

Redefinition of new physics philosophical principles for explaining motion phenomenon

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Abstract

In this research, a fundamental revision is made on the Newtonian mechanics to provide a new theory having a more diverse range of phenomena explained. The first and second laws are reformed and the third one is held while the general law of gravity has been removed. The basic concepts of Newtonian mechanics are location, mass and absolute time. The absolute time being held, mass is included as a more general concept and location is not an original concept, but a second order one. Motion in 3D frame is considered to be an inherent property for 3D objects and location is its integration. On the other hand, location for light as a 4D object is not sensible. The free fall phenomenon is described without using Newton's general law of gravity. The well-known experimentally verified results of relativity theories (special and general) are covered by three postulations of the new theory. The gravity is a result of Ether's motion as a fluid among cosmological masses and the accelerating expansions of galaxies as well as the fast motion of objects in the galaxies margin are shown to be explainable without needing some unknowns such as dark energy and dark matter. The philosophical aspects of new theory are analyzed at the end.

Key words: Theoretical physics, Gravity, Dark energy, Dark matter

1. Introduction

In the Royal Institution of Britain in 1900, Lord Kelvin's speech was entitled as "19-th century clouds over the dynamical theory of heat and light" [1]. According to the contemporary physicist, there were two clouds: 1- the failure of attempts to detect Ether wind and 2- the application of

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energy equipartition which was in variant with experimental results. These were deduced by Maxwell's electromagnetic theory and Boltzmann's statistical thermodynamics. According to Maxwell's equations the speed of light was c and this makes sense only in a reference frame entitled "Ether" [2]. The Galilean transformations should be held in the case of Ether wind as well. Albert Michelson and Edward Morley aimed to reveal Ether's motion in their famous experiment and it was confirmed that light has the same velocity c with respect to any moving object, regardless of the amount and direction of motion, contrary to the Galilean transformations. If so, what is the reference frame where the electromagnetic fields have the speed c . In his special theory of relativity (SR), Albert Einstein suggested that the speed should be measured in any inertial frame independently, based on two postulations: 1- the speed of light in empty space has always the same value c , 2- all inertial frames are equivalent with respect to all laws of physics [3]. The first assumption is the direct consequence of Michelson-Morley experiment. The second assumption was also included since any absolute reference frame has been ignored, while in the Newtonian mechanics we obtain the governing equations versus an absolute frame. Although SR is credited with Einstein, the contribution of several other scientists has been conducted in this way. The principle of relativity history can be attributed to Galileo Galilei in his famous example by ship [4]. Newton also included this matter in the Newtonian mechanics [5]. However, he had to consider an absolute frame to distinguish an accelerating frame. He also used the concept of absolute time as an equably flow regardless of any external thing. One can conclude from Newton, he used to think that God has taken his creation in an absolute time and space. Ernst Mach can be addressed as the scientist who provided a new challenging basic against absolute space and time. Woldemar Voigt in an independent research about invariance of wave equation in moving frames found that transformation from a system at rest to one with constant velocity affects the time. The researches

of Oliver Heaviside and George Francis Fitzgerald guided them to the conclusion that the size of body is changed by its motion relative to Ether. The factor by which the length of body was contracted in this research was the same in the Voigt transformation leading to time dilation. Joseph Larmor showed a new shape of transformations and proved that his results give Maxwell's equations invariant in any frame and showed that the length contraction of Fitzgerald is a direct consequence of his transformations. Three years after Fitzgerald his formulation was extracted by Hendrik Antoon Lorentz. Some experiments in 1902 showed that the mass of electron is increased by its velocity. It was Lorentz who looked for a universal theory for the first time and the correct space time transformation was offered by him. He believed that Ether influences the moving bodies in such a way that enables it to remain hidden. Jules Henri Poincare was the first to prove the absence of Ether to reconcile Galilean transformations with Newtonian mechanics. In 1900 Poincare showed in his article that local time and time at rest are distinguishable. In his book published in 1902 he remarked that there is no absolute uniform motion and physical experiences are unable to recognize inertial motions. In total, Poincare, Einstein and Lorentz can be known as the most effective scientists in development of relativity theory among whom it was only Einstein that evolved his theory in isolation without any touching with scientific community. Herman Minkowski was also who ascribed the fourth dimension to time. Reformulation of relativity theory using 4D tensor in a concise form was among his other contributions [6-22].

