REVIEW ARTICLE

A model for combining classical and quantum physics, based on Lorentz invariants

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ABSTRACT

The paper develops the application of a mathematical model describing the physical vacuum and matter by two component systems. In contrast to Newtonian physics, to describe the energy of a body, its volume is taken into account. The model allows representing matter as a middle state between "black" holes and space. Using examples of changes in the energy of matter, the emergence of electric charge and magnetic fields is shown. The conclusion that the movement of time is impossible without a change in the rate of time is substantiated. The change in the rate of time, distorts the data on the rate of expansion of the universe. It is concluded that the movement of time is a transformation of the future into the past. The spiral motion of photons is explained. The application of rectangular coordinates to describe the physical essence of phenomena is justified.

Keywords: Time rate; Physical vacuum; Charge; Magnetic field; Present; Transformation

INTRODUCTION

Mathematical analogy of electromagnetism, classical and quantum physics indicates the existence of general laws in physics. Common characteristics (elementary electric charge, mass of elementary particles, physical constants), indicate the subordination of matter to unified processes in nature. A paradox arises: Laws exist, but they are unknown. A single process exists, but its effect on matter (or vice versa) is unknown. Physics, describing nature around it, does not want to become a unified science. Understanding and unification of the recorded facts, is solved by more complex system mathematics. Here a paradox arises: The increased application of mathematics "takes away from the physical essence of the process describes the physical process more accurately". The paradox is solved by the application of a more complex system. Currently, they are complicating nature by introducing new entities, such as "dark" substances. "Dark" substances are needed to explain the recorded facts and no more. No one is looking for dark energy carriers or studying the chemical properties of "dark" matter. IMHO the cat in the dark room will be looked for as long as money will be allocated to look for it. The desire to understand the physical essence, the search for the fundamental "building blocks" of matter, got hung up on chopping up elementary particles, in the hope of getting the most elementary particle of nature. (Is it hard to understand that you can divide indefinitely?). This option led to the creation of more powerful elementary particle acceleration systems [1].

Both options are based on the existing model of describing the world, based on the use of the laws of interaction of the "3 supporting whales of the universe": Matter, energy and volume. Interaction of the supporting essences creates a figure a triangle. The triangle is a rigid figure, *i.e.* it is invariant.

LITERATURE REVIEW

To understand the existing universe, let's increase the complexity of the system by considering the existing world as a 4 corner. Introduction of the 4th "whale", makes the interaction flexible to form a 4 corner, a new "whale" is required. We will use no ether's theorem as a tool in the search for a new "whale" of the universe. From no ether theorem for existence of cost (existence of a triangle), you need a variable. A common variable, in all processes, is the movement of time. As the 4 "whales" let us apply the time rate of a body, from the relation MV=TE where M,V,T,E are mass, volume, time rate and energy of a material system, respectively. M,V,T,E are generalized as phenomena of nature. In the relation, the rate of time is a characteristic of matter similar to mass, energy, and volume. The ratio allows the application of logic and mathematical analysis, creating room for explanation and limiting the possibility of unfounded interpretations [2].

For the system ET=MV=cost, the right and left parts of the relation interact, creating mutual compensation of changes, in the phenomena of nature. One time changes persist. Continuous changes create continuous existence of changes, *i.e.* movement. Movement occurs in a part or all of the existing nature phenomenon and cannot exceed the value of the nature phenomenon. This requirement limits the effect created by the movement of nature phenomena.

The term motion has broad application and to be specific, let's calls a continuous change in a nature phenomenon, a defect. A defect is a movement of a part or the entire nature phenomenon in the system under analysis. To eliminate difficulties in understanding the concept of "defect," duplication, in the form of "continuous change" or "movement," will be applied from time to time. The defect creates a new characteristic of the phenomenon of nature. By its properties, the defect must be similar to the phenomenon of nature and not be it. The defect arises as a result of internal changes in the system, as well as under the action of external causes.

The natural rate of time is a category throughout the universe. Energy, mass, rate of time, and volume of a body are characteristics of a body. Conclusion TE of a body is the result of interaction of matter with the universe. For matter to interact with the physical vacuum, there must be substance T_0 E_0 throughout space. The motion of matter, relative to the physical vacuum, creates the changes described by the Lorentz transformation. To register changes, a point of reference is needed. The point of reference is the substance T resting in the space of the universe$_0$ E_0. Let us call T_0 E_0 of the universe, the aether.

