.

Besides, note here that the photons don't principally differ from T-particles, really every particle in Matter fundamentally obligatorily has both – the gravitational and inertial masses, the gravity force acts on the photons analogously to the T-particles.

Note also, that the difference of intrinsic processes rates in bodies that are in space points with different Gravity potentials is predicted in GRT as "gravitational time dilation", and, whereas this effect is trivial in this informational model, this GRT prediction was completely new in physics in 1916. It was measured yet in 1960-s in well known Pound-Rebka-Snider experiments, where GRT value of the difference $\delta\omega_1 - \delta\omega_2$ was confirmed [11], [12], measuring Mossbauer resonances values at propagating photons that are created at gamma-decay of Fe-57 nuclei. However, in this case two different physical effects are involved – the real difference of intrinsic processes rates of the nuclei on different heights, and possible red/blue shifts of photon frequency. Thus the experimental results can be in accordance with GRT only provided that the GRT postulate that photons don't change their energy at propagating between points with different potentials [13] is valid, what can be incorrect, photons must interact with gravity field, changing energy as that all other particles do.

This problem now can be experimentally solved only in experiments, where is only one of possible impacts on intrinsic processes is measured. Now such rather easy experiment is possible – for that it is enough to measure elapsed time intervals of preliminary synchronized in one point clocks, after the clocks were placed on different on 400-500m heights on Earth, for example in a skyscraper:

- it is necessary to synchronize two clocks, say on the ground floor;
- to lift slowly or with known speed one clock on a height 400-500 m;
- to wait a few hours;
- to return the upper clock to the other on the ground floor and to compare the clocks' elapsed time showings.

On the tick rates two effects impact: "kinematical" slowing down because Earth rotation that is proportional reverse Lorentz factor $(1 - v^2/c^2)^{1/2}$, v is the speed of the clocks ~400m/s near equator, the difference of the frequencies for different heights, H, is ~ $1.5\text{x}10^{-27}$ $2\pi RH$, near equator and for H=500 m ~$3\text{x}10^{-17}$, and the gravitational impact, in this case the difference because of the gravitational impact is ~$5\text{x}10^{-14}$, i.e. on 3 orders by magnitude larger, and so the kinematical contribution is negligible.

Thus after 1-hour duration the difference of the clocks elapsed time showings will be ~3.6×10^{-10}, if GRT is correct, or two times lesser, if this model is correct, the measurement of such time intervals isn't a too hard problem now.

If the difference of the showings will be in accordance with GRT – this result will be more convincing confirmation of GRT validity than Pound-Rebka-Snider results, if not in accordance with GRT, and rather possibly in accordance with this initial Gravity Model, from such result, including, it would experimentally follow that photons really change energy/frequency in Gravity fields, what contradicts with GRT postulate that photons propagate along geodesics having constant energy [13].

Quantum Gravity

In the model above the quantum nature of Gravity follows directly, and it looks as rather natural also that after this initial model will be developed at least on the level of classical electrodynamics, the QM gravity formalism will be developed as well – as that happened with classical electrodynamics, "QM ED", i.e. as the Dirac equation, and QED. Note also, though, that both these Forces and both – classical and QM, theories eventually rather probably should be developed taking into account the common remarks to standard mechanics formalisms, see section "Conclusion" in [5].

Nonetheless yet now from the above follows principal possibility of observation of quantum gravitational effects, corresponding experiment was proposed yet in 2007 in [1], [9], [14], where it is proposed the measurement of monochromatic photons beam gravitational distortion using an interferometer with at least two arms, one of which is parallel, and other is vertical relating to Earth surface; arms lengths ~ 300-500 m.

For the experiment it is so enough to upgrade some of the first installations that were made aim at observation of gravitational waves, and using photons source that is able to work in 1-2 Hertz stability mode at least during few seconds; in this experiment the changes of photons energy in Gravity field will be observed directly as well.