In order to generalize the SR to the accelerating frames, Einstein introduced his general theory of relativity (GR) [23]. In this theory, the trajectories of the planets in the solar system are the projections of the space-time curves onto the three dimensional space. The GR field equation relates the mass/energy distribution to space-time curvature [24]. The first evidences about presence of some unknown type of matter was showed by Zwicky [25]. Later measurements

implied that the galaxies are dominated by this invisible matter called dark matter [26, 27]. The objects orbiting in large distances than galaxy center were expected to have lower angular velocities, contrary to what was observed and this was a sign about presence of dark matter. Different efforts to find what is dark matter, have been unsuccessful up to now. On the other hand, the detailed measurements of the mass density of the cosmos shows a value that was 30% that of the critical density. Since the space is very nearly flat, there is no explanation for 70% of the energy density of the universe. This problem appears to be in connection with the observation of the nonlinear accelerated expansion of the universe [28-32]. We would expect the rate of expansion to slow down due to the effect of gravity. In the GR, the equivalence between matter and energy means that gaseous pressures caused by thermal molecular motions can be a source of gravitational fields [33], which can justify the dark energy.

In a great program parallel to relativity, the mechanics of microscopic particles was developed. Here the Planck's constant played a fundamental role. Planck suggested that emission and absorption of electromagnetic radiations take place using quanta of energy to justify the radiation of blackbody [34]. The first manifestation of wave-particle duality observed in the Einstein's paper for interpretation of photoelectric effect [35]. Arthur Compton performed an experiment whose description was based on particle-like properties for light [36]. Louis Broglie's contribution also represents a wave-particle dualism, leading to a path toward quantum mechanics [37]. Bohr solved the problem of stability of atoms using Planck's idea about quanta based on which old quantum mechanics was constructed [38]. Between 1924 and 1925 the old quantum mechanics seemed to be inefficient due to some difficulties whose solution required a new theoretical frame. The new laws developed in two different paths. The attempts of Louis de Broglie [37] lead to Schrodinger's wave mechanics [39] and the researches of Born, Jordan and Heisenberg resulted to matrix

mechanics [40], nowadays known as quantum mechanics. Schrodinger and Eckart [41, 42] showed the equivalence of wave and matrix mechanics. Although quantum mechanics results were experimentally brilliant, its philosophical interpretation was too strange. What wave functions and matter waves can be really is not easy to provide answer for, even after one century. A wave is realizable only in a medium which is not predicted by quantum mechanics, so wave function can be only a statement of our knowledge.

In this paper the basic concepts, used to develop a mathematical model, are mass and absolute time. Location is found to be a property of 3D objects, only. Mass is defined as a more general concept in comparison with Newtonian mechanics. No one of SR and GR hypotheses are used. Among Newton laws, the modified forms of first and second laws are used and the law of action and reaction is held. A wide spread spectrum of observation is explained. There is no need to general law of gravity and some unresolved problems like those justified by dark energy and dark matter are explainable here by making use the concept of motion for Ether. The philosophical foundations of new theory are discussed at the end and wave-particle duality is explained applying the generalized definition of mass in this theory.

2. Foundations of theory

2.1 Fundamental concepts

Due to the fundamental philosophical alterations made on basic concepts here, in comparison with Newtonian mechanics, the author has provided a clear definition for the basic concepts used in this theory:

Universe: anything existing out of our mind and independent of our measurements is a member of universe, so the whole is known as universe.

Mass: the essence of constituent content of anything. Anything in the universe is known to be “existing” if and only if it owns mass. The properties of anything in the universe are descriptions about its mass. So the properties like having inherent time, location, weight, color, density, curve, etc. are applicable only for a thing that owns mass.

Absolute time: an assumed variable in our mind on which we can model the variations taking place continuously in the universe. Absolute time is not constituted of mass, so it is not a thing and does not exist in the universe.

Absolute frame: an assumed frame in our mind in which we can model the events. Absolute frame is not constituted of mass, so it is not a thing and does not exist in the universe. So, some properties like curve and warping are indefinable.

3D object: If the constituent mass of something is constrained in a way that restricts it to be existing only in a 3D frame, it is known as 3D object. The mass of a 3D object is constrained to a certain volume of 3D frame and has two important properties. It occupies a definite place so the occupied place is its location and it is dynamically in alteration so this alteration is the time felt by it. The word “mass” in the Newtonian mechanics is equivalent with the word mass for 3D object, here.

4D object: If the constituent mass for something is not restricted to a 3D frame and distributed in 4D, it is a 4D object and would have some different properties from 3D objects.

Inherent motion: mass in its general definition has a general property known as motion. An important evident in this way is our experience that we see everything in motion.

2.2 Postulations of theory

Assume that cosmos comprising fluid known as Ether covers all objects. The Ether and its constituents are in motion along the fourth dimension with velocity c and this motion is not

necessarily uniform. Any floating object in Ether follows the motion c with its own one, being among its inherent properties. Due to the flexibility of motion of fluids, the velocity of Ether along the fourth dimension is equal to that of object in its neighborhood, locally.