Newtonian mechanics assumes that the mass of a body is concentrated at a point, neglecting the size and shape of the body. What conclusions can be drawn from a departure from Newtonian physics?

Interaction of matter and T_0 E_0 of the universe, creates an interaction between matter in the physical vacuum, along the lines of the time rate change. The rate of time is changed by velocity (kinetic energy) and gravity (potential energy). The general dependence, on the rate of time, contributes to the transformation of kinetic energy into potential energy and vice versa.

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Consequently, gravitation is the interaction between matter, along the line of mutual change of the rate of time.

In essence, the time rate T describes the duration of a standard unit of time (t_0), at different velocities of the object. At rest and at $T/T_0=\sqrt{1-v^2/C^2}\sim 1$ ($v<<C$), equation, describes classical physics. When traveling at the speed of light, time motion is stopped $T/T_0 =\sqrt{1-v^2/C^2}=0$ and the equation describes quantum physics. At velocities close to the speed of light, the van and classical components are commensurable. It can be argued that the formula $\sqrt{1-v^2/C^2}$ shows the share of the classical component, in matter.

Temperature is related to electromagnetic radiation. Electromagnetic radiation occurs when an electron moves from a high, to a low orbit. Consequently, the temperature of the body is one, with the rotational energy of the electrons of the atom. Let's consider the differences between thermal, kinetic and potential energy of the body. Kinetic and potential energy is a vector. Temperature, a scalar characteristic. Having energy of motion, and not having a vector, allows rotation. Conclusion: Temperature is the rotational energy of the electrons and nucleus of the atom. Vector, is transformed into rotation if the vector is "bound" to a point moving slower than the body. Braking, when sliding, creates a rotation of the atoms in the contact area, creating an increase in temperature at the surface. The result: Sliding down an inclined surface, the potential energy of the bar, is transformed into the thermal energy of the contact molecules. The impact creates interatomic interaction and the transformation of kinetic energy, into thermal energy, occurs throughout the body volume.

Mathematical analysis of the model

For the analysis, let's take energy, the main parameter of the ratio

E=MV/T

Let us denote the defects of the phenomena of Nature as: The defect of mass-d**M**, volume-dV, energy-dE, the rate of time-dT.

When describing matter with the formula M_0V_0, the volume and shape of bodies depends on many factors. To eliminate the influence of external factors, let's take as the value V_0 such a volume of matter, which is practically constant under existing. Conditions elementary particles of atoms of a body satisfy these requirements. The formula M_0V_0 describes matter without taking into account magnetic and electric properties, temperature, and physical duality. In this case, the elementary particle of matter must be a particle that has no electric and magnetic properties. These conditions are satisfied by the neutron particle. Let us define the physical meaning of the defects of the phenomena of nature. Change in the energy of a material system during a volume defect.

$$dE_v=M_0 (V_0 \pm dV)/T_0 \qquad (1)$$

Any deformation of a material system is a deformation of its molecules and further atoms in a molecule. Deformation of the atom creates a change in the electric interaction within the atom. Consequently, the volume defect of a material system characterizes the interaction of charged particles in matter. Equation (1) describes the change in energy from the volume defect: Contraction, stretching, chemical reactions, change in shape, interaction of charged particles and systems [3].

If the formula $M_0 (V_0 \pm dV)$ describes the interaction of charged particles and electric fields, then it must also describe the charged particles themselves. Consequently, there is a defect in the volume of matter in the form of an elementary electric charge. Its

Mathematical form is $\pm M_0dV_0$.

The broad meaning of relation (1) is possible in mathematics, but requires specificity in physics. The description by one formula of charges, their interaction and change of the body volume, is possible if two kinds of defects of matter volume exist in nature min two. The magnitude of the first defect is unified in nature and is related to processes throughout the universe. The second kind is the change in the natural volume defect under the action of local, relative to the universe, causes and is observed in local conditions. The local volume defect of matter creates a change only in the affected matter. Taking into account local influences, relation (1) will take a form:

$$dEv= M_0 (V_0 \pm Dv \pm V \pm dV_1)/T_0 \qquad (2)$$

dE_v the defect (change) of matter energy created by the defect of matter volume.

