On the General Reality of Gravity, as Well as Other Forces in Nature and the Creation of Material Particles and Force Fields in the Universe

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This work derives the relation between the Planck constant and Einstein's gravitational constant. The relation between the Planck constant and Newton's gravitational constant is deduced. The relation between the Planck constant and the electric force of 1 Coulomb and the magnetic force of 1 Henry is deduced. It establishes that the Planck constant represents the density of momentum of the void space in the Universe. This work proves that gravitational force has its opposite force in the internal momentum of atomic particles of matter. It establishes that two terms mass and electric charge introduced by mankind are not known in nature. It is proven that, in nature, there is only one type of force and that is the force-balance of inertial forces, between the internal momentum of particles and the reversely oriented force of its own force-field in the surroundings of mass particles. This work further maintains that the essence of the composition of the mass of all atomic particles, as well as all force fields in the universe, is the same and is created by the compression of density of the momentum of the void space.

1. Introduction

Three centuries have elapsed since the creation of the fundamental theories of classical mechanics Newton (1686), a hundred-fifty years since the completion of explorations of electricity and magnetism by Maxell (1848), a century since the crucial experiment measuring the speed of light by Michelson and Morley (1887), the creation of basic physics theories of relativist mechanics and gravity Einstein (1905, 1916). Over eighty years has passed since the creation of quantum physics and mechanics Bohr (1917), De Broglie (1919), Heisenberg (1926), Schrödinger (1926), Dirac (1926), Klein and Gordon (1926).

Until now, all these theories represent the valid fundamentals of current physics. Over the past ninety years, physics witnessed a huge increase in essential experimental data and discoveries, which the above creators of our currently valid fundamental theories of physics did not know. After Hubble's (1925) , Lindblad's (1926) and Ford's (1975) discoveries, modern physics learned the universe is structured into rotating galaxies, throughout which billions of stars rotate both around the center of the galaxy, as well as around their own axes.

After the discovery of the proton by Rutherford (1919) and the spin of particles by Dirac (1927), current physics learned that matter in the universe is structured by electrons, rotating both around their proton-neutron nuclei and spinning around their own axes. By discovering the essence of cosmic radiation (1930-1945), microwave background radiation (1964) and the neutrinos (1930-2000), today's physicists understood that space anywhere in the universe is not void, but that thousands of protons, billions of photons and neutrinos can be found per second in each cubic meter of space in the universe.

These breathtaking discoveries dramatically changed our view of the current civilization of universes surrounding us, yet they were not known to our great predecessors, who created our currently valid fundamental theories of physics.

From the beginnings of modern physics (which are mostly connected to the work of Newton) until today, the quantities of force, momentum and energy are included in the basic terminology of physics. On the other hand, all physicists, from Newton to today, jointly maintain that they *do not know* what physical reality these quantities of energy and momentum represent, nor their origins in nature.

Briefly, in today's physics they are valid totals for the numerical measures of mass, speed and acceleration. In relation to this, we quote the opinion of perhaps the most recognized worldwide university text book on the basic subject of physics since the times of Feynman (1, Vol. 1, par 4.1.) *"It is important to realize that in physics today, we have no knowledge what energy is. We do not have a picture that energy comes in little blobs of a definite amount"*.

Similarly, with the quantity of force, we quote Feynman's opinion on the force of gravity *"Newton did not consciously focus on the cause of gravity, did not come up with hypotheses. He was satisfied with the knowledge and description of what takes place, without understanding the mechanism. However, nobody yet discovered such a mechanism. The law of the conservation of energy is a statement regarding quantities that must be calculated and there is no mention of mechanism in it. Similarly with the great laws of mechanics, which are quantitative mathematical laws, the mechanisms of which we do not know"?* Likewise Feynman (1, Vol. 3, par 18-9) (the Nobel Prize laureate for quantum physics!) *"I think I can safely say that nobody understands quantum mechanics"*.

And also Feynman (The Character of Physical Law, 1965) "We have always had a great deal of difficulty understanding the world view that quantum mechanics represents. At least I do, because I'm an old enough man that I haven't got to the point that this stuff is obvious to me. Okay, I still get nervous with it.... You know how it always is, every new idea, it takes a generation or two until it becomes obvious that there's no real problem. I cannot define the real problem, therefore I suspect there's no real problem, but I'm not sure there's no real problem."

As of today, there has been no complex effort made on the part of physics to remedy this dismal situation. This is despite the fact that, over the past 90 years since the times of the great theories of physics, formulated some 90 to 320 years ago, physics accumulated an enormous amount of physical data and made significant discoveries.

In this work, we are convinced that, based on current knowledge, we may shift the way our predecessors viewed the physical world around us.

2. The Essence of the Planck Constant, as well as Its Relation to Einstein's Gravitational Constant and Einstein's Corrected Gravitational Constant

In today's physics, the *Planck Constant* is the most substantial term of all mathematical relations in quantum physics. However, over the 110 years since its discovery, there is a polemic circulating in quantum physics regarding what the Planck constant actually is, or even to which specific quantity of momentum, energy or force it belongs. Planck himself speaks about his constant, discovered when explaining the shape of a spectral curve of radiation of an absolutely black body-as a constant of the smallest quantity of energy ("blobs") proportionate to the frequency of the $\varepsilon \sim h\nu$ radiation, later called the photon.

Einstein identified Planck's statement concerning proportionality, with a statement about the equality of the total of this constant and the frequency of photon with its energy $E = h\nu = mc^2$ and the concurrent validity of the relation $p = h/\lambda = h\nu/c$ for the momentum of photon. Planck himself did not like this statement, doubting that nature could function in this way. Through this Einstein's relation, the momentum and energy of the photon became equivalent quantities $E = h\nu = hc/\lambda = pc$, differing only through the multiples of the constant of the speed of light c. Our previous work shows (6), that in the same manner, in relativist mechanics, the quantities of momentum and energy were linearized $E = pc = mvc$, where the energy is momentum extended by the speed of light c.

Though todays relativistic mechanics strictly indicate for kinetic energy solely relation $E_k = mc^2 - m_o c^2$ (enabled by an omission approximation trick at Taylors series come to classical kinetic energy mechanics $m_o v^2 / 2$) only kinetic energy in the form mvc is attached to the General relativity energy –momentum tensor, where connection ρvc so mvc is included. Moreover, connection ρv^2 so mv^2 (without approximation) is located in this tensor. In our previous work (6) we show that the correct relation for the energy of photon is $E = h^2\nu^2/c^2 = h^2/\lambda^2$ and, for particles, $E_t = m^2 c^2 = \gamma^2 m_o^2 c^2, E_k = m^2 v^2 = \gamma^2 m_o^2 v^2, E_o = m_o^2 c^2$. These energies roll up from today's physics calibration point, where we define our units of quantities $1kg = m/s^2, 1N = kgm/s^2, 1J = kgm^2/s^2, p = m/s$, so we can write them for particles as $E_t = \gamma^2 m_o c^2, E_k = \gamma^2 m_o v^2$. These last two energy relations exactly equal two of the three energy relations in Einstein's energy –momentum tensor $\gamma^2 \rho_o c^2, \gamma^2 \rho_o v^2, \gamma^2 \rho_o vc$ so $\gamma^2 m_o c^2, \gamma^2 m_o v^2, \gamma^2 m_o vc$.