Consider an absolute 4D frame $X - Y - Z - W$ with the dimensions of length. The frame $x - y - z - w$ which represent the constituent points of Ether is floating along fourth dimension with the velocity c . One can call the absolute frame as the Lagrangian and the moving one Eulerian. To have a better realization of suggested geometry here, consider a 2D frame shown in Fig. 1 which is moving along W by velocity c . Based on the above explanations, the new theory is introduced here with three hypotheses: 1- The cosmos is in motion along the fourth dimension W of absolute frame with the velocity $c = dW/dt$, 2- Force is the cause of changing direction of motion, 3- Each action has a reaction with the equal amount and opposite direction.

Noticing the first postulation, the well-known velocity in the Newtonian mechanics $v_i = dX_i/dt$ (i.e. $i = X.Y.Z$) is a component of c , visible in 3D frame and the other component is the felt time by object. In this theory c is an inherent property of 3D objects and can be different for different objects. So, let us call it inherent motion. Since v is a component of c , the resultant of motion in 3D frame and the motion along w as the felt time by object is considered to be constant such that:

$$\vec{c} = \vec{c}^* + \vec{v} \tag{1}$$

According to Eq. (1) as the v is increased, c^* is decreased. The light speed is equal to that of Ether, locally and it is not a global constant in this theory.

3- Kinematics

3-1 Time dilation

In the present theory one can offer an exact definition about the rest object using the definition of inherent motion. If the inherent motion of an object is equal to the time felt by which, $c = c^* \Rightarrow$

$v = 0$ so it is in rest, absolutely. Now consider two objects A and B in Fig. 2 with the equal inherent motions c , both initially at rest. Noticing absolute time and space, one can apply Galilean transformations in its modified form $x_B = x_A + (v_A - v_B)t$. The object A , starts to move by velocity v_A . In the Newtonian mechanics we have to consider a relative motion for object B , as well. However, here motion is an absolute phenomenon, independent of other objects so, $v_B = 0$.

We obtain the time felt by object A using Eq. (1) as following:

$$c^*_A = \gamma c \quad (2)$$

In Eq. (2) we have $\gamma = \sqrt{1 - (v_A/c)^2}$. The felt time for object B is obtained below:

$$c^*_B = c \quad (3)$$

One obtains from inserting Eq. (2) in (3) the equation below:

$$c^*_A = \gamma c^*_B \quad (4)$$

The felt time by a moving object is dilated by factor γ with respect to a rest case. Let us assume that an event happens in distance l from two objects. The absolute time for observer to receive it, is calculated by $t = l/c$ while the time felt by objects are $t_A = l/c^*_A$ and $t_B = l/c^*_B$:

$$t_A = \frac{t}{\gamma} \quad (5)$$

$$t_B = t \quad (6)$$

$$t_B = \gamma t_A \quad (7)$$

The interpretation of Eq. (5) is that the clock of object A itself has slower inherent time and this lead to slower motion of its hands. Given that an absolute coordinates system and time are included; the local time is explained in term of absolute time. So, the time is dilated only for moving object. In the contrary with SR, here the local time is independent of x therefore, no need to synchronize clocks and simultaneity is absolute. It is expected in this theory that the biologic time of object to be affected by velocity because time and velocity are inherent properties of

object's mass. When an event happens in a distance l , it is reported by light speed since the speed of light is equal to that of Ether and is almost independent of object velocity. The variation of Ether velocity will be discussed soon.

3.2 Size contraction

As explained in section 2.1 the characters such as warping and contraction can be applied on something existed in the universe. Since the absolute 4D frame is a mental description which is not a thing, it cannot be contracted. So, in this theory it is Ether whose dimensions are affected by motion of the object that surrounded by. Another important point to be explained is that the direction of motion has no priority for contraction in comparison with other directions. The contraction is a result of decreasing Ether's motion. As mentioned, an important property of Ether is that its motion near other objects is equal to that of them. Consider the same objects of section 3.1 the motion of Ether is also c uniform for when two objects are stationary. Thus, around the object B the gradient of Ether velocity is zero and there is no size contraction. On the other hand, its velocity near object A is γc and the more distance from that is increased, the more velocity of Ether is increased such that in a specified place away from A the velocity gradient is removed, depending on Ether properties. This is similar to gravitational fields (see section 4.2). If we show the absolute frame in spherical coordinates system with $R - \Theta - \Phi - W$ and the moving one with $r - \theta - \varphi - w$, by considering the Ether velocity c far away from object A as the standard velocity, one can consider the Ether dimensions there as neither contracted nor expanded. Therefore, the relation of dimensions and motion is obtained as following:

$$(ds)^2 = (c dt)^2 = (dR)^2 + (R d\Theta)^2 + (R \sin \Theta d\Phi)^2 \quad (8)$$