ΔV-matter volume defect resulting from matter decay/synthesis.

dV_1-influence of external influences and electric fields.

dV is the natural volume defect of matter.

If the natural volume defect is equal to the volume of the particle, then it becomes impossible to decompose the particle into stable parts.

Within the brackets, additivity of defects arises. At dEv=const additivity will create processes in matter.

- Decay of neutral systems is accompanied by the formation of charged particles and systems electrical phenomena in earthquakes are a consequence of changes in the volume of compressed matter in the earth's crust
- Motion changes the volume of the body. The change in volume is partially compensated by the acquisition of an electric charge by the body. If the body is dielectric or insulated, static electricity accumulates in it.
- Rapid condensation of water vapor creates conditions for thunderstorms and water hammer.
- Alloys that increase the total compactness of the initial components increase the chemical passivity of the alloy components.
- The piezo effect is compensation for the resulting volume defect by the separation of charged particles in the volume.
- Alternating electric current, creating a volume defect in a conductor, creates sound vibrations.
- Pressure and exposure to an electric field change the rate of evaporation and chemical reactions.

At the processes are less pronounced, compensating for the volume defect, changing the energy of matter.

A particle $\pm M_0dV_0$ must have mass and lack of rest volume. Lack of resting volume is observed in waves and fluxes. Charged particle, possessing a mass, the ability to create flux, and possessing wave properties, is an electron. With equal change in energy, the greater the mass of the particle, the weaker the wave and flux properties are expressed. Therefore, the proton has less pronounced wave properties.

The limiting volume defect, in proton and electron, prohibits their further disintegration, into stable particles by charge or mass. Change in the energy of the system, by a mass defect of matter.

$$dE_m=V_0(M_0 \pm dM \pm \Delta M \pm dM_1)/T_0 \qquad (3)$$

dE_m is the change in the energy of matter during the mass defect of matter.

$\pm$ dM is a natural mass defect of matter.

$\pm dM_1$ is the effect of external fields created by the mass defect of matter.

ΔM is a mass defect formed during the decay/synthesis of matter.

$\pm V_0$ dM is an elementary particle with a natural matter mass defect.

When $dM=M_0$, the particle mass defect is not affected by external conditions, *i.e.* it is impossible to separate, into stable particles.

For the existence of fields and particles, a continuous mass defect of matter is necessary. The continuous mass defect of matter is achieved in two ways: By accelerating matter and by continuously changing the mass of matter. Continuously changing the mass of matter will end in the zeroing of mass or the emergence of enormous mass. This option is a dead end. Motion with linear acceleration requires a continuous inflow/outflow of energy, an unrealistic option. There is a variant of matter motion with acceleration, without change of matter's energy-motion of matter with centripetal acceleration-circulation. In matter, the duration of mass circulation is limited by forces of internal interaction. Continuous circulation of mass is

possible outside the matter. What form should a circulating mass of matter have? The spherical shape does not allow for a uniform circulation over the entire area of the sphere. The circulation of a defective mass of matter can be created by a torus shape.

DISCUSSON

Elementary particles must exist for the circulation of mass. According to equation (3) these particles have a specific volume. But a specific volume with a specific mass is a material particle. Consequently, the mass defect is created by particles that have no rest mass and have a volume. The particles must have a torus shape. Inside and circumferential rotation is possible in a torus. Rotation around the circumference allows observing the rotating field effect. Inside rotation creates an "input-output" duality, registered as poles. The vortex flow through the poles, cannot be broken into two oppositely moving parts. A torn torus collapses or forms smaller to ruses, *i.e.* it is impossible to separate opposite poles of one field. This description corresponds to the properties of the magnetic field. Among the elementary particles known in nature, neutrinos, mathematically represented by the formula ± V_0dM_0, satisfy the described conditions. Consequently, the neutrino is a torus without a rest mass. The opposite directions of the mass defect rotation, along the diameter of the torus, relative to the poles, create signs in the neutrinos.

Particles with no rest mass, when emitting and absorbing, create a migration of mass. Simultaneous shape migration changes the shape of the body at the magnetic poles. At one pole of the magnet, a depression must form, at the other pole a convexity (+ the center of gravity shifts). This conclusion can be verified.