2.3. Initial model of Gravity Force, stationary field, free fall

Here we consider (in the absolute frame that is at 3D space rest in the absolute Matter's spacetime, where [in the frame] all parameters of everything in Matter have real values) utmost simple, however important, free fall motion of bodies in a free closed system, where the bodies have rest masses M_0 and ("test mass") m_0, $M_0 >>> m_0$; say m_0 is mass of proton, and, besides, the consideration will be based on, first of all, two propositions that were formulated by Ronald R. Hatch in his "modified Lorentz ether theory (MLET)" of Gravity [15]. The first position is that

"….the source of gravitational energy is the rest mass energy of the particle – not the curvature of spacetime…..Gravitational force converts gravitational potential energy (rest mass energy or structural energy) into kinetic energy when a particle falls and vice versa when a particle rises…",

- and the second one is that at a particle motion gravitational and inertial masses aren't equivalent, and gravitational mass, m_g, is lesser than the inertial mass, m_i, in inverse Lorentz factor,

$$m_g = m_i(1 - v^2 / c^2)^{1/2} \qquad (13)$$

These, well rational, and so rather probably really correct and really foundational, propositions have rather questionable base in MLET, however are in full accordance with this initial Gravity model. Indeed, as that is pointed above, a circular graviton is radiated by the G-marked FLE of a particle as the ether FLE that has kinematical angular momentum be equal $\hbar$, and the "precessing momentum in *g*-dimension" be equal to $\vec{p} = \frac{\hbar \vec{l}_P}{l_P^{\,2}}$. Further this "point" transforms into the rim of flipping ether FLEs, where the "precessing momentums in *g*-dimension" angle decrease so that $\vec{p} = \frac{\hbar \vec{r}}{r^2}$ in the 6D spacetime, and are orthogonal in all 3D space directions to the rim's circle, i.e. the corresponding ether FLE flipping points propagate in the 3D space along strait lines relatively to the starting point, and so have zero energy (i.e. ***the circular gravitons aren't particles***, see section 1.1). However, if such flipping ether FLE hits the irradiated particle's flipping G-marked FLE, the particle's FLE obtains the momentum above, at that its "kinematical" precession angle decreases, so the particle's algorithm becomes be longer and so runs slower, i.e. the *inertial* mass of the particle in the Gravity field decreases – what is observed as the gravitational mass defect, which is in statics also inertial mass defect. By another word the irradiated particle in a Gravity field – which is the flow of circular gravitons – moves in the ether like a human swims in water, spending for that his own energy.

As well as Eq. (13) becomes to be quite natural – if a having rest mass (T-particle, all material objects are made from which) particle, the algorithm of which ticks with maximal rate when the particle is at absolute 3D space rest, and so moves only along the $c\tau$-axis with the speed of light, moves also in the 3D space with a speed *V*, the algorithm's FLE sequence is "diluted" by "blank space" ether FLEs, becomes be longer, and the algorithm's tick rate ω decreases in the Lorentz factor. So the moving particle lives longer, and, besides, so the rate of radiating by the particle circular gravitons decreases in Lorentz factor as well.

In the considered here closed system the system's whole energy, *W*, is equal

$$W = E_M + E_p - U \qquad (14)$$

- where E_M is energy of the having inertial mass *M* body, further "energy of *M*", E_p is energy of particle, U is the potential energy of the system. Here we consider the case, when the masses are on infinite distance $W = M_0c^2 + m_0c^2$, since gravitational potential energy U=0, but if the mass *m* after some negligible impact starts to move to *M* under gravitational force, then the mass *M* practically remains at rest, its energy changing is negligible, whereas so the particle's energy, because of the energy conservation law, remains at the motion to be equal always to m_0c^2 and Eq. (14) becomes to be as

$$W = M_0c^2 + E_p - E_{diss} \qquad (14a)$$

- where E_{diss} is an energy that, in principle. can be dissipated from the system at the motion, say, when the mass *m* radiates "ordinary" gravitons at its acceleration, the