In today's physics, General relativity is represented as a theory of gravity, yet this is a very simplified view. General relativity concerns the total energy system of mass and gravitational fields around this mass, clearly indicated by Einstein (7, p. 184) :

*" For if we consider a complete system, the total mass of the system, and therefore its total gravitating action as well, will depend on the total energy of the system, and therefore on the ponderable energy **together** with the gravitational energy"*

So we may say that General relativity set right (generalized) the Special relativity one-sidedly seen energy (in fact momentum) relations. We may consider our conclusion correct in our previous work (6), that energies in special relativity, such as mc^2, mvc, $m_o c^2$ and the energy of a photon $h\nu$ do not represent a quantity of energy, but a quantity of momentum, multiplied by c, so $mc \cdot c$, $mv \cdot c, m_o c \cdot c$, $c \cdot h\nu/c$ and the dimension of such quantities merely equals in dimension the quantity of energy. Therefore, for energy, we can in no case write $E = mc^2$ but only $E = m^2 c^2 = \gamma^2 m_o c^2$.

Using Einstein's special relativity energy concept $E = h\nu = hc\lambda = mc^2$ (where energy and momentum are equivalent quantities), to explain the hydrogen atom energy spectra emitted by electron $E_n = R_y / \lambda^2 = R_y \nu^2 / c^2$ no quantity remains, since $E = h\nu = hc / \lambda \neq R_y \nu^2 / c^2 = R_y / \lambda^2$. Instead of rejecting Einstein's special relativity energy concept, the remedy by wave function in Schrodinger equation $E = mvc = \psi mv^2 / 2 = \psi p^2 / 2m_o$ written as $\Delta E = mvc = mc^2 - m_o c^2 = h\nu - h\nu_o = \psi R(\nu^2 - \nu_o^2) = \psi h^2 / 2m_o \cdot (1 / \lambda^2 - 1 / \lambda_o^2) = \psi p^2 / 2m_o = \psi h^2 / 2m_o \Delta\lambda^2$ and by an obscure mathematical construction called quantum mechanics, was developed, allowing relativistic and quantum mechanics to play on its own playground. As $E = mvc \neq mv^2 / 2$, Einstein's special relativity energy concept is also cut away from Newton's classical mechanics.

The primary working term of current physics, particularly of high energies, is the energy equivalent, or so-called energy units. However, it is clear that it would be just as possible to work with a momentum equivalent, or momentum units, as the quantity reduced by the multiple of c. Here we take note of Feynman's opinion on the „*Idiocy of energy units – It's too bad, but I have already apologized and there is nothing more I can do.*"

Current quantum physics considers Planck's constant to be the minimal value of physically dark concepts of action. No physicists will confirm that, by discovering Planck's constant, we have actually *found* the quantum, the smallest part of anything. We use Planck's constant to calculate equally the quantities of momentum or energy of particles (for example photons). However, we have no limits for the values of these quantities. Their values stretch from zero to infinity, just as the frequency or wave-length of energy and momentum of the photon can run from zero to infinity.

When considering how to handle Planck's constant, we must take note of the concept of Compton's wave-length, $\lambda = h / m_o c$, which is the central part of relations in Compton's scattering experiments of photons on electrons. Planck himself had already worked with a similar relation for photons in the form of $h = mc\lambda$. In the relation for electrons $\lambda_o = h / m_o c = 2.43 \cdot 10^{-12} m$ (named the Compton wave-length of electrons), m_o represents the rest mass of an electron where, for high energies, the relativistic correction of this mass is valid according to the increase of mass $\lambda = h\left(1 - v^2 / c^2\right)^{1/2} / m_o c$, that is, $mc / \left(1 - v^2 / c^2\right)^{1/2} = h / \lambda$. However, there is no relativistic correction in this relation to the Compton wave-length, even though relativity strictly requires it, by its principle of the concurrent increase of mass and contraction of length.

Today, after Anderson's discovery of creation and annihilation of the electron-positron pair (1932), we know that a photon wave-length of at least $\lambda_o = h / m_o c = 2.43 \times 10^{-12} m$ is necessary for the creation of such pairs while, for the creation of a proton, it is necessary an approximate wave-length of $\lambda_o = h / m_o c = 1.32 \times 10^{-15} m$. These values are, however, minimum limits of wavelengths or frequencies of photons. When the particles pair to create their output speed will depend on the input frequency of the photons in excess of these limit values exactly as it is at photoelectric effect. The output speed of the created particles at limit values is to be regarded as approximately zero. The fundamental discovery of Anderson that all creators of our physical theories from Newton to Dirac did not know. This discovery proved the physical validity of us considering the wavelength λ of the photon momentum as a relation of dimension and location of this momentum $h / \lambda = p$ and at the same time as a dimension of the localization of the created particles.

This dimension is proportional to the mass of the particles and the amount of their internal momentum at the limit frequency of the photon. In this work we maintain that, since Anderson's discovery is physically unacceptable the de Broglie relationship (1919) about the transfer of photon momentum to the particle $p = h / \lambda = mv$ by using the concept of the wave functions, phase velocity and dispersion relation that is the basis of the whole of quantum mechanics. De Broglie (along with his fellow physicists) was fully confident that mass is connected with the internal frequency $h\nu = mc^2$ of particles. But he did not know if and how frequency ν was connected with photons and that the creation of mass from photons is an existing reality, so that frequency ν_o and wavelength λ_o is as inevitably connected as $h\nu_o / c = h / \lambda_o = m_o c$ also for particles. De Broglie took $\lambda_o = \infty$ in order to solve his controversy with Einstein's special relativity energy concept $E = mc^2 = h\nu = hc / \lambda = mvc$. A correct solution to this controversy is shown in our previous paper (6).

Since the discovery of rest masses m_o of electron (1911) and proton (1919) and Anderson discovery (1932) of minimum limits of wavelengths λ_o necessary for their creation we clearly see the mistake of de Broglie basic supposition $mv = h / \lambda$, because by the de Broglie relation at these rest values, particles output velocities equal light velocity $v = h / \lambda_o m_o = 6.62 \cdot 10^{-34} / 2.2 \cdot 10^{-42} = c$. A detailed explanation of de Broglie's physically

unacceptable considerations are mentioned in our previous work (6), where it is shown that, in the case of the transfer of photon momentum relation on the momentum of the particle, it is required to perform this transfer from the limit values of frequencies or wavelengths by $h/\lambda - h/\lambda_o = mv = p$ so as added value to the internal momentum of particles $h/\lambda - h/\lambda_o = mc - m_o c = mcv/c = mv = p$.

With great conviction, we therefore assume that the dimension of localization of both the electron and proton during their creation will be identical with the dimension of the wave-length of the photon from which they were created. Moreover, in the case of the proton, our assumption is nearing certainty, because currently its dimension is rather accurately known. Subsequently, we can (with certainty) use the relativist relation of contraction of lengths in relation to Compton's relation of the increase of mass with the increase of energy, and write $m_o c/\left(1 - v^2/c^2\right)^{1/2} = h/\lambda_o \left(1 - v^2/c^2\right)^{1/2}$ by which we come to a constant of $m_o \lambda_o = h/c = 2.21 \times 10^{-42} kgm$.

We receive the same physical result in relativist mechanics, where we can deduce a relation $m_o^2 c^2/m^2\left(c^2 - v^2\right) = l^2 c^2/l_o^2\left(c^2 - v^2\right) = 1$ or, after arrangement, get the relation $m_o^2 l_o^2 c^2 = m^2 l^2 c^2 = k^2$ from the basic prerequisites of the special relativity of increase of mass $m = m_o/\sqrt{1 - v^2/c^2}$ and contraction of length $l = l_o\sqrt{1 - v^2/c^2}$. We can state that for any difference $\left(c^2 - v^2\right)$, the product $m_o l_o = ml = k/c$ remains constant. If we enter the known values of a proton mass and dimension into and possibly the known mass value of the electron and the Compton length of electron, we get Planck's constant, specifically $m_o l_o = ml = h/c = 2.21 \times 10^{-42} kgm$.