Matter, with zero rest mass, is analogous to form. If form circulates, the magnetic field changes the surrounding physical space. The change of space affects the behavior of moving particles, which received their properties from the change of physical space particles possessing a charge. This explains the reason for the deflection of moving charged particles in the magnetic field [4].

At dE_m=const, the additivity of mass defects, in equation, will cause a counter reaction in the form of the formation of magnetic fields or neutrino emission, in the processes of matter separation/synthesis. At , the additivity of matter mass defects will be weakened by the presence of matter energy defect.

Equality of effect, from the motion of the mass defect and the motion of the matter itself, creates changes in the magnetic field, when the magnet moves.

By analogy with the tempo of time

- The absence of a mass defect or its insignificance |± dM| <<M, describes classical physics.
- Absence of rest mass ± dM=0, describes quantum physics.
- Detectable mass defect is described by relativistic physics.

The change in the energy of a material system when the time rate of the system changes.

$dE_t=M_0V_0(T_0 \pm dT \pm dT_1)T_02$ (4)

dE_t is the change in energy of a material system when the time rate changes.

dT is a continuous change in the natural rate of time;

d,T_1 influence of external defects of the time rate;

Inside the brackets, additivity is observed.

Let's divide equation (4) into two parts. At dT_1=0

$$-dE_t = \frac{M_0V_0}{T_0} \times \frac{(\pm dT)}{T_0} \qquad (5)$$

M_0V_0 describes the characteristics of matter at rest. The value $1/T_0$ characterizes the duration of the present the duration of the "now" time period. The duration of an event consists of the sum of a set of periods $1/T_0$. Before the moment "now" there is the future. After the moment "now", time becomes the past. Consequently, the past is formed from the future for the period $1/T_0$ or $1/T_0$ is the period of transformation of the future into the past. In this case, the formula $M_0V_0=T_0$ describes finding matter in the present. The change of "now" moments is registered as a motion of matter in time.

The relation $(\pm dT)/T_0$ describes the change in the rate of time.

The rate of time is changed by giving matter speed (kinetic energy) or growth of kinetic energy slows the rate of time. In the reverse process, there is an acceleration of the rate of time and a return of kinetic energy by a material body in the form of electromagnetic (heat, light) energy. Consequently, acceleration of the rate of time creates the process of emission of electromagnetic radiation by matter. If the change of the rate of time in matter occurs when kinetic energy is received or is accompanied by emission of electromagnetic energy, then the natural change of the rate of time creates a similar process in matter. In this case, during the natural acceleration of the natural rate of time, massive material bodies emit electromagnetic energy, while less massive ones have a heated or molten core inside them. The Earth has a molten core. Saturn and Jupiter emit more energy into space than they receive from the Sun. The sun and stars emit electromagnetic energy. What fraction of the energy emitted by a star belongs to the energy from the star's motion through time?

It follows from formula (4) that the amount of energy emitted by matter, when the rate of time changes, is equal to the product of the mass of matter by the volume of elementary particles of matter. The volume of matter is proportional to its mass.

Consequently, the emission of energy by stars, when the time rate changes, is proportional to the square of the star's mass, or the specific emission of energy by stars is proportional to the mass of the stars. A correction in the energy emission is introduced by the chemical composition of stars, but about this later.

The increase in the density of elementary particles of matter with depth is insignificant. The almost uniform release of energy, by the matter of stars, is not able to create a large temperature gradient, between the surface and the center of the star. This fact is confirmed in the analysis of the fluctuations of the solar surface. The nature of the fluctuations of the surface of the Sun suggests that the Sun, almost uniformly heated body. A check can be made by measuring thermal radiation from the surface of the Moon, on a lunar night. Excess radiation will confirm these conclusions [5].

The photons retain the time rate of the universe that existed at its inception. A change in the rate of time in the universe, will create a "red" or "violet" shift of the photons' radiation spectrum. Presence of a "red" shift in the spectrum of photons in nature indicates a positive acceleration of the time rate in nature. Practically it is difficult to verify this, because the Doppler effect is similar.

If the present is a period of transformation of the future into the past, then the question arises: "What, and into what is being transformed?