In the above ds is the standard length of Ether's element. Regarding the Ether velocity is only a function of radius $c = c(r)$, we assume the contraction to be axisymmetric so $\partial c / \partial \Phi = \partial c / \partial \Theta = 0$. By substitution of Eq. (3) and (4) in (8) one achieves:

$$(dr_B)^2 = (c dt)^2 = (dR)^2 \quad (9)$$

$$(dr_A)^2 = (\gamma c dt)^2 = (\gamma dR)^2 \quad (10)$$

We can obtain the ratio of dimensions for an object in rest and motion conditions by combining Eq. (9) and (10) which gives:

$$r_A = \gamma r_B \quad (11)$$

3.3 Coordinates transformation

In this theory the governing equations are extracted based on absolute coordinates system. The motion in Eq. (1) is absolute and it is possible to define motion of each object independent of other ones in absolute frame. As a conclusion, no need to the transformation rules based on which the governing equations are invariant. The obtained results in Eq. (5) and (10) are not deduced by coordinates transformation, but an evident consequence of absolute motion. The light speed is not a global constant, and Lorentz transformations will not play their traditional role from present point of view. The speed of light in 3D frame, according to experimental information, is equal to that of Ether, locally.

3.4 Doppler effect

Consider the objects A and B with equal inherent motions c . The modified Galilean transformations are $x_A = x_B + v_A t$ and the object B is in local stationary state. In $t = 0$ when the object A is at x_0 the first beam of light from B is sent and $n + 1$ light signals are emitted frequently with period τ in a way that the last pulse is emitted in $t = n\tau$. We consider that the signals are in the form of very brief pulses and separated by τ . As a result, a flow of light is produced with

frequency $\omega = 1/\tau$ from object B to A . If t_1 and t_2 are the moments of receiving the first and last signals by observer A , according to absolute time, and its corresponding positions in these moments are x_0 and x_1 , respectively, we shall to find the frequency and period for observer A .

Given that the summation of n wavelengths for observers B and A are $\lambda^n_B = cn\tau$ and $\lambda^n_A = (c + v)n\tau$ respectively, we have the time interval (versus absolute time) of receiving two consecutive signals ($n = 1$) for two observers as $\Delta T^B = \tau$ and $\Delta T^A = (1 + v/c)\tau$. Using Eq. (5) and (6) in ΔT_A and ΔT_B one obtains the ratio of periods between two objects:

$$\tau_A = \sqrt{\frac{1 + \beta}{1 - \beta}} \tau_B \quad (12)$$

And the relation between frequencies is:

$$\omega_A = \sqrt{\frac{1 - \beta}{1 + \beta}} \omega_B \quad (13)$$

4. Kinetics

4.1 Second law

Given that any object is in motion, once the force is applied to object, its motion direction is changed. This principle is to be employed to define the second law. Now consider Fig. 2, while applying force the amount of C^* is decreased and the amount of other component v is increased.

So, the second law of Newton is rewritten as following:

$$F_i dt = m d\vec{c}^* \quad (14)$$

It should be noticed that C^* is perpendicular to moving frame, locally. Consequently, changing direction of C^* is only possible by making the Ether warped. Thus, the angle of bending is defined as “the amount of deviation from orthogonal condition”. For more clarity of the concept, the Ether is flat when $v = 0$ and directions of W and w are coincided in this case. As the object moves with

the constant velocity v , there is an angle between two directions having been depicted in Fig. 2, while the directions in this case e_i are orthogonal yet, locally, and $d\psi = 0$. On the other hand, when the object undergoes a certain force, the directions will not be orthogonal locally and this causes the acceleration. By considering Fig. 3 we have:

$$\vec{c}^* = |c^*| e_w \quad \Rightarrow \quad d\vec{c}^* = c^* de_w \quad (15)$$

The variation of velocity is in direction as well as in amount. Here the effect of direction variation is included, the variation in amount is applied in Eq. (30). One can write Eq. (1) in the form of squares summation as $c^* = c\sqrt{1 - (v/c)^2}$. We also find from Fig. 3 that $de_w = e_i d\psi$. Using the recent equations in Eq. (15) we obtain the following equation:

$$d\vec{c}^* = c\sqrt{1 - (v/c)^2} e_i d\psi \quad (16)$$

On the one hand we have: $\sin \psi = v/c \Rightarrow d\psi = \left(1/c\sqrt{1 - (v/c)^2}\right) dv$, by substituting which in Eq. (16) we find Eq. (17):

$$d\vec{c}^* = dv e_i \quad (17)$$

Eventually, we replace Eq. (17) in (14) to obtain the well-known equation of motion in the Newtonian mechanics from view point of 3D frame:

$$F_i = m a e_i \quad (18)$$

There can be found one of the fundamental questions here, answered. Why the reaction of body under applying force is to show inertia is that, since it is in motion along fourth direction, applying force changes the direction which is felt by inertia. In other word, the inertia is the resistance of Ether against bending.