Through a comparison of these constants with the currently valid Einstein's gravitational constant $\kappa = 8\pi G/c^4 = 2.07 \times 10^{-42}$ we find by our physically consistent theory that we have reached equality in those two constants $h/c = \kappa = 8\pi G/c^4 = 2.13 - 2.21 \times 10^{-42}$. By this means, we reached the correct value of Einstein's gravitational constant, unlike Einstein, who came to the value of 10^{16} times larger, $\kappa = 8\pi G/c^2 = 1.86 \times 10^{-26}$. This value of Einstein's was, in subsequent decades, corrected by physicists to the current value.

The corrected Einstein's gravitational constant also represents the cosmological constant of a stationary universe, that is, the matter density of void space. We must also consider, as such, the $\kappa = h/c$ constant. The same essence can be found in the concepts of the polarization of a vacuum during the creation of particles in quantum mechanics, the dark energy in astrophysics, or the today physics low-down concept of ether in classical electrodynamics.

Current physics considers as self-evident that particles of matter have their inner energy and that this energy is compressed in these particles that, through mere increases of the speed of these particles in accelerators at high speeds, we are able to produce and multiply an enormous number of mass particles from a single particle.

In the case of expressing the momentum of photons $p = h/\lambda = h\nu/c$, as of today physics has not entirely clarified the essence of the quantity of photon frequency. This quantity was automatically taken from the concept of the frequency of electric circuits generating electromagnetic waves, where frequency represented the number of oscillations of these generators, that is, the number of wave packets per second. However, this quantity has no physical meaning for a *single* wave packet, similar to the quantity of temperature for a *single* molecule of air. It is apparent, based on the relation $\lambda = c/\nu$ that, in the case of the quantity of photon frequency in the relation $p = h/\lambda = h\nu/c$ we can clearly assign to frequency the time interval of flight through light across length λ of one photon.

The original meaning of the frequency quantity, that is, the number of waves per second, can also be viewed as the quantity frequency of photon spins per second. In case the wave-length of the photon also represents the possible diameter of the localization sphere of the photon, then it becomes apparent from the relation $\lambda = c/\nu$ that the rate of its surface rotation is always equal to the speed of light, as $\nu/2\pi$ (which is Dirac's understanding of the Planck's Constant $\hbar = h/2\pi$).

The increase in frequency of rotation of the photon necessarily represents a change in the time interval of the light's flight through the dimension of the photon, a decrease of the wavelength of the photon, a decrease of its volume and, all this while, a sustaining of constant surface rotation at the speed of light. We can support this physical idea by the known solution of Maxwell's equations for vacuum, in the form of a wave equation $\partial^2 E/\partial t^2 = \frac{1}{\varepsilon_o \mu_o}\partial^2 E/\partial r^2 = c^2\partial^2 E/\partial r^2$ that is $\partial^2 E/c^2\partial t^2 = \partial^2 E/\partial r^2$ that is $\partial E/c\partial t = \partial E/\partial r$ and equally $\partial B/c\partial t = \partial B/\partial r$ .This solutions also shows the connection of change of field intensity, with the change of its space localization ∂r or the time of the light's flight through this space $c\partial t$.

In this manner, just as in the particles, we can consider the photon to be a compression of matter density of the universe and calculate it's mass in relation as an amount of matter in the given volume at the radius λ, that is $m_{eth} / \lambda = h / c \cdot 1 / \lambda = h / c \cdot \nu / c = m_{phot}$. We can see the interchangeability of $\lambda = c / \nu$, that is, that the length or dimension of the particle can be equally expressed as the speed of light, divided by the time interval of the light flying at this distance c / ν.

By multiplying the mass of the photon as the amount of matter, by the velocity of its motion c we get a dynamic quantity of this matter, that is, its momentum in the form of $m_{eth} / \lambda \cdot c = h / c\lambda \cdot c = h / \lambda = m_{phot} c = p$. Later in this work we will prove that multiplying this relation by c for the purposes of obtaining energy is physically incorrect, because this manner we receive both the values of the energy of the vacuum and the momentum of the photon and, subsequently, the internal momentum of the particles increased by the value c.

After this, we can state that the mass of the photon increases precisely as the amount of matter increases, through the relation $\kappa / \lambda = m_{eth} / \lambda = h / c\lambda = m_{phot}$. Stopping the photon with a sufficiently short wave-length, through a collision with another particle, produces different particles, the matter of which (just as this matter of the photon), is a compression of the density of the matter of the universe. By stopping the photon, we generate a particle with the mass and internal momentum $m_{eth} / \lambda \cdot c = m_{phot} c = h / c\lambda \cdot c = h / \lambda = m_o$. Therefore, by stopping a photon in the length of $10^{-15} m$ we get the mass of proton $10^{-27} kg$ with the internal momentum $p_{pi} = h / \lambda = 5.02 \times 10^{-19} kgm / s$ and dimension $10^{-15} m$ and with zero external momentum.

As we will establish later, this external zero momentum must be related to the zero velocity toward its own gravitational field of the particle and the density of the momentum of the surrounding space in the universe. We receive the density of the momentum of the universe from its matter, that is, its density as the amount of matter, by multiplying the corrected Einstein's gravitational constant with the speed of light $\kappa c = h / c \cdot c = h = 6.63 \times 10^{-34} kgm^2 / s$. Then we can state that the essence of Planck's constant is not the *specific* part of the amount of the smallest quantum of energy, but the *dynamic momentum* of the amount of matter in a unit of the volume of space in the universe.

In the physics theory of fields, there is a valid principle of equality between the amount of energy inside a force source of the field and the amount of energy placed in the force field generated by this source. This principle was confirmed in this work. A thorough physical solution in acquiring the mass of particles from the matter of a vacuum field, was the same as received from the analysis of the gravitational field generated in the surroundings of mass bodies by Einstein (and through the correction of his value by subsequent physicists).

Subsequently in this work, we state that through generating mass particles, by compressing the density of momentum of the vacuum, we concurrently generate a gravitational field of these particles. The value of momentum of the gravitational field on the surface of the particle is equal in size, but reversely oriented to the value of the internal momentum of the particle. We state in this work that the gravitational force field of all physical bodies has its opposite forces, based in the internal momentum of the individual particles of these bodies and that this internal force action is reversely oriented to the force of the actual gravitational field of these particles.

Should this theory of the origin of gravitational fields and its concurrent creation of particles prove correct, then we must get the correct value of the Newton gravitational constant, that is, the force of momentum in the distance of 1 meter from the proton, from the calculated value of the momentum of gravitational field on the surface of the particle $5.02 \times 10^{-19} kgm / s$.

3. A relationship between Newton's Gravitational Constant and the Planck Constant

We have, therefore, calculated the internal momentum of the particle and also the momentum of the reversely oriented gravitational field. However, we do not know, to what length the quantities of force or momentum in the field around the body spreads. The measured value of the gravitational constant for one proton represents the value $p_g = G / 2N_A = 5.54 \cdot 10^{-38} N (m / kg)$. From the acquired value of the dimension of the inner momentum of the proton $5.02 \times 10^{-19} kgm / s$ we can easily get the theoretical value of Newton's gravitational constant, that is, the force of the field in the distance of 1 meter from the surface of the particle. However, we must be convinced that we understand Newton's gravitational law as Newton understood it. The validity of Newton's law of gravity force was verified by Coulomb's law $Q_1 Q_2 / r^2$ with great precision, but with electric charges always at the same amount.

However, from the perspective of logic, it is clear that if we assign both charges the force gradient of $1 / r^2$ then their mutual force gradient will change by the relation of $1 / r^4$. For this reason, we must reject the simplified

explanation of Newton's law of gravity by today's physics, which maintains that the decrease of force field of one material body follows the law of $1/r^2$. By such an explanation, we would receive the value of 10^{-49} from the calculation of force effect of the gravitational field from a proton from the depth of its localization of $10^{-15}m$ in diameter, calculated from its value of its internal momentum $5.02 \times 10^{-19} kgm/s$ at the distance of 1m from the surface of the proton.