energy of mass m is $E_p = \frac{m_i c^2}{(1-\beta^2)^{1/2}}$, $\beta \equiv \frac{V}{c}$, V is the 3D the particle's speed; and if, as that is suggested here, E_{diss} is negligible, at least in first approximation so we have

$$\frac{m_i c^2}{(1-\beta^2)^{1/2}} = m_0 c^2 \qquad (15)$$

Using Eq. (13), (15) obtain so the equations for m_i:

$$m_i = m_0 (1-\beta^2)^{1/2} \qquad (16)$$

- and for m_g :

$$m_g = m_0 (1-\beta^2) \qquad (17)$$

The "own" particles energy is spending, since circular gravitons act only in 3D space direction, as converting it into increasing the particle's kinematic energy, E_k

$$E_k = E_p - m_i c^2 = \frac{m_i c^2 [1-(1-\beta^2)^{1/2})}{(1-\beta^2)^{1/2}} = \frac{GMm_i}{r}(1-\beta^2)^{1/2} \qquad (18)$$

For the force that acts on the m we have

$$F_g = -\frac{GM\vec{r}}{r^3} m_0 (1-\beta^2) \qquad (19)$$

Solving equation (18) relating to $(1-\beta^2)$ sequentially obtain ($a = \frac{GM}{rc^2}$)

$$(1-\beta^2)^{1/2} = \frac{(1+4a)^{1/2} - 1}{2a} \qquad (20)$$

$$(1-\beta^2) = \frac{1+2a-(1+4a)^{1/2}}{2a^2} \qquad (20a)$$

For $\frac{GM}{rc^2} << 1$ obtain from (20a)

$$(1-\beta^2) = \frac{1+2a-(1+4a)^{1/2}}{2a^2} = \frac{1+2a-(1+2a-2a^2+4a^3...)}{2a^2} \qquad (20b)$$

$$\approx (1-2a)$$

- and so $\beta \approx (\frac{2GM}{rc^2})^{1/2}$. From this it follows that particle on Schwarzschild radius $R_g = \frac{2GM}{c^2}$ distance has speed that is equal to the speed of light, and so the approach above isn't applicable, including gravitational and inertial masses aren't in

accordance with Eq.(13). Thus the rather simple approximation above isn't applicable as well. So it is necessary to use Eq.(18) to obtain the correct equation for m_g

$$m_g(r) = \frac{m_0 c^2 [1-(1-\beta^2)^{1/2}] r}{GM} \tag{21}$$

- so the 3D force

$$F_g = -\frac{\vec{r}}{r^2} m_0 c^2 [1-(1-\beta^2)^{1/2}] \tag{22}$$

- and further solving differential equation relating to $\beta(r)$, $\beta(r=\infty)=0$,

$$-\frac{dE_k}{dr} = -F_g, \tag{23}$$

- one can obtain full description of the mass *m* motion dependently on *r*.

The case of small r. All that above Eq.(21) so is valid only in rather weak fields, the Eqs. (1) – (10) are valid *for sure* only till the Newton Gravity law is valid, whereas if *r* decreases, and in statics, say if $r = R_g$, the relative coincidence rate N_{c12} in a "irradiated" particle in Eq. (2.13) is 0.5 of the particle algorithm's frequency, at $r = \frac{GM}{c^2} \equiv R_N$, R_N is the Newtonian analogue of R_g , i.e. that is the radius of a surface, where the escape velocity is equal to the speed of light in the Newton's Gravity, the number of circular gravitons impacts is equal to the particle algorithm's ticks rate, i.e. the particle's mass defect is equal to m_0 at all, what looks as is rather strange.

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At that, though, if the radiated circular gravitons impacts have Poisson distribution, then rather essential part of the impacts happens as multiple, *k*, events at the same the irradiated particle's algorithm's tick, though the average N_{c12} remains as in Eq. (2)

$$N_{c12} = (\sum_k \frac{k(2n_1\tau)^k e^{-2n_1\tau}}{k!}) n_2 = 2n_1 n_2 \tau$$

What happens at multiple events, when same G-marked FLE in irradiated particle is more than 1 time impacted at this FLE's flip? - isn't known now – though application of the couple of last Eqs. rather probably will clarify this point to some extent.