It is possible to take a particle of time only from ether T_0 E_0. Anther, gives a part of its time $1/T_0$, to form a new moment "now". The ether, giving away a particle of time, changes the ratio of TE, creating the energy change requirements. Excess energy dE, is radiated into the surrounding space. Consequently, the "now" moment exists continuously, because the anther of the universe is continuously transforming conclusion. Anther, the substance that ensures nature's future. What transforms the ether, creating the present, and further the past, with the release of energy? In relation, the greater the value M_0V_0 the more energy is released when the rate of time changes. The value M_0V_0 shows the amount of matter. Consequently, matter, transforming ether, creates "now" time, *i.e.* matter is a transducer of the future into the past. In the universe, without matter, motion of time and present "now" will not arise. But where does the previous "now" disappear to? Preserving the present would create the possibility of moving

to past "now" moments. Such events are not registered. If the present is not preserved, what does it transform into? For the answer, consider Figure 1.

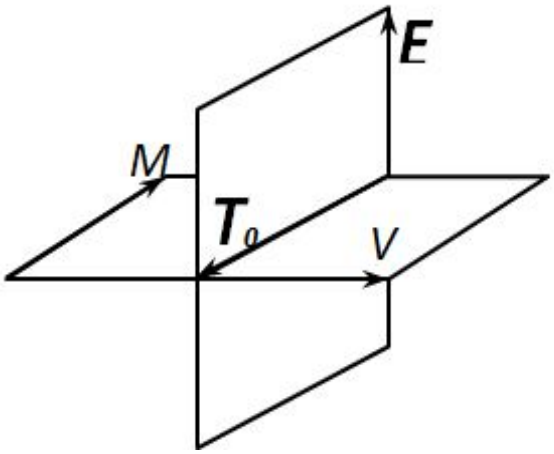

Figure 1: The interaction of the MV and TE quadrants creates the M:E and V:T ratios.

The intersection of planes shown in the figure tends to "lose" one axis of the planes, combining two vectors into one. One axis becomes double. Each axis has a specific physical and informational meaning. Combining two axes creates a loss of information. Which two axes have merged? Of the known phenomena of nature, the rate of time does not register. Therefore, graphically the "disappeared" axis is the rate of time. With which axis has the time rate "doubled"? Not with the energy axis, since TE is a single plane. Consequently, the axis of the rate of time is aligned with the axis of mass or the axis of matter volume. Matter moves through time with different amounts of energy [6].

Consequently, the vector of mass of matter coincides with the vector of the rate of time. The aligned axes may coincide in direction or be opposite. If the vectors coincide in the direction, the time rate and mass must disappear somewhere or appear from something, which is not real. Another option: The axis of the time rate and the axis of mass are directed counter.

The opposite direction of the axes can be described as a ratio: M=f (-T)

(or M+T=const) (6)

This variant shows increase of matter mass in the universe, by transformation of TE universe, into matter mass. The growth of mass in the universe, increases the amount of transformed Ether and accelerates the rate of time. Transformation of ether into energy, and "now", disrupts the equilibrium MV=ET for this moment "now", hence this equilibrium is true.

In terms of the graphic presented, ether is our future, matter is our past. Time exists only in the moment "now"- the moment between the past and the future. The abstract multitude of "now" moments creates the duration of an event or the interval between events. There is no time beyond the present=the "now" moment. Beyond the "now" time exists as a component of the anther (an almost still future) or as a mass of matter (an almost still past). "Now" is no longer anther and not yet matter, with the properties of anther and matter. This medianness allows the past (matter) and the future (Ether) to be present together in the "now" moment. The fulfillment of equation (6) is possible if the mutual relation of the phenomena of nature is represented by the following relation M=iV=-iE=-T.

The transformation of ether into matter is accompanied by the release of electromagnetic energy. What happens to electromagnetic radiation? Electromagnetic radiation is absorbed by matter and interacts with each other. These processes lead to loss of electromagnetic energy and formation of radiation, with an infinite period of oscillation. What is EMP with infinite period of oscillation? The answer is the analogue of relation (6) in the form of the pair "volume-energy" V=f(-E), Electromagnetic energy is transformed into a "string" of space or the Universe is expanding, by transformation of EMP into space.