4.2 Gravity

In this theory the acceleration is a result of Ether bending and the bending is deduced by gradient of velocity. So, when we apply force to the object, the Ether around it, is warped which gives the

direction of motion changed, while for a gravitational field the objects accelerate due to the velocity gradient of Ether, there. An important property of Ether is to compromise itself by environment objects. That is, near other cosmos masses, its velocity along fourth dimension is equal to theirs. Now consider Fig. 4 in which two objects having masses m and M with different inherent motions c_1 and c_2 , respectively, floating in Ether such that $c_2 < c_1$. Regarding the Ether property that has equal velocities along fourth direction in the border of objects, so its velocity is a function of r and we have $c^* = c^*(r)$. The superscript “*” is used to show that the velocity component of object m along fourth direction is equal to that of Ether. The radius is defined as $r = |x - x_0|$ and x_0 is the position of M . From Fig. 4 we realize that the warped Ether decomposes the motion of object m in two component as $c_1 = c^* e_w + v_r e_r$. As a result, the variation of $c^*(r)$ is such that at the border of object M we have $c^* = c_2$ and by getting away from that the velocity become uniform in a specified distance. The variation of Ether velocity follows its experimental properties and not the Newton’s law of gravity. To calculate the force in a gravitational field, we know that the acceleration is a function of r because $c = c^*(r)$. Once the object gets into a gravitational field, its velocity along radius is $v_r = \sqrt{c^2 - c^{*2}}$ so it is accelerated. The object is in a velocity field and we can combine $dt = dr/v_r$ and $dt = dv_r/g$ to find $g = v_r dv_r/dr$. This equation can be converted in $g = -c^* dc^*/dr$ by differentiating absolute value of velocity components in Eq. (1) (i.e. $-c^* dc^* = v_r dv_r$). One can achieve the force equation in a gravitational field by inserting the acceleration in Eq. (18) in the following form:

$$F_r = -m c^* dc^*/dr e_r \quad (19)$$

In this equation g is a general law obtaining from Ether properties, while according to general law of Newton’s gravity, a constrained behavior is imposed to Ether since Newton was looking for covering free fall phenomenon by his second law. If we find the governing equation of Ether

behavior, it will be possible to describe g for any arbitrary condition from solution of this equation. However, this equation is not available now, but we know from experimental data that for boundary conditions in the solar system the solution of this equation is the same of Newton's law of gravity. Other boundary conditions demand more analysis.

To verify Eq. (19) we should find $c^*(r)$. Although this is an experimental matter, here we use the results of GR. The reason is that since the GR is verified experimentally, we can coincide our results on those of GR to obtain experimental data. Time in SR and GR is a relative parameter (i.e. local parameter from view point of this theory) while it is absolute here. On the other hand, light speed is a global constant in SR and GR, but a local parameter in this theory because $c^* = c^*(r)$. So, from an experimental point of view we can consider the coefficient resultant of $l = ct$ equal to each other in two theories. It is emphasized that two theories are made by different postulations and nobody is allowed to compare their equations, but it is possible to compare the results by experimental data where both theories should be valid. In the GR this parameter is obtained as following [24]:

$$l = ct(r) = ct\sqrt{1 - (\bar{r}/r)} \quad (20)$$

In Eq. (20) we have $\bar{r} = 2GM/c^2$. The corresponding parameter in the present theory is:

$$l = tc^*(r) \quad (21)$$

The equality of Eq. (20) and (21) from experimental point of view gives the below result:

$$c^*(r) = c\sqrt{1 - (\bar{r}/r)} \quad (22)$$

The next step is to substitute Eq. (22) in (19) which gives the gravity force in solar system:

$$F_r = -\frac{GMm}{r^2} e_r \quad (23)$$

The size contraction of Ether in a gravitational field can be calculated from inserting Eq. (22) in (10):

$$(dr)^2 = \left(\sqrt{1 - (\bar{r}/r)} dR \right)^2 \quad (24)$$

4.2.1 Mercury's orbit

To obtain Mercury's path equation we convert spherical coordinates in polar one by considering $\Theta = \pi/2$. Replacing Eq. (22) in (1) and by considering $v^2 = (dR/dt)^2 + (r d\Phi/dt)^2$, one can find Eq. (1) in the following form:

$$\dot{W}^2 = \dot{W}^2(1 - (\bar{r}/r)) + \dot{R}^2 + r^2 \dot{\Phi}^2 \quad (25)$$

We can conclude from Eq. (24) and (2) that $\dot{W} = (dw/dt)(1 - (\bar{r}/r))^{-1/2}$ and $\dot{R} = (dr/dt)(1 - (\bar{r}/r))^{-1/2}$, in addition the conservation of angular momentum gives $r^2 \dot{\Phi} = r^2 \dot{\varphi} = h$, thus we rewrite Eq. (25) in this form:

$$\dot{r}^2 + \frac{h^2}{r^2} (1 - (\bar{r}/r)) - c^2 \frac{\bar{r}}{r} = 0 \quad (26)$$

In Eq. (25) the light speed far away from gravitational field is \dot{W} and in the position of mass m is \dot{w} . We differentiate Eq. (26) with respect to time and consider the variable $u = 1/r$ to obtain the refined Kepler equation as following:

$$\frac{d^2 u}{d\varphi^2} + u = \frac{GM}{h^2} + \frac{3GM}{c^2} u^2 \quad (27)$$

As can be seen, this equation is exactly the same as that resulted from GR. The value of Light ray deflection is calculable simply using the same manner applied by [24] due to the equivalence of Eq. (22) with that of GR.