So, for example, if we define the radius *r* as measured in "R_N units", as, let, $r = \alpha R_N$, than, though for α ~2 and lesser the consideration above Eq.(21) looks as rather uncertain, especially in statics, however we can hope that even this application will result in at least a zero approximation picture, including, say, about what happens below the event horizon of Sagittarius A*, where, even if the central compact object would be a big neutron star, α is ~10^{-4}.

The uncertainty of the Eq. (23) application really can be essentially lesser, including rather probably that allows to obtain ~ first approximation description of particle's

motion up to absorption of the particle by *M*; and some reliable picture what happens in such cases in statics.

Besides note, that though any falling particle in statics for sure adds to any *M*-object only whole energy $E = m_0 c^2$ and nothing more, after the particle stops in the object on the radius α <1, when N_{c12} becomes too essentially large, some particles, nonetheless, can, in principle, exist – having at that their "sizes" – Compton lengths $\lambda = \frac{\hbar}{mc}$ be $\lambda \sim \alpha \frac{GM}{c^2}$, i.e. rather macro lengths. For α well more 1, say, more 5 – in the neutron stars, this effect isn't too essential, and particles remain be ordinary ones, including rather probably protons indeed transform into neutrons, etc.

2.4. Initial model of Electric Force, statics

The electric force is rather similar to gravity - both potentials are as 1/*r,* if some charged bodies interact, then in reality the interactions of separated charged particles happen, etc.; except, of course, that gravity force is much weaker than electric one and that electric force can act as the attraction and as the repulsion, and so can be effectively screened, whereas this effect is much lesser in Gravity. So it is rather reasonable to conjecture that the equations for the potential energy should be similar also, but the probability of electric interaction should be larger

– because of, as that is assumed in this model, the widths of "circular photon" rim, W_1, and of the "receiving part" of the activated E-marked FLEs in "irradiated" E-charged particle's algorithm, W_2 are much more than the size of only one G-marked FLE in the gravity case.

Note also that that the circular photons are analogues of the circular gravitons, i.e. have kinematical angular momentums be equal to $\hbar$ and the "precessing momentum in *e*-dimension" absolute values be equal to $p = \frac{\hbar}{r}$.

So for the electric coincidence rate we can obtain some analogous to Equations (2.10) – (2.13) (for a couple of particles with the elementary charge, e) equations:

$$N_{cc21} = \frac{m_1 c^2 \cdot 2\pi r W_1}{4\pi r^2 \hbar} P_E \frac{m_2 c^2}{\hbar} 2\tau_E , \qquad (24)$$

where P_E – the probability of the interaction if through particle-2 a radiated by particle-1 circular photon have passed, τ_E – the "passing" time. Under rather plausible conjectures that:, $\tau_E = W_2 / c$, $W_1 = \alpha^{1/2} \lambda_1$, $W_2 = \alpha^{1/2} \lambda_2$, where λ_1, λ_2 are the Compton lengths of the particles; P_E =1; and α is the fine structure constant, we obtain from Equation (2.24) that electric potential energy of the two-charge system is

$$U_E = \hbar \cdot N_{cc21} = \frac{\alpha \hbar c}{r} = \frac{e^2}{4\pi\varepsilon_0 r} , \qquad (25)$$

and for the electrical force in the statics obtain

$$\vec{f}_E = \frac{d\vec{p}}{dt} = N_{cc21}\vec{p}_0 = \frac{e^2\vec{r}}{4\pi\varepsilon_0 r^3} = \frac{q_1 q_2 \vec{r}}{4\pi\varepsilon_0 r^3} \quad . \qquad (26)$$

(The lower term in Equation (26) is for arbitrary charges).

Note, that in the Equations (25) and (26) we suggest, as that was for circular graviton above, i.e. that the elementary momentum, which is transferred at the elementary interaction is $\vec{p} = \pm\frac{\hbar\vec{r}}{r^2}$.