By transforming the anther, material bodies create the anther rarefaction between themselves. Under the action of the rarefaction the bodies are attracted, and the effect of gravitation arises. Consequently, gravitational interaction is created by the existence of the present, *i.e.* the movement of time. Anther rarefaction reduces the intensity of anther to energy transformation, *i.e.* gravitation weakens the process of anther to energy transformation. Transformation of ether is similar to the process of suction of ether by matter, which will create rotational momentum in matter. The energy to form the torque is proportional to the energy generated, *i.e.* obeys the dependence E=f (M^2).

The energy of rotation of a material point is proportional to the square of the angular velocity. Equal dependences of the released and absorbed energy will create the effect of a linear increase in angular velocity, in the layers of planets and stars, when approaching the center. The increase in angular velocity, from the surface to the center, creates shear stresses, in the solid layers and rotation of the liquid core. The earth's core rotates faster than its surface layers. Shear stresses in solid layers of the planet will create conditions for shifting of the layers relative to each other. Displacement of the layers will manifest itself as continental drift and earthquakes.

Radiation of energy by matter, from transformation of Ether into matter, creates a counteracting process in matter. The counteracting process is absorption of energy by matter. Absorption of energy, in its essence, is transformation of energy. The ability to transform energy, realized in two ways: "Photon energy transformation changing photons without transforming their energy". "Changing photons without transforming their energy" was realized as the ability of matter to reflect photons transformation by direction. "Photon energy transformation" was realized in the ability of matter to transform the energy of photons into another kind of energy. Another kind of energy became kinetic energy. verification. The movement of the mirrors should change their reflectivity. Matter, by transforming electromagnetic energy, into kinetic energy, created counteracting processes in direction and quantity. The transformation in direction led to the emergence of rotational motion. Quantitative transformation created acceleration.

Evolutionary development of the ability to emit photons led to an increase in the emission potential. The radiation potential decayed qualitatively and quantitatively. Quantitative decay created the intensity of radiation. Qualitative decay created the spectrum. Further, the intensity and width of the spectrum increased. Consequently, the relic radiation must be weak in intensity and "compressed" in spectrum, even taking into account the "red shift" [7].

For mutual communication, independent systems, a point of contact or mediator is necessary. The intermediary must have the dimensionality of both independent systems. For space and time, the intermediary's dimensionality must contain the dimensionality of time and space. The intermediary must be neither time nor space and possess the characteristics of time and space. A characteristic of time is continuous motion. The state of rest is characteristic of space. The mediator must be at rest in time and move in space. Time and space are real, but not material. The mediator of two immaterial entities must be nonmaterial. In linear motion, for contact in the "time-space" pair, the mediator must be one and have the d imension of m/sec. From the known phenomena, speed corresponds to these parameters. When time motion stops, there comes fixation of the "now" moment, on a specific (Planckian) value. A specific duration of the "now" moment sets a specific speed limit the speed of light in the medium. With such variant the postulate about constancy of light velocity gets mathematical and logical explanation. The M:E ratio, has the dimension kg:J and varies from zero to MS^2.

Change in energy, with defects in mass, volume, and time in the system. In matter, three defects occur in the decay/synthesis of material systems and in the motion of matter.

$$dE_{tmv} = \frac{(M \pm diM)(V \pm diV)(T \pm diT)}{T_0^2} \quad (7)$$

dE_{tmv} The change of energy of the system under defects of mass, volume and time in the system.

di-defect arising from motion, presence of field, charge and magnetic fields, separation/synthesis processes, influence of external fields.

Nature is always in moving time. As a result, the decay of matter is accompanied by the acquisition of speed of its parts. And vice versa. For synthesis, there must be velocity in the components. In consequence of additivity, a change in any defect will cause a response, in other defects. The response is aimed at reducing the change in the first defect. By counteracting the appearance of defects, matter changes its shape, electric and magnetic properties, and reacts by changing its velocity or temperature.

In matter in motion, in the absence of decay, the product MV=const, *i.e.*, only the variable dT is varied and the energy of the moving system is proportional to the change in the rate of time. Velocity is a measure of the kinetic energy of the body. Temperature is related to electromagnetic radiation, *i.e.* temperature is a quantum component in the total time defect of matter.