4.2.2 Dark energy – Dark matter

As discussed in the gravity section, the general law of Newton's gravity cannot be a global rule for the whole cosmos. According to GR, the distribution of mass-energy is the input of Einstein's field equation and gives the output of space-time how to be warped [24]. On the other hand, in this

theory there is no need to any field equation and everything is explainable by knowing velocity distribution of Ether which can be obtained from the possible governing equation of its motion. Although this equation is not available at the current moment, the behavior of Ether can be estimated by some simple rules experimentally.

A key origin about the motion along fourth dimension, concluded from experimental observations, is that the more mass density of object is increased the more inherent motion is decreased. The Ether itself is a light mass object and its inherent tendency is to move with high velocity. The 3D objects whose mass are restricted to 3D frame, are of high densities and their inherent motion are expected to be lower. Thus we expect the inherent motion of Ether near galaxies to be slowed down but in the space among galaxies its velocity is higher. The more distance from galaxies are increased the more velocity of Ether is increased. This is shown in Fig. 5 in which each black circle represents a galaxy. In the first to third pictures we see that velocity gradient is $dc^*/dr = 0$, $dc^*/dr < 0$ and $dc^*/dr > 0$, respectively. The fourth picture is depicted according to Newton's law of gravity. The prediction of this theory is that the Ether velocity become slowed down as we get closer to the galaxy corresponding to second picture. Thus the galaxies are expected to get away from each other with a positive acceleration without needing to any unknown such as dark energy. In this theory the behavior of galaxies is affected by Ether's motion equation and there is no constraint deduced by mass-energy distribution. Let us call the scale factor as b [32], so the deceleration parameter is represented as $q = -\ddot{b}/\dot{b}^2$ where any expanding universe have a negative decelerating parameter, $q < 0$. The scale factor in this theory is obtained from Eq. (11) such that $b = c^*/c$ where c^* is the velocity of Ether in any arbitrary point of universe and c is its velocity where the length of Ether is standard. As a result, the deceleration parameter is $q = -\ddot{c}^*c^*/\dot{c}^{*2}$. Since c^* and \dot{c}^{*2} are positive numbers, the deceleration parameter is negative if $\ddot{c}^* >$

0. Why the second order derivative of Ether velocity is a positive number, depends on the effective parameters in its motion equation. Although present theory cannot explain it, here we know what we do not know. This is a big achievement in comparison with the view point of GR regarding dark energy, where we know nothing about dark energy.

The same manner can be applied to find the behavior of Ether inside a galaxy. In the center of galaxy there is a black hole whose motion is $c = 0$. Based on GR the space-time is expected to become flat by approaching galaxy border, otherwise the warped space-time is attributed to dark matter. In this theory Ether's motion is zero beside the black hole and in the margin of galaxy the motion is increased continuously since its motion is too fast at the free space outside galaxy. This is shown in Fig. 6 where the first picture is based on present theory results and the second one is representative of Newton's general law of gravity. Thus, this theory forecasts the 3D objects at the margin of galaxies to rotate around the center faster and no need to relate this observation to something like dark matter. There are many numerical data showing the rotational velocity in large distances from center of galaxy must be of $v = cte$ shape, while in the solar system it is $v \propto r^{-1/2}$. The validation of this theory is simply possible because we have an unknown $g(r)$ which can be estimated for any arbitrary experiment by interpolation of points using the velocity-radius graphs. In total it is known that in the solar system we have $g = -GM/r^2$ and it is $g = cte/r$ for large distances from galaxy center.

4.3 Momentum conservation

In this section, the superscript “*” denotes the moving object. This theory predicts for an object to have a momentum with components in four directions. If the object is stationary, its only component of momentum is in the fourth dimension, but for a moving object, using Eq. (1) we have:

$$m^* \vec{c} = m^* \vec{c}^* + m^* \vec{v} \quad (28)$$

Noticing the fact that the momentum variations is equal to the impact inserted to body $\int_{t_0}^{t_1} F dt = m \Delta v$, and by recalling that the applied forces can be effective only in 3D frame, (i.e. $F_w = 0$), so the momentum along the fourth direction is invariant which gives:

$$m \vec{c} = m^* \vec{c}^* \quad (29)$$

From Eq. (29) one achieves the following by combining it with Eq. (2):