Note that, as what was obtained above for gravity,

- if the particles have opposite charges and so the resulting system has negative mass defect, then there should exist the "*electrical time dilation*", i.e. really the slowing of internal processes in tied electrical structures, e.g., – in the atoms. For example, in the ($\mu^- - muon$ + proton) "Hydrogen atom" $\mu^- - muon$ should live longer than in free state and this dilation should be essential (detectable?) if a muon is on *K*-shell of, e.g., Uranium. Though, of course, since the muon in this case more time is inside the Uranium nucleus and so here some other forces, besides the EM, can act on the muon, it seems as very unlike, that a corresponding experiment would be informative; and

- all what is true in Gravity model, first of all that circular photons aren't particles, and so don't carry some energy, is true in the Electric Force case. However, unlike Gravity, in this case we cannot for sure suggest that at slowing down of the internal processes in electrically charged particles motion the charge decreases in the Lorentz factor, moreover, in classical electrodynamics it is postulated that the electric charge is invariant at motion.

Note, also, that from this E-model follow a couple of important consequences. From the equation for potential energy Equation (22) follows the explanation of physical puzzle - *Why* $\alpha\hbar c = e^2 / 4\pi\varepsilon_0$ **?** – whereas in this equation fundamentally different in physics universal for everything in Matter constants – the fundamental elementary action $\hbar$ and the speed of light, *c*, and the specific for only one fundamental EM Force, the elementary electric charge, *e,* are united by some unknown in the official physics way so, that their ratio is a dimensionless fundamental fine-structure constant, α, and

- that so called magnetic monopole doesn't exist.

From experiment and classical electrodynamics, it is well known that the magnetic force appears only if an electric charge moves in some "*stationary*" frame, and disappears, if the charge is at rest in the frame (for example, see [13])

From the above seems it rationally follows that the magnetic force is not really a fundamental Nature force, which exists, in Newton's words "of itself, and from its own nature", and so has its own charge "magnetic monopole".

However electric and magnetic forces are practically completely symmetrical in the electrodynamics, when, according to SRT, all relatively moving inertial reference

frames are completely equivalent, and so the argument above turns out to be inessential if SRT is completely correct.

Correspondingly, after the Dirac's publication [16], presenting a number of QM arguments in support of the existence of a magnetic monopole, the "magnetic monopole" problem from 1931 year and until now remains a popular, and even a fundamental, physical problem [17].

Nonetheless, since the Matter's spacetime is absolute, and so all/every inertial reference frames really aren't completely equivalent and legitimate, the argument above is valid, since the absolute, i.e. that are at absolute rest in the absolute 3D space, reference frames are the frames that differ from all other "*stationary*" frames first of all by that *only in the absolute frames physical objects, events, and processes, have real values of their physical parameters.*

Thus, since the field of a charged a body that is at absolute rest in the space is purely electric field – from that follows that magnetic monopoles really do not exist.

It also seems quite rational to suggest that the magnetic force is a specific actualization of the electric force, when the ether FLEs in circular photons that are radiated by a moving charge obtain additional momentum proportional to the spatial speed of the charge, including because that FLEs in radiating particles are additionally precessing in the 4D kinematical space at motion along, say, X-axis, and rotated in the $(X, c\tau)$ plane, (more see sections 2.3., 2.4. in [4])

- so the flipping ether FLEs in circular photons, though aren't transformed into a particle at inertial motion, nonetheless become precessing in the "kinematical" 4D space as well. And when they hit an E-marked FLE in another charged particle, they transmit to this particle an additional momentum, which, if the "irradiated" particle is at spatial rest, is orthogonal to momentum that would be transmitted if both charges are at rest, i.e. along direction of the radius-vector between the charges, what is observed as "magnetic force". If both (all in other cases) charges move with the same velocity, their FLEs are precessing identically, and so in such systems only electric Coulomb interactions are observed.