Briefly

- The rate of time is influenced by the processes that slow down the rate of time. Consequently, the greater the mass and velocity of the planet, the higher the temperature of absolute zero on it.
- Gravity counteracts the motion of time. We can say that dT is directed towards gravity, *i.e.* the radiation energy of stars affects the gravitational constant of planets (time dependence).
- At the speed of light, the rate of time is zero and there is no radiation of energy-photons do not emit energy. Therefore, photons passing by are not visible, i.e. Space is full of light and does not glow.
- At the speed of light there comes a stop of time motion, *i.e.* the change in the rate of time stops. The cessation of the change of the rate of time fixes the present, at a specific minimum value, different from zero. The specific value of the duration of the present, does not allow the moving system to possess infinite mass and zero volume, while moving at the speed of light [8].

Influence of matter defects on anther transformation

Separation of matter into dual parts changes the process of transformation of ether into matter and energy. The direct process is amplified, by one dual part. In the other dual part, the reverse process occurs - the transformation of time "now" and energy into ether.

- Neutrinos are equal in mass defect, volume, and opposite in direction of rotation. This creates a zero balance. Consequently, neutrinos do not create a change in the aether transformation rate.
- Charged particles have a significant difference in mass. The Compton effect shows that the electron lowers the energy of photons. Proton transforms aether energy and time "now". Electron transforms energy and time "now" into ether. Quantitatively (more volume and mass), the proton destroys the aether more than the electron creates. There is a surplus of energy release by the atom. Continuous replenishment of electron energy, from the nucleus of the atom, creates electron stability in the atom. The more electrons in the atom, the more efficient the reverse process and the atom emits less energy. This effect explains the effect of the composition of stars, on the intensity of their energy release.
- The presence in Nature of several defects of one phenomenon of Nature, creates mutual dependence of the constituent parts of equation (5). Gravitation slows down the natural rate of time. The slowing down of the rate of time leads to the reduction of energy release by the material system, which can be represented in a dual way:

A decrease in the natural rate of time, at MV=const

Changing the work MV, at 1/ T=const=$1/T_0$

In reality, both processes occur. In matter, gravitational influence, changes the rate of time. A change in the rate of time, changes the value of the product MV of matter. Processes in nature, when changing the product MV, mainly change the volume of matter. The defect in the volume of matter is aimed at reducing the effect of the defect in time on the system. Consequently, the density of matter depends on the coefficient of utilization of the natural time defect in the system. In the nucleus of the atom, the density of matter is conditioned by the natural time defect. In the atom, the influence of the time defect is attenuated by the electrons. In molecules, the process of weakening the influence of the time defect is more effective than in atoms. Therefore, chemical compounds have a density lower than the average density of their constituent atoms.

The phenomenon of nature, at the maximum defect value, exists only as a defect. In this state, matter has no rest mass and the change in the rate of time is stopped. Photons have these properties. Consequently, the energy of photons is described by the relation.

$$E_{mvt} = \frac{-dMdVdT}{T_0^2} = \frac{-dMdV}{T_0} \times \frac{dT}{T_0} = h\nu \quad (8)$$

h-Plank´s const.

v is the emission frequency of the photon.

$1/T_0$-size/standard time tempo.

The energy of a photon is given by the conditions at its emergence. These conditions are the frequency of radiation. The frequency of radiation is given by the characteristic dMdV of the photon. Consequently, dT/T_0 describes the Planck constant. Let's take the value of the Ether time potential equal to a standard time interval 1 second. Let's take into account that all phenomena of nature are volumetric. In this case, energy of physical vacuum (anther in space) is inversely proportional to the Planck constant and equal to $2{,}88\times10^{33}$ дж/м^3. Such energy density allows matter to move in physical vacuum without resistance [9].

Let's calculate the linear value of Planck's constant

$$G_h = \sqrt[3]{\frac{3h}{4\pi}} = 1{,}08 * 10^{-11}$$

G_h the linear value of Planck's constant.

Mathematically G_h describes the radius of a sphere of volume h. Multiply G_h by 2π, we get the diameter of the sphere and the number equal to the gravitational constant with a deviation of 2%. It follows that the quantum of electromagnetic energy in its motion rotates, forming a tunnel with a circle numerically equal to the gravitational constant. Spiral (tunnel) movement of electromagnetic radiation creates conditions of energy quantum transfer in concentrated form regardless of the distance to the object. Such motion allows one to register photons from a distant radiation source, which explains the photometric paradox. It is experimentally proved that photons in their motion rotate, forming a tunnel by their rotation. The radius of rotation of photons in the publication is not specified.