Newton was convinced of the relation of linear decreases in force with distance and with geometric progression measured in time intervals per single material object. If we take the relation of the decrease of the force field from a single material object, according to Newton's belief, then from a calculated momentum of the proton $5.02 \times 10^{-19} kgm/s$ on its surface $\lambda_o = h/m_o c = 1.32 \times 10^{-15}m$ we get the value of Newton's gravitational constant, equal to the measured gravitational constant $5.02 \cdot 10^{-19} \cdot 1.32 \cdot 10^{-15} \cdot 10^{\sqrt[4]{15}} \sim 5.12 \times 10^{-38}$.

As well with Newton's approach, we can also use the classics of electricity and magnetism, that is, the quantities of stat coulomb $m^{1/2} r^{3/2}/t$. For these reasons, in this entire work we define the term momentum as a quantity, in which force measured in equal time intervals changes as the root of time $p = mv = mx/\sqrt{t}$ so that in the subsequent product of two reversely oriented momentums, the energy changes linearly in equal time intervals $p^2 = m^2 v^2 = m^2 x^2/t$.

A weak force, as we consider the gravitational force of two bodies at a distance of 1m, is an enormous force, nearly 10^{19} larger, at the source where it's generated. But such a big force stands up nowhere in our physical theories of quantum physics and electricity and magnetism. Hereafter we propose that magnitudes of gravity force and electric force equals and that these forces are identical.

4. The Relation of the Planck Constant and the Amount of Force of One Coulomb.

Hereafter we state that the gravitational force has its opposite in the internal momentum of the proton, in place of its source on the surface of the proton and that the force of the inner momentum represents *exactly* the amount of electric charge as the forces reversely oriented toward the force field surrounding the particle, represented by the field of the electron or the gravitational field. We also state that the momentum of the proton on its surafce we calculated $p_{pi} = h/\lambda = 5.02 \times 10^{-19} kgm/s$ is equal with the electric charge of Coulomb, which is generated according to the spatial placement of these forces.

We further state that nature does not recognize the two man-made concepts of mass and charge of a particle and that these quantities are, in fact, identical. We therefore state that, in nature, there is only *one* force, which mankind separates, termed gravitational, electric, inertial, magnetic, strong and weak depending on the physical, spatial placement and kinetic conditions of measurements. These statements must be and can be proven.

According to the Coulomb's law $F_e = k_e QQ/r^2$, the unit of a charge as 1esu today 1 Coulomb was selected by the 19th century creators of the theories of electricity and magnetism. They determined it as an amount of electric force, the effect of which corresponded with the established unit of force 1dyn, today $1N = 1kgm/s^{-2}$ for particles of one side of this source (actually after precise recalculating 1esu to 1C it is 3N, but because it is for another full paper for purpose of general thinking we take 1N in this paper) that is, to the inertial resistance of $1kg$ containing the number of particles $N_A = 6.022141 \times 10^{26}$ upon acceleration of $1kgm/s^2$.

However, only after the Millikan discovery in 1911, was it found that this charge of 1 Coulomb is generated by the number of particles $N_C = 6.24151 \times 10^{18}$ of protons or electrons. It was therefore discovered that the number of particles N_C generates electricity comparable to the inertial force generated by 1kg, that is, N_A of these particles accelerated by $1m/s^2$. However, the number of particles N_C generates an inertial force of $1 \cdot N_C/N_A = 1.036427 \cdot 10^{-8} N$.

Therefore, it was found that, in the case of for example a proton, the amount of generated inertial force at acceleration of momentum by $1m/s$ (which is actually the mass of a proton $m_p = 1.6726 \cdot 10^{-27} kg$) the proton generates an electric charge at a value 0.9648×10^8 times larger, thus producing electric force called 'the proton charge' $Q_p = m_{pE} = 1C/N_C = 1N/N_C = 1.602 \cdot 10^{-19} N$.

We have punctually received the Faraday constant $0.96485 \cdot 10^8 C / kg \,(protons)$ (2, CODATA). By our theoretical reasoning, we confirmed the Faraday experiments of electrolysis referred to us that per transferal of an arbitrary amount of charge always transfers an amount of $1.0364 \cdot 10^{-8}$ times the less initially charged proton mass.

 The correctness of our physical reasoning of this is also confirmed by the amount of the quantity, the so-called specific charge, of proton $0.957876 \times 10^8 C / kg$ (2, CODATA). The Faraday's constant (after electrolysis uncharged mass), specific charge of proton constant (charged matter, so without mass of electron), the Millikan's constant of a proton charge divided by mass, as well as force from one side source in Coulomb's law, divided by mass, are identical constants.

In the case of the specific charge of the proton, we therefore compare the self-generated inertial force of the proton (at the acceleration of $1ms^{-2}$) with its self-generated electric charge, measured in the static condition. In this work we therefore conclude that the proton generates an electric charge equal to its inner momentum, divided by the value of π. So the mass of a proton $m_p = \pi m_{pE} v / c = p_{pi} v / c = 1,679 \cdot 10^{-27} N = 1,679 \cdot 10^{-27} kg \,(amount of matter)$ is part v / c of measured electrical force, as well as the inner momentum of the particle. Therefore, the internal momentum of the proton $p_{pi} = m_p c$ generates the force of the external field, that is, the electric charge

$$Q_p = e = m_{pE} = p_{pi} / \pi = m_p c / \pi = h / \pi \lambda_p = m_{eth} c / \pi \lambda_p = 5.02 \cdot 10^{-19} / \pi = 1.6 \cdot 10^{-19} C = 1.6 \cdot 10^{-19} N .$$

Upon accelerating the proton by $1ms^{-2}$ we find that its inertial force, that is its mass, is smaller than its electric force by the value $m_p = m_{pE} \pi / c$, and for ratio of these forces, we obtain

$$m_p / m_{pE} = m_p \pi / cm_p = m_p \pi v / cm_p = 1 / 0.9578 = 1.04406 \cdot 10^{-8} = \pi v / c = \pi \cdot 0,33 \cdot 10^{-8} N / C .$$

By this theoretical reasoning, we therefore confirmed Millikan's measurement of the amount of electric charges of protons or electrons. The mass of a proton (and therefore an arbitrary matter) is the carrier of equal opposite internal and external force that, in Millikan's case, we call an electric charge.

We see that the actual measured electric charge of the proton is π, that is, $m_p c / \pi = m_{pE}$ times smaller than the charge acquired by multiplying the mass of the proton and the speed of light. We assume that, according to Dirac's vision, the force of the particle generated as the internal momentum is distributed across the surface of the particle.

We get the same ratio from the fiction that, by increasing speed of the proton, its inertial force and thus also its momentum and mass will increase as well. At the speed c, the mass of the proton would be $5.0178 \cdot 10^{-19} kg$ and the inertial force of the proton (and thus its mass) would be π times larger than its electric charge, that is, the charge of $1.602 \cdot 10^{-19} C$ if we are to believe the statements of current physics that the particle charge is an invariable quantity.

We further state in this work that there is no difference between the concept of the mass of the particle and the charge of the particle. By identifying the inertial resistance of the particle during its acceleration by $1ms^{-2}$, that is, by establishing the mass of the particle, we have measured the v / c part of the current internal force of the proton and thus also the force the inner momentum, as well as the amount of its electric power, that is, the charge.

In this work, we maintain that the mass of the proton m, which we identify as the amount of its resistance through $1ms^{-2}$ acceleration, also concurrently represents the amount of added force $mv = mcv / c$ to its rest force $m_o c$ $mc = m_o c + mcv / c = m_o c + mv = m_o c + m_o v / (1 - v / c) = m_o c + m_o vc / (c - v) = m_o c / (1 - v / c)$.