$$m^* = \frac{m}{\gamma} \quad (30)$$

5. Results and discussion

A long literature of discussion there has been developed to show the relation of material and motion from philosophical point of view, which is not taken here for abbreviation. The worth mentioning point is that Mulla-Sadra, an eastern philosopher, has proved that motion is an inherent property of material [43] in his theory of substantial motion. The mathematical equivalent statement is that mass m , motion v and inherent time c^* are in fact several aspects of a unite essence, from which the foundation of present theory has been built. To have a better realization about substantial motion of Mulla-Sadra, the author suggests the motion of an unripen apple toward ripening which takes place along fourth dimension. Another conclusion is about nature of inherent time, since it is modeled using a vector rather than a scalar. So, in this theory time is an arrow from past toward future, compatible with our common sense and with the fact that the amount of entropy is being increased continuously. As a result, time as a property of mass is irreversible.

A matter of high importance is the concept of absolute time. We are confronted with a universe, any moment of which is quite different from other moments. The author believes that absolute time is a variable in our mind and should be considered to take into account the variations of universe, just as Newton has made and it is neither a thing nor a property of objects.

Another philosophical aspect here is the concept of location for light. As explained by Eq. (1), motion is an inherent property of mass while in the Newtonian mechanics, firstly we introduce mass, absolute time and location and then the velocity is defined as a second order concept as $v = dX/dt$. Although we have used the same equation in this theory as well, here only mass and absolute time are used as basic concepts and motion is an inherent property of mass. In fact, mass and motion cannot be separated from each other. So, the location is a second order concept so that $X = \int v dt$. As a fundamental conclusion, the location is a property for 3D objects for which velocity v is sensible and it cannot be applied for the case of those objects out of 3D frame. A well-known factor to distinguish 3D objects from 4D ones is the concept of rest mass in SR. In other word, any object with a limited speed (the limited speed in SR is equal to light speed, but here is defined by Eq. (1)), is a 3D object. This can be discussed from another point of view, as well. The motion c is an inherent property of mass and depends on mass density. More density of mass leads to lower inherent motion. So, for the case of objects whose density tends to infinity, such as black hole, the inherent motion tends to zero $c = 0$. As a consequence, it is impossible to define time and motion for such a system. On the other hand, for the case of light mass objects when density tends to zero, such as light with no rest mass (according to SR), the inherent motion tends to infinity. Although infinity at the current moment has no physical interpretation, the author interprets it as that the light mass is distributed in 4D and not a certain location. for more clarity of the concept the author suggest a mental experiment in which we have $dW = c dt$ but as the time variation tends zero $\Delta t \rightarrow 0$ the variation of displacement tends to a certain nonzero number $\Delta W \rightarrow k$ because $c \rightarrow \infty$ (see Eq. (8)). Thus, the location is not a useful concept for light. Each photon has a unique identity, so it is particle and its mass is not restricted to 3D frame that is its mass is distributed in four dimensions, so it is wave.

6. Conclusion

In this paper mass and absolute time were employed as two basic concepts to develop a theory based on three postulations. The well-known experimentally verified results of SR and GR were explained in this theory while the problems of dark energy and dark matter were resolved. The philosophical aspects of new theory were stressed at the end and wave-particle duality of light was discussed applying generalized concept of mass in this theory.

Biography:

Mohammad Asadi-Dalir is a researcher in mechanical engineering. His philosophical point of view as well as his willing to write mathematical model for natural systems has affected his findings in theoretical physics and solid mechanics.

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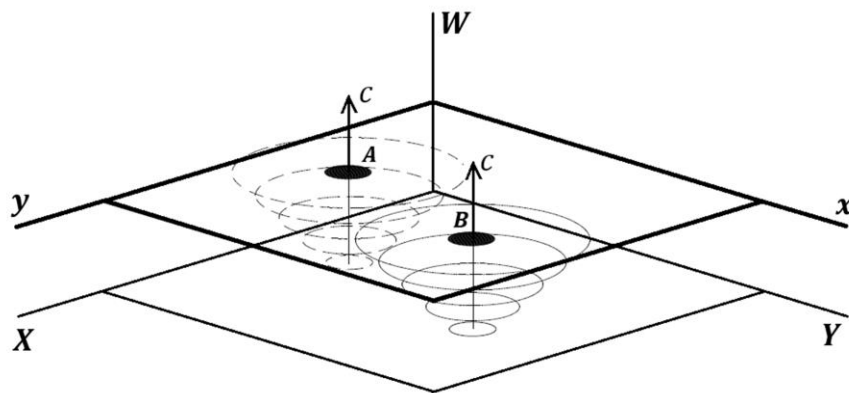


Figure 1. The objects *A* and *B* are in motion along fourth dimension by the velocity *c*.