Space is a point on the arrow of time, *i.e.* space, is in the moment "now". As a consequence, change of the rate of time in space, is practically simultaneous, for all physical Space. Such rate of time movement in physical space, creates synchronization of time "now" in the whole physical space. Synchronization of time in physical space, determines the existence of the Doppler effect and creates the same value of the Planck constant, depending on the amount of matter, in the whole universe.

The disintegration of systems creates a mass and volume defect in parts of the system. Taking into account the natural course of time, three defects arise in matter. The defects are realized by: Acquisition of velocity, change in temperature, emergence of electromagnetic radiation conversely. An increase in velocity increases the possibility of fusion. Synthesis creates an opportunity for particles to "stick together". If the resulting particles are unstable, followed by disintegration. Consequently, increasing the energy of particles (in colliders), new, in understanding the essence of nature, will not give. To understand the essence of nature it is necessary to make a counter movement from quantum physics to classical physics. For this purpose, to investigate the processes of EMP energy changes on electrons and protons.

$dE=MVdT/T^2=hv$

$MVh/T=hv$. From $M/T=const$, the volume in the equation shows the frequency. Under pressure, the volume of matter decreases. Consequently, under pressure, at equal temperature, matter radiates electromagnetic energy of higher frequency.

Defects of the phenomena of nature and the stability of matter

A defect cannot be greater than the phenomenon, *i.e.* there is a limit to the sum of the same type defects. If the defect has reached its maximum value in the system, then the other defects of this phenomenon of nature, are equal to zero. The presence of the limit of the sum of defects affects the properties of the systems.

- The volume defect of matter, in the form of an electric charge, increases the stability of matter to decay and deformations, contributing to the conservation of mass of the system. In the electron, the specific value of the defect is higher than in the proton and the electron is more stable than the proton in terms of decay.
- The presence of the time defect creates the stability of matter's existence. The presence of the mass defect allows matter to retain its form. The neutron, at rest, has no mass and volume defects, which makes this elementary particle unstable in the free state. The neutron increases its stability with increasing velocity and being in unity with the protons present in the nucleus.
- The most stable, of material particles, is the photon, as a particle consisting only of defects of nature's phenomena. Photon does not decay, does not react to electric and magnetic fields. Electromagnetic radiation, having lost energy, becomes space, which is much more stable than photons.
- Continuous synthesis of new matter, creating a mass and volume defect, stabilizes the physical vacuum, from decaying into dual parts [10].

In a stopped moment "now" (quantum mechanics), the Heisenberg principle emerges. With a moving "now" moment, one can know exactly the place and velocity in space. In quantum mechanics, an arrow will never hit a bird. The excess energy of the arrow will go to change the frequency of the arrow.

Why does a person seeing "now" not see the past and the future? Reason: There is a huge difference in energy between the "now" and the past future. The past is the "now" without energy. Having given up energy, the "now" becomes a "black," all consuming past. The future, having a surplus of energy relative to the "now," is transparent to us. The physical vacuum has a specific energy density, for this reason it must have a specific material density. The physical vacuum is complex to matter, hence, its density is the inverse of the neutron's density.

Superposition the possibility of being between "is not". Examples outside quantum physics: moment "now" between past and future, liquid between solid and gas, centripetal acceleration (change of velocity in direction, *i.e.* change of vector is, but linear change of vector is not). In other words, superposition is the normal to the duality of "is-no". Is it possible to turn back time? To do this, we must change the process of time travel into the future that is going on in the universe. What about traveling to the future and the past? The present is one and there is no way out of it. The prohibition, on the travel of material bodies in time, does not create a prohibition on the movement of information (photons), which makes it possible to observe the light of stars.

The decay and synthesis of ether, by particles having a charge, creates a state of equilibrium between the time rate defect and the volume defect. It can be said that in an atom the volume defect compensates the time defect. Consequently, the ratio of the density of the nucleus of the atom to the density of the atom is the ratio of the elementary electric charge to the Planck constant:

$p_z/\rho_a=e/h$

ρ-density of the system, a-atom, z-nucleus of the atom.

CONCLUSION

It is concluded that the movement of time is a transformation of the future into the past. The spiral motion of photons is explained. The application of rectangular coordinates to describe the physical essence of phenomena is justified.

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