Today, since we know the mass and amounts of charge of elementary particles (unlike Einstein - electron 1911, proton 1919), it is clear that from the value of an electronvolt $1.60218 \times 10^{-19} C$, we get mass of proton as $m = p_t / c = mc\pi / c = 1.6021 \cdot 10^{-19} \pi / 3.10^8 = 1.678 \cdot 10^{-27} kg$. This way, all the values of Einstein's energy equivalent are overvalued by $mc^2 \pi / mc = c\pi = 9.42 \cdot 10^8 m / s$. This is why, in particle physics, the reversed conversion to energy equivalent is used, that is, the quantity of momentum equivalent is used (see en.wikipedia.org/wiki/Electronvolt)

$$p = E / c = mc^2 / c = 1GeV / c = p_{pi} = (938.3 \cdot 10^9)(1.6021 \cdot 10^{-19} C) / c = 5.01 \times 10^{-19} kgm / s .$$

Even Feynman mentions this (F ,1, 1.235), „surprisingly, the relations $pc = Ev / c$ and $p^2 c^2 = E^2 - m_o^2 c^4$ are used more often"which, using the arguments presented in this work, we can rewrite as $p = E / c \cdot v / c = mc \cdot v / c$ and $p^2 = E^2 / c^2 - m_o^2 c^2 = m^2 c^2 - m_o^2 c^2 = m^2 c^2 v^2 / c^2 = m^2 v^2$.

Hence in this work, we claim that the relations of energy in relativistic mechanics as mc^2, mcv, m_oc^2 and the relationship the photon energy $h\nu$ do not represent a quantity of energy, but the momentum multiplied by c so $mc \cdot c, mv \cdot c, m_oc \cdot c, h\nu / c \cdot c$ and just their dimensions is equal to the quantity of energy. A detailed explanation of the physically unacceptable quantity of energy of relativistic mechanics is explained in previous work (6).

5. Relation of the Planck Constant to the Amount of Magnetic Force

The 19th century creators of theories of electricity and magnetism chose as the unit of magnetic force, unit force of today's $1H = 10^{-7} N$ that generated a current of a strength 1C. By Millikan's discovery of 1911, it was revealed that this force is generated precisely by the amount of current comparable to the electric charge generated by the number of particles $N_C = 6.24151 \times 10^{18}$, that is, $1A = 1C / 1s = N_C / 1s$. The number of particles of one kilogram $N_A = 6.022141 \times 10^{26}$ will generate a magnetic force larger by 0.9648×10^8 , that is, $9.6N$. This value was later theoretically adjusted to $1H = 1.257 \times 10^{-7} N$, specifically, $7.675 N / kg$.

Thus, $1kg$ generates an inertial resistance of $1N$ and, with this force, a comparable electric charge of $0.9648 \times 10^8 N$ and a magnetic force 1.257×10^{-7} smaller, $7.675 N$. One proton will therefore generate a magnetic force amounting to $7.675 / 2 \times 6.022141 = 6.3723 \times 10^{-27} N$. Therefore, the magnetic force generated by a single proton m_{pB} in such amount of electric current, which is comparable to its electric effects $m_{pE}\pi / c = m_p = m_{pB} / \pi$, is comparable to the inertial force. In quantum physics, the measured magnetic moment of a nucleon is $\mu_N = 5.051 \times 10^{-27} A \cdot m^2 \left[C \cdot m^2 s^{-1} \right]$. We can therefore state that $\mu_N / \pi = e\pi v / c = m_{pE}\pi v / c = m_p$.

The magnetic moment of a nucleon is expressed by the relationship $\mu_N = e\hbar / 2m_p$. Based on previous conclusions, we can write $\mu_N / \hbar = e / 2m_p$ and $\mu_N 2\pi / m_p c\lambda_p = m_p c / 2\pi m_p$ from which it is apparent that the extension of magnetic moment must be equivalent to the extension of mass, that is, the inertial force during the acceleration of the proton by $1ms^{-2}$.

Current electrodynamics single-mindedly concluded that electric alternative current transmitted through conductors definitely does not represent a transfer of electrons. The conducted current represents a transmitted force, an electromagnetic wave as a compressed force field, spreading through its conductors at the speed of light. The electrons move at rates nearing centimeters per second (Feynman calculated millimeters) and are only the mediators of the transmission maintaining the electromagnetic wave in the conductor.

If then, the electric current, with the amount of compression of force field equaling the electric power $1C = 1N$ generated by the number of particles $N_C = 6.24151 \times 10^{18}$, is flowing through the conductor, then this current also affects by pressure the particles around which it flows. The result of the pressure is a reduction of the volume of these particles, an increase of their own force field around the particles and thus, also around the conductor, which results in the force measured as magnetic force. We claim that magnetic force and inertial force are expressions of the same mechanisms of changes in the ratio of balance of inner momentum of a particle and its own force field. Magnetic force is a phenomenon reversed to inertial force. In inertial force, the particle moves against its own force field and by identifying mass, that is, the amount of the inertial force, we add this just-identified mass to the overall force, that is, the internal momentum *as well as* the external force field.

On the other hand, in the case of magnetic force, the already compressed force field moves around the particle, resulting in compression of the particle, which then results in an increase of the force field around the particle and thus around the conductor. The increase in the amount of current, that is, the increase of compression of the force field spreading in the conductor, results in an increase of the magnetic force field generated by the particle. Equally, an increase of particle acceleration in void space, results in an increase in its inertial force (that is) also an increase in its mass and internal momentum, due to the increase of pressure, as well as increased deformation of the field in the vicinity of the particle.

We can precisely state that this magnetic force proves the invalidity of the invariability in rest mass, postulated in relativist mechanics. Therefore, the relations of increase of mass $m = m_o / \sqrt{1 - v^2 / c^2}$ and the contraction of length $l = l_o \sqrt{1 - v^2 / c^2}$ are not kinematic relations changing with the change of rate, the physical mechanism of which is based in the change of space and time.

These relations represent realistic changes of volumes and localization of particles in material bodies and increase their mass with the increase of velocity. They represent the changes of balance of the inner pressure of momentum and the reversely oriented outer pressure of the force field itself on the surface of particles of the

object, that is, changes in the density of momentum of void space of the universe. This is also the understanding later reached by Einstein, as he mentions in (3, p. 57). "*In order to get closer to the behavior of real matter, we must add to the energy tensor a term which corresponds to the pressures. The simplest case is that of a perfect fluid, in which the pressure is determined by a scalar p*". In later years, Einstein spoke about the need of the existence of ether in order to understand physical phenomena of nature (4) "*Recapitulating, we may say that according to the general theory of relativity, space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity, space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of the existence of standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense*".

The change of intensity of the electric field per unit of length or time of flight of light through this length, that is, the change of density of the force field in the solution of Maxwell's equations for the vacuum $\partial E / c\partial t = \partial E / \partial r$ is equal to the change of magnetic field $\partial B / c\partial t = \partial B / \partial r$ as a reaction of material particles to this change of the field. The change of force field of a particle is radially symmetrical, however due to the geometry of the linear alignment of the particles, in the vicinity of the line conductor, we observe this change as a force working in a perpendicular direction to the conductor, while in the conductor itself we observe this change (in the linear direction) as a displacement current $\partial D / \partial t$.

The magnetic force is therefore comparable to the added inertial mass during acceleration of a particle, that is, through the term mcv / c in the

relation $mc = m_o c + mcv / c = m_o c + mv = m_o c + m_o v / (1 - v / c) = m_o c + m_o vc / (c - v) = m_o c / (1 - v / c)$. We can write such a change using the change of the dimension of the localization of the particle
$p = mv = mc \cdot v / c = mc - m_o c = h / \lambda - h / \lambda_o = h / \lambda \cdot (\lambda_o - \lambda) / \lambda_o = h / \lambda \cdot v / c$.