Note also, though, that the radiating of circular photons by charged FLEs evidently isn't completely symmetrical because of the 4D circular motion of the FLE flipping point in particle's algorithm; that, seems, can result in that so charged particles have non-zero magnetic momentums.

The next suggestion seems rather rational as well: if a charge is accelerated, then, at least sometimes, some circular photons under impact of changing momentum transform into close-loop algorithms "ordinary photons", where the "electric" and "magnetic" components of transmitted at interaction precessing FLEs momentums cyclically change each other. Rather probably the same happens at the acceleration in Gravity Force, and an accelerated electrically charged particle in parallel radiates also gravitons, which are unobservable till now because of the extreme weakness of Gravity.

Another "circular photon" transformation rather probably happens when an "ordinary photon" interacts with some circular photon, say, of a nucleus, and a T-particles, e.g., $e^{\pm}$ pair, are created, with "double opposite rotations" of the photon's momentum from a

spatial direction into two momentums of the pair components with opposite directions along the $c\tau$ -axis.

2.5 Strengths of Gravity and Electric Forces

From the last sections above it follows, that Gravity is extremely weaker than Electric Force

To illustrate that let consider a system of two electrons. Electron has the reduced Compton wavelength λ =3.861x10^{-13}m, the number of G-marked FLEs is universal for all fundamental particles , i.e. equal to1; the number N of E-marked FLEs is relative, $N = \alpha^{1/2} N_0$, N_0 is whole "logical" algorithm's length $N_0 = \lambda / l_P$.

So in this case N_0=2.4x10^{22} FLE, gravity charge 1 FLE, electric charge ~ 8% of N_0, i.e. near 2x10^{21}FLE; the whole electron's algorithm ticks with frequency ω = 7.763x10^{20} s^{-1}; and so intensity of the radiated rings for electron are: 7.763x10^{20}s^{-1} of circular gravitons, and ~1,55x10^{42} s^{-1} of circular photons.

The probability of radiated circular photon to hit into flipping electrically marked FLE of other ("irradiated") electron correspondingly is larger than for circular graviton also in ~2x10^{21} times, so the whole intensity of hits at electric interactions is larger than at gravitational interaction in ~4x10^{42} times, and so for a pair of electrons the Gravity force is weaker than Electric force in this value – as this ratio really is.

Note here two important points that follow from the above:

- from that this real ratio of gravitational and electrical forces is obtained without using Newton and Coulomb laws it follows that the initial Gravity and Electric Forces models above are reliable; and

- form this result, which is based on the assumption that the FLEs in the algorithms have the size be equal to the Planck length, follows, that this main assumption in the whole physical model is with a rather large probability true.

3. A few of main implications that follow from the models

From the consideration of the Gravity and Electric Forces above it follows, first of all, that:

(i) - really the main fundamental problem in classical and quantum electrodynamicses, where in the first one some "flows of energy" and "energy density" are postulated, despite of the evident problem: why, from what mystic infinite reservoir, and how, this energy constantly always is flowing, whereas, say stable charged particles exist well stably billions of years?,

- as well as in QED, where for the equally as the above mystic reasons and ways the charges constantly billions of years radiate flows of "virtual photons", which also transmit to other charges some energy, etc.

- becomes to be clarified – there is no these fields' energy flows, correspondingly there is no any energy densities, no some "electromagnetic masses", no energetic "virtual flows" etc.;

(ii) – both, Gravity and Electric, fields have no specific gravitational and electric charges and so don't interact specifically – really only the charges, i.e. gravitational masses and electric charges interact; and

(iii) – real physical theories must be based on the postulate that really all fundamental Nature forces are mediated only by real mediators, and practically for sure the really non-mystic Gravity and Electric Forces theories should be based on the models above.

(iv) – the developed here model of Gravity Force at free fall motion of comparatively small masses in gravity fields of material objects that have extremely large masses, first of all cosmological objects, allows to obtain at least zero approximation description of what happens at small distances to the objects, including what happens below event horizons of SMBH.

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