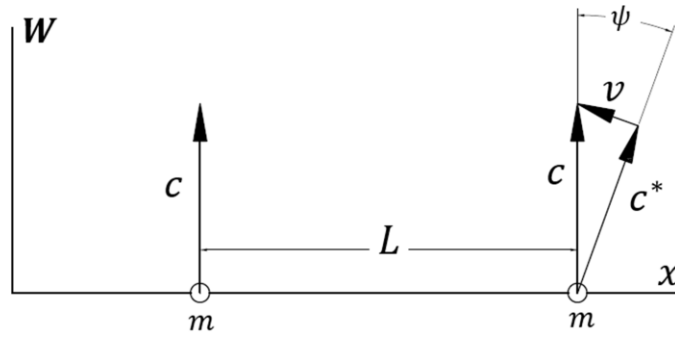


Figure 2. The angle of motion along fourth dimension is deviated for a moving object in comparison with one at rest because the Ether is warped

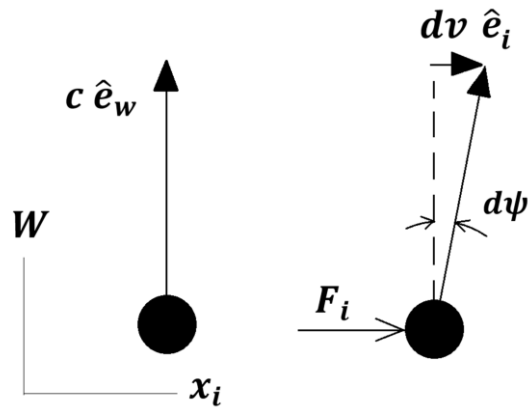


Figure 3. Applying force changes the direction of motion along fourth dimension and changing direction lead to acceleration in the 3D frame

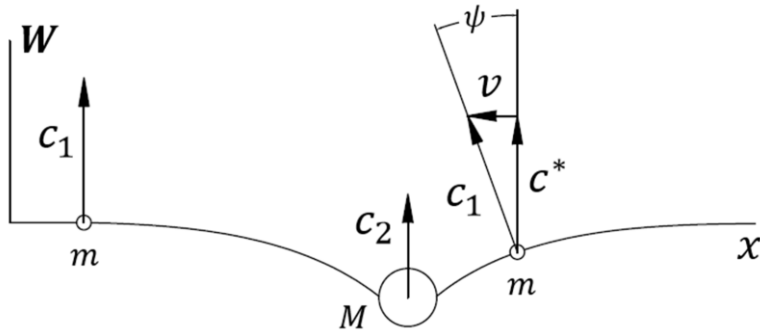


Figure 4. The gradient of Ether velocity near massive objects bends it and this develops a variable velocity field which is known as gravity

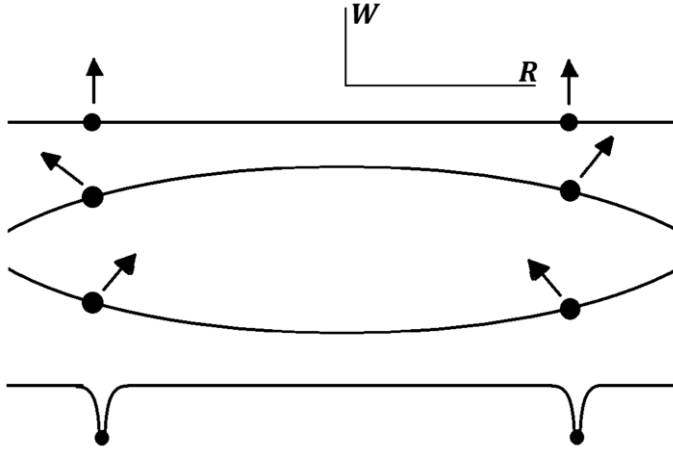


Figure 5. A schematic model of galaxies with different velocity gradients of Ether, which explains their relative acceleration

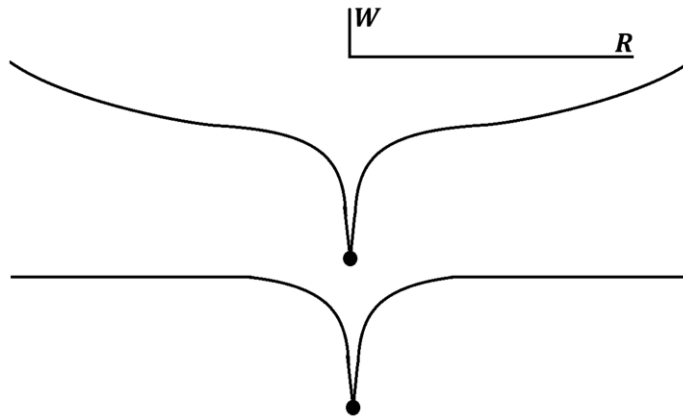


Figure 6. A schematic model of Ether's velocity gradient inside a galaxy. The first picture represents the result of present theory and the second one is based Newton's general law of gravity