Further, we state in this work that it is not possible to put equality between gravity and acceleration, as it is not possible to put equality between the amount of electric and magnetic force. But it is possible to put equality between the *change* of gravitational force and the *change* of inertia of a body as well as change of electric and magnetic forces.

Therefore, the same relation is valid as in the case of electric and magnetic force, where the changes of electric force are equal in absolute values to the changes of magnetic force $\partial E / c\partial t = \partial E / \partial r = \partial B / c\partial t = \partial B / \partial r$.

The relation $mc / \pi = m_o c / \pi + mcv / \pi c = E_o + \partial E / \partial t \cdot v / c = E_o + \partial B / \partial t \cdot v / c$ is valid for the absolute value of electric force and magnetic force. In this work, we state that electric force occurs when we move the proton's own force-field, that is, when we shift or push away the electron from the proton and perform the measurement of force between the force of the internal momentum of the proton and the force of its own force field.

We thus maintain in this work that nature does not recognize the two man-made concepts, mass and electrical charge of matter. We only recognize one force in nature, without its differentiation to type, such as gravitational, electrical, magnetic, strong or weak, as introduced by mankind.

6. The Inertial Forces, Today Still Named in Physics as Fictitious Forces or Pseudo Forces are Real and No Other Forces Exist in Nature

The basic pillar of Newton's classic mechanics is the law of action and reaction, declaring that every force is accompanied by another of equal magnitude, but opposite direction. In classic mechanics, these opposite forces are the inertial forces. From Newton's time until today, physics considered inertial forces to be fictitious or virtual, fictitious or pseudo forces, defined as zero in cases of an idle state or constant motion of an object. These forces are generated by matter in cases of changes in its idle or constant-idle state. Newton speaks of these forces as "*vis insita or innate force of matter*" or "*power of resisting and can be called vis inertiae or force of inactivity*" (5, page 74).

The inertial forces are described in physics kinematically (without their explanation) as the forces opposite to other forces assigned to product of mass and the observed kinematic quantity of the change of velocity. Based on the arguments presented in this work, we state that *all* inertial forces are real and represent the change of balance of the force of internal momentum of material particles of the object, with the reversely oriented force of their own force field. We further posit that just these inertial forces (or their overall reversely working values, or the changes of the overall values proportionate to the change of velocity), introduced by current physics as virtual or "pseudo" are actually the *only* forces in nature and no other forces exist.

Using Newton's gravitational constant, we calculated the amount of force on the surface of the proton of the radius $10^{-15} m$. Within the distance towards the edge of the atom $10^{-10} m$ the decrease of force of its field drops $10^{7.23} = 1.69 \times 10^7$ times. In this manner, at least 99 percent of the force field of a material object of the size of 10

cm (that is, almost the entire force field of the object) is concentrated within the object itself. What we measure from the force field as a gravitational force in the distance of 1 m is only a small remnant of its internal force.

For this reason, we maintain in this work that the inertial force of a body, as the resistance against its acceleration or deceleration, is the force appearing as the change of balance of the internal force action of the object's particles (identical to the electrical force of the proton or nucleons) against their own gravitational field (identical to the reversely-oriented electrical force of the electron force field). With the change of velocity, there is a change of the balanced initial pressure of the force field on the surface of the particles and the change of their reversely-affecting internal momentums $mc = -mc$. The overall size of the opposite momentums represents the energy $m^2 c^2$.

By measuring the inertial force $1N$ upon reaching the velocity of $1m/s$ we measure with precision v/c the ratio of the size of the total force of the internal force or the electrical force, which is generated by mass of $1kg$. Over this ratio we increase both the internal force (that is, the mass of the body) and the external force of its force field. Thus we increased the ratio of these forces by the ratio of energy v^2/c^2. Subsequently, during the change of velocity of the body, these two momentums work against each other $mv = mcv/c = -mv = -mcv/c$ and this change of velocity (hence, the change of force tension between the internal momentum and its own gravitational field) cause the change of pressure in the perpendicular direction on the surface of the particles of the matter, including the change of gravitational field on the surface of the particle and a change of localization of particles in proportion to the velocity of the object.

We observe this momentum of the particle (or the change of the radius of localization of the particle) as the difference compared to the rest state, using velocity or changes of the internal momentum or the changes of the average of localization as the

relation $p = mv = mc \cdot v/c = mc - m_o c = h/\lambda - h/\lambda_o = h/\lambda \cdot (\lambda_o - \lambda)/\lambda_o = h/\lambda \cdot v/c$. Therefore, a change of mass occurs in all its definitions – in Newton's, as the change of the amount of matter in volume, or as the change of inertial force and gravitational force manifestations of a body.

The added (that is, kinetic) energy represents the product of an increase in the reversely-oriented momentums $m^2 v^2 = m^2 c^2 v^2 / c^2$ $E_k = p^2 = m^2 v^2 = m^2 c^2 \cdot v^2 / c^2 = m^2 c^2 - m_o^2 c^2 = h^2/\lambda^2 - h^2/\lambda_o^2 = h^2/\lambda^2 \cdot v^2/c^2$.

In classic mechanics, at small velocities (compared to the speed of light), we do not observe this increase of both mass and the change of volumes of objects. However, it is precisely this imperceptible increase of mass at small velocities, in comparison with c as a change of volume, due to the change of pressure that is the true cause of all forces of classic mechanics and various velocities of bodies.

Because we are barely able to measure the localization of particles of a material body, we have no other option than to measure the mass of a body through its inertial effects or gravitational effects. By weighing bodies in the gravitational field of the Earth, we establish the size of the force field of the Earth and (in the weighed object) identify the mutual ratios of the number of particles of the weighed bodies, but not its own actual force field effect, which we neglect in comparison to the weight of the Earth. It is only after the impact of the weighed object on the Earth that we learn the actual force effect, the gained amount of inertial force, the acquired change of momentum, the acquired change of mass or size of the diameter of particles of the body that were affected by the gravitational field. We know from classical physics that this change is proportional to v^2.

This way, we can state that the resulting gravitational force of material bodies is a sum of gravitational forces of the particles of the object's matter and that gravitational force has its own opposite of equal size. This is the internal force of the particles, reacting with the same force against the force of the gravitational field. The physical essence and magnitude of gravitational and electrical force, as overall forces and the inertial and magnetic force, as additional forces to those overall forces, *is equal*. We only identify them as different according to the geometric, physical and kinetic placement of the particular *circumstances* in which we measure these forces.

7. Unifying Classical, Relativist and Quantum Mechanics

Classical physics, relativist physics, quantum physics and gravity, after adjusting the points of view on these areas, as shown in this work, provide the same physical description of forces, quantities of momentum and energy of physical phenomena found in nature.

Classical physics describes only the forces *added* to the rest state of bodies through the change of kinematic quantity of velocity of bodies, while *neglecting* the increase of their interior force with an increase in velocity. Relativist physics describes the forces of nature as overall forces, through the change of extent of internal forces in relation to the kinematic quantity of speed toward speed of light. Quantum mechanics describes these changes of the internal forces in nature through the change of radiuses, in which these internal forces are located.

In this physical approach to classical, relativist and quantum physics, force, momentum and energy cease to be mere products of numbers, as is found in classical physics, but represent specific physical mechanisms, even though still macroscopic ones.

In this work, we state that if we hope to develop a unified physical view of energy and momentum in classical and relativist mechanics, we must consider both the energy and momentum of classical mechanics to be *added* values to the rest value, always in two reversely-oriented momentums, that is, energy. In this manner, we can write both the overall momentum and energy in the relativist mechanics as relations using the added values of classical mechanics $p_t = p_o + p = mc = m_o c + mcv / c = m_o c / (1 - v/c) = m_o c + mv$ and

$$E_t = E_o + E_k = m^2 c^2 = m_o^2 c^2 + m^2 c^2 v^2 / c^2 = m_o^2 c^2 / (1 - v^2 / c^2) = m_o^2 c^2 + m^2 v^2.$$

The arranging of the relation of special relativity $m = m_o / \sqrt{1 - v^2 / c^2}$ of increasing mass by the advancement of it's rising to the higher power to $m^2 c^2 - m^2 v^2 = m_o^2 c^2$ already represents energy. The relations of momentum and energy in accordance to the relativist concept of physics should be correctly written, always using the proportion v / c or v^2 / c^2 to their basic or idle state $m_o c$ and $m_o^2 c^2$, that is, as $mc - m_o cv / c = m_o c$ and $m^2 c^2 - m^2 c^2 v^2 / c^2 = m_o^2 c^2$.

The multiplication by the constant c in relation to the momentum and multiplication by the constant c^2 with subsequent extraction of the root in the case of energy, in order to *obtain the equality* of the relation $E = pc$ is unacceptable in physics. The inertial force represents an interaction of particles of the body with its own gravitational field, that is, the resistance of the body against its acceleration.

In this work, we state that the relations of quantum mechanics represents an expression of quantities of energy and momentum through the dimensions of localization of particles and these dimensions can be equally expressed either as only dimensions of the actual particles as such, or by the ratio of the velocity of the movement of these particles to the speed of light as

$$p = mv = mc \cdot v / c = h / \lambda - h / \lambda_o = h (\lambda_o - \lambda) / \lambda \lambda_o = h / \lambda \cdot (\lambda_o - \lambda) / \lambda_o = h / \lambda \cdot v / c$$

$$E_k = p^2 = m^2 v^2 = \gamma^2 m_o^2 c^2 \cdot v^2 / c^2 = h^2 / \lambda^2 - h^2 / \lambda_o^2 = h^2 / \lambda^2 \cdot (\lambda_o^2 - \lambda^2) / \lambda_o^2 = h^2 / \lambda^2 \cdot v^2 / c^2$$

In our physical measurements, we always register only one half of the energy and the other half (that is, the internal half) remains hidden in cases of classical physical phenomena. For this reason, we consider $E_k = p^2 / 2 = m^2 v^2 / 2 = m^2 c^2 \cdot v^2 / 2c^2 = h^2 / 2\lambda^2 \cdot v^2 / c^2$ to be a commonly observable value of Energy.

8. Discussion

At least since 1926 (Lindblad) , when the Milky Way galaxy rotation was discovered and from the discovery of the amount of the velocity (up to 1000km/s) and the compound rotational direction of the Earth in space, two basic physical premises of the Michelson-Morley experiment (focusing on the identification of the motion of ether toward M-M interferometer) became invalid. The premise of the Earth's rotation around the sun at the rate of 30km/s, as the only motion of the Earth in space, is not valid. Also is invalid, the premise of the rectilinear of the motion of one arm and the rectilinear of motion of the second arm of an interferometer toward the surrounding space, that is, the ether. So is invalid, that relation $\Delta t = 2L / c \sqrt{1 - v^2 / c^2}$ represents time difference of flight through light in perpendicular arms of M-M interferometer.

Subsequently, the explanation of the zero result of the M-M experiment through special relativity, using the dilatation of time, must necessarily be considered a mathematical concept incompatible with physical reality. Additionally, the physical cause of the contraction of length and dilatation of time is exclusively kinematic, connected to time-space changes which can only occur through the change of velocity of an object, without the existence of the physical cause of this phenomenon. The contraction of length and the increase of mass are in special relativity, attributed to the change of measured values of length, time and thus also speed during various mutual velocities of relative systems during the measurements, in comparison to the final speed of light.

The contraction of length and increase of mass in special relativity is not connected to the actual change in dimension and mass of the body, which is evident from the decisive claim of relativity physics that the rest mass and length in each inertial frame of reference are unchangeable invariants. Upon a change of velocity, the invariant mass (and thus therest inertial and gravitational force) are proclaimed unchangeable invariants, even though the energy and momentum, as well as the force effect increases.

The general theory of relativity (GTR) in no way provides a connection, nor does it suggest a physical mechanism or physical reality between an body located in space and the deformation of space and time in its surroundings,

even though the size of this deformation is (according to GTR) the consequence of the mass of the object. According to the general theory of relativity, this deformation of time and space also represents physical reality in the gravitational field surrounding the bodies.

Einstein's explanation of gravity as the curvature of time and space is a mathematical construct, incompatible with the claim that this is a physical reality of the description of a physical phenomenon. The description of moving bodies (forces) through the deformation of time and space has no material basis. The value of the claim that gravity is a curvature of time and space is equal to the claim that the force of the resistance of an body in void space, at the time of its acceleration, is the consequence of the occurrence of the curvature of time and space in the surroundings of the body and that the extent of the deformation of this time and space is equal to the extent of the acceleration of the object. This parallel clearly arises from the principle of equivalence of gravity and inertia, where Einstein uses the premise that during a free-fall, no force affects the object. Thus he had no option but to ascribe the cause of motion to the curvature of time and space.

In this work, we claim that in the gravitational field, the forces of that gravitational field affect the atomic particles of the object. For as long as Einstein's roofer continues to stand on his scaffold contact pad, the gravitational field affects the atomic particles of his body. These push, one against the other, only due to the resistance of the scaffold, which is the reason the roofer *feels* the gravity. The reason why Einstein's 'falling roofer' *fails* to feel the gravity, is that the roofer has no receptors through which he would feel this gravitational force on an atomic level. Equally, upon his acceleration in the free space of the universe, Einstein's roofer feels acceleration as the mutual pressure of his atomic particles against the contact pad *causing* his acceleration.

In this work, we claim that the roofer would *feel no forces* in cases where the atomic particles of his body were strongly magnetized with their polarity in one direction and his acceleration in void space, performed without a contact pad and at long distance through the pressure of a large magnet in the direction of his acceleration.

Einstein's roofer, standing on the earth's surface, would claim that there is no pressure of the earth's atmosphere on the skin of his body, because he feels no such pressure. Each ordinary physicist knows that the pressure of the atmosphere on his skin (an area of about $1.5m^2$) is approx. $15000kg$. Einstein's roofer, standing on the earth's surface, would claim that there is no cosmic ray flow (thousands of protons, billions of photons and neutrinos per second) running on and passing through his body, because he feels no such flow.

After observation of the destruction of the Shoemaker-Levi comet, in 1994 by Jupiter's gravitation field, we can beyond all doubt, along with Newton, declare that the gravitation field is a force field ("as a certain power or energy *diffused* from the centre to all *places around* to move the bodies that are *in them*" 5, p.76, Def. VIII). That force field managed to rip this comet into 21 pieces, with diameters up to 2km. Einstein's bed-rock of General relativity that there are no forces at free fall is necessarily labeled by his own admission (Einstein had labeled his cosmological constant) as the "biggest blunder of his life ".

It is beyond doubt, that a man standing within Einstein's free falling lift, accelerated in a gravitational field, would observe length dilation of his body in direction of the centre of gravity and would observe length contraction in this lift with the same acceleration in the void space of isotropic homogeneous momentum density of void space matter, the amount of which is measured as the velocity of light.

Insofar as Newton clearly declared that the source of forces is matter m and that acceleration a his equation $F = ma$ is his mathematical construction of how he per changes of space and time of moving bodies described the amount of force generated by matter. Yet Einstein compelled physicists to believe for 100 years (1905, 1915) that this acceleration and thus the change of space and time is the physical reality of forces in nature.

Moreover, as Einstein was confident that no matter generates energy of the gravitational field ("The field equations for matter-free space formulated in § 15…" (7, p. 184)) the second half of this belief is inseparable from the relativity claim that the essence of all particles and mass bodies is curvature of space and time (" The special theory of relativity has led to the conclusion that inert mass is nothing more or less than energy.." (7, p.184)). In this paper we do not believe that a 1kg steel ball is curvature of matter-free space and time.

Gravitational and electric forces and fields obey the same type of the physical law, but no physicist would dare to say that the electric field is curvature of space and time. It is not the deformation of space and time, but the electromagnetic waves, as compressed fields press on each body, either as photons by momentum $p = h / \lambda$.

There is no doubt that, at least since the discovery of protons in 1919, atomic and subatomic particles are the source of *all* force manifestations in physics. There is also no doubt that the concept of GTR, often represented by an image where a full compact gravitational object curves the surrounding space away from its surface, is *incorrect*. Such curvature must begin, not on the surface of a gravitational object, but on the surface of the particles of the atomic structure of the gravitational object.

As shown in this work, the curvature from the surface of the actual gravitational body is only a negligible part of the curvature beginning with the atomic particles. Therefore this vision of GTR, of gravitational waves as waves

produced by a whole compact gravitational object, is also flawed. The gravitational waves, according to perceptions of GTR, *do not exist*. The search for gravitational waves was solved a long time ago. They are the electromagnetic radiation of individual atomic particles of material bodies during their possible accelerated motion through space, (for example) the sources of gamma radiation of binary stars, mutually rotating at enormous rates.

In this work, we claim that, in both cases of gravity and acceleration, there is no deformation of space and time, but rather a deformation of the force field of the density of the momentum of the universe *in the vicinity* of material objects, with a concurrent change of the inner momentum and the dimension of localization of these material bodies during their acceleration.

In the description of the physical mechanism of occurrence of force fields and particles, shown in this work, the gravitational field deformation of void space of the universe *in the vicinity* of the mass body is a physical reality. This deformation of the void space field is the consequence of the creation of a particle, through its compression in the opposite direction to the compression of the gravitational field. The physical essence of the matter of gravitational fields and the matter of bodies is the same. This physical essence is the momentum density of the void space field of the universe.

9. Conclusions

Based on the results of the physical elaborations and calculations stated in this work, we conclude that:

-For energy of particles, we can in no case write $E = mc^2$ but only $E = m^2 c^2 = \gamma^2 m_o c^2$.

-Energy of photons, do not represents relation $E = h\nu$ but $E = h^2 \nu^2 / c^2 = h^2 / \lambda^2$.

-The essence of Planck's constant is *momentum density* in a unit volume of space in the universe.

-Material atomic particles, from which all material bodies in the universe are composed and the force fields located around these particles, are the result of a compression of density of the momentum of void space in the universe. All mass matter, as well as force fields in its vicinity, are created in full by the compression of the momentum of the void space in the universe.

-The gravitational force effect of bodies has its equally large reversely-oriented opposite, the force effect lying in the internal momentum of particles from which the material bodies are composed. The magnitude of the gravitational field of the body also represents the fixation of the body in its space within the surrounding universe.

-There is only one force in nature, based on the opposite force effect between the internal momentum of a particle and its own force field surrounding the particle.

-Inertial force, labeled by physics as fictive force, is an *actual* force and represents the change of the magnitude of that balance of forces between the internal momentum of a particle and the reversely-oriented force of its own force field.

-The forces identified and measured by mankind as gravitational, electrical, magnetic, strong or weak, are the consequence of various physical, spatial and kinetic displays and placements of the mutual force of interaction of particles with their own force fields, within large groups of these particles.

-In terms of magnitude, the overall gravitational and electrical, as well as added inertial and magnetic forces on the surface of the particle, are equal to each other. We can ascribe the electrical forces to the forces of internal momentum of protons or nucleons. Their opposite force is the gravitational force, we can ascribe to the force field of electrons surrounding the nucleons.

-Two concepts established by physics, mass and particle charge, *are not known to nature*. The mass of a particle is measured and, concurrently, added part to the particle charge.

-The intermedial particles of photons, gluons and intermedial bosons are *not* the agents of force fields between particles of matter, but rather *products* of these force fields.

-Electrons must be understood as a reversely-oriented force field toward the force field of a proton or atomic nuclei. In the orbital spheres of protons or atoms, electrons are distributed as spherical layers of the force field, always spinning at the speed of light in various directions around the nucleus of the atom. There, the thickness of these layers decreases toward the nucleus, proportionate to the shortening of the radius of such layer and thus proportionate to the increase of energy of the layer.

-As a corpuscular spherical particle, the electron is created only upon its emission to open space from the surface layer of an atom spinning at the speed of light, through wrapping of the emitted surface layer.

Through the rejection of the existence of ether (1905), physics has divested itself of the option of a realistic description of the world around us.

-Physics has *lost the option* of a realistic physical description of forces through force fields. These force fields were replaced by a misleading construct of mutual force effect through exchange interaction (absorption and emission) of virtual particles such as gravitons, photons, gluons or intermedial bosons. These particles work on the principle of an uncertainty relation and the option of their detection as particles of the force field is excluded in advance.

-Physics has *lost the option* of describing the initial inertial force. It has never even attempted to explain this basic force in nature. The only explanation of the inertial force by current physics is found in the claim that it is the deformation of space and time as equally valid claims, according to the principle of equivalence to the GTR claim that gravity is the deformation of time and space. This work presents an alternative, claiming that both gravitational and inertial forces are consequences of the pressure of radial deformations of ether in the vicinity of objects.

-Physics has *lost the option* of a realistic description of the essence of the composition of mass particles. The composition of matter was postulated by the misleading construct of matter of 2 or 3 quarks. By principle, these can no longer be found individually, because an infinitely huge power is necessary for their possible separation.

However, in recent years and based on experimental results, physics came to the conclusion that the mass of particles lies in the spinning quark-gluon field and the actual mass of the quarks has but a minimal contribution to the mass of the particles. Subsequently, the only thing left of the quark model is the misleading division of the electrical charge of the particle to the individual quarks (1/3 and 2/3). This division was created precisely and only for the purpose of explaining the mass of particles through the division to three or two quarks. It is therefore appropriate to consider the quark model as misleading.

-Physics *lost the option* of a realistic description of the mechanism of creation of particles from force fields. These mechanisms are replaced by partial ethers as a polarization of vacuum, various binding or coupling constants, or the Higgs field and Higgs boson.

10. Ending

If physics from Newton up to this day does not respond, the question of what the energies and momentums are and where forces originate from, in this paper we believe that we have tried to provide such an answer. Together with Newton (unlike Einstein) we claim that, (as in gravitational fields, so in void space) measured velocities and acceleration by lengths (space) and times are instruments for the description of amounts and changes in pressures of momentum densities (as in Einstein's stress-energy-momentum tensor) of real matter. While for Newton, mass density is the source of gravitational forces, as well as the accelerating forces in void space, the source of the gravitational forces as well as the accelerating forces in matter-free empty space for Einstein is a curvature of density of space and time in the vicinity of mass bodies.

In this paper we claim that momentum and energies express per velocities amount of balanced pressures between the internal pressure of particles of mass bodies and gradient of matter fields in their vicinity. Forces express changes of this balance per acceleration so as changes in velocities. The source of internal pressure and the opposite gradient of surrounding fields of particles of bodies as the essence of energy, momentum and forces are the compression and gradient of the momentum density of void space.

Physicists and chemists before 1900 knew only the compound ratios of elements and strongly believed that atoms exist. Their conviction resulted in the revelation of a breathtaking and immense world of atoms and elementary particles. Today, in this paper, we presume that all we know about our subprarticles and subforce field environments is the ratio of compressions of mass particles, field particles and force fields toward the momentum density of the space surrounding us.

If we are clearly and strongly convinced of this belief, we may imagine that new subparticles and subfields world in the world of physics may yet be discovered.

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