Absolute motion from dynamic

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Abstract

Both the mechanic of Newton and Einstein arise of the relativity principle derived of the kinematic of the geometric motion, which in Newton apply to the inertial motion while in Einstein to any motion. The relative geometric motion is the change of coordinates of points in a mathematical spacetime between reference frames; therefore it lacks of physical reality and is illusory. Of other hand, studied by the dynamic, the true motion embraces mass, momentum, kinetic energy and force of material particles and bodies. It is the real motion. The changes of energy, which it produces, enable stablish the absolute motion without need of a preferred frame. In this work we prove the existence of the absolute motion and present a general equation of the speed in the absolute motion.

1. Introduction

The discussion on whether the motion is absolute or relative is very antique. Basically, the question is: Is there a preferred frame or not?

Between the most notable members, of the groups formed by those that responded:

1 Affirmatively, implicating absolute motion that is refereed to a star or a medium in rest, as:

- Aristotle considering the Earth was resting in the center of the universe, therefore, all motion relative to the Earth.

- Huygens with his wave theory of light introduced the aether as medium in rest to its propagation, therefore, all motion relative to it. After, Maxwell when he unified the theories on the light of Faraday with Huygens.

2 Negatively, implicating relative motion referred to any other frame of reference, as:

- Descartes formulating that all motions are relative to one another.

- Leibniz declaring that the motion consists in the changing relations of position between frames of reference without any one frame absolutely at rest.

- Mach said that the motion of a body in itself is senseless, only it can be determined when it is compared with other bodies. Mach formulated the law of inertia in the interactions of bodies, since it is not possible dispense with the rest of the world. A body preserves unchanged direction and velocity with respect to the entire Universe. Mach adduced in opposition to the bucket experiment that if it is referred to the stars then the apparition in the water of centrifugal effects depend whether they are fixed, deleting when they are in rotation. Thus, centrifugal forces arise from relative rotations. [1].

- Einstein generalized the Galilei principle to any accelerated uniform motion, homogeneous gravitational system and rectilinear uniform movement. From Transcendent Einstein Equivalence Principle [2] it obtains that any accelerated system can be considered as an inertial system although located in a gravitational field and this system, in free fall, as an inertial system. All frames are equivalents although in the general case with change of geometry of spacetime [2]; there is no preferred frame, in consequence , there is not aether, "furthermore, space is homogeneous and isotropic, there does not exist any rotational axis of the universe" [3]. Therefore, the inertial motion, accelerated motion and gravitational motion are relative states, i.e., simple effects of the change of coordinates, as if acceleration, gravity and inertial motion did not really exist [2].

3 Affirmatively but only it is cognoscible the relative motion as: Galileo arguing the relative motion can be only observed but to fix it, it is required also absolute motion. Newton with his equations described relative motion of Galileo's kinematics. Kant with the handedness problem reinforced the Newton´s bucket experiment that it leads to the absolute distinction between left-handed/right-handed while in Newton between rotating/non-rotating; they are not understandable as relational difference. The inertia law in Galileo was referred to the Earth supposed to be at rest while in Newton was referred to the absolute space.

Away of the philosophical and physical discussion the absolute motion had been proved:

“The preferred frames defined by the Robertson-Walker metric, the Hubble effect, and the cosmic microwave background radiation are probably identical. In this case the absolute motion of the Sun was determined by the dipole anisotropy experiments of the cosmic microwave background radiation to be (371 ± 1) km/s” [3].

Too, the author proposed an experiment to stablish the absolute motion respect to the quantum vacuum as frame of the movement, since it has a physical reality, which allows test the absolute motion, by the Doppler Effect induced by means of a decelerator of photons, affecting an electromagnetic wave in the direction of the motion of an inertial system. This Doppler does not exist in the nature because the source of the electromagnetic wave is in rest respect to system. But, in each cycle, due to which the wave propagates inside the decelerator, the speed of the system combined with the speed of the wave, respect to vacuum, provokes the induced Doppler. The expected result is that an observer, inside an inertial system, fully insulated from the outside, may determine whether his system is in rest or in motion and measure its speed, in absolute terms [4].

However, yet the relativists say that the relative motion is valid locally.

In this work, we prove that in any case the motion is absolute. We prove that it is locally possible establish whether a frame is really in motion. Also, we prove that in any frame of reference taken itself it is possible measure its absolute speed.

2. The mechanic

The mechanic is the branch of the physics that study the motion according to the intrinsic, material attributes of the mass, energy and force in the spacetime external condition. It is subdivided into:

- Kinematics on the geometric motion, modeling it in abstract geometrically as points according position in the spacetime, velocity as rate of change of position in a determined direction, whereas speed is only the magnitude and acceleration as rate of change of velocity.

Kinematics refers truly to the geometry of the motion in the mathematical representation of spacetime modeling as Galilean, Minkowskian or Semi-Riemannian (Lorentzian) spacetime.

- Dynamics on the material motion, modeling it physically through of mathematic as the motion of material particles and their aggregates (bodies) with the physical properties of the mass, momentum, energy and force.

- Statics on the force without changes in motion, mass or energy.

In Newton and in the Relativity theory the concept of motion is elaborated only from kinematics. Whereas in Galilei-Newton the inertial motion is an effect of coordinates in Relativity the inertial motion, accelerated motion and gravitational motion are relative states. Therefore, every motion is considered only as a relative motion, i.e. simple effect of change of coordinates, in the general case, with change of geometry when it passes between flat and curve spacetime, in a geometric mathematical spacetime according to the subjective perception of observers from some frame of reference respect other. The geometric motion is illusory resulting equivalent to no motion [2]. “A conviction, on grounds of epistemology or metaphysics or both, that motion is can be nothing but the observable changes of relations among bodies” [5].

In General Relativity the geometry of the spacetime is absolute since a Minkowski spacetime is not possible transform in a Lorentzian spacetime through of change of coordinates, neither contrary. However, it is impossible stablish the absolute motion, which would be with respect to absolute spacetime [6], since it would be required the translation of a body from one absolute place into another while translation of a body from one relative place into another is the relative motion. Newton believed in the existence of the absolute motion although he declared as only possible prove relative motion [7].

Relative space is space measured relative to perceptible bodies and relative time is time measured relative to some perceptible motion [6]. Though they take both, the motion it describes geometrically referring to a coordinate system. Thus, spacetime is a mathematical model that combined space and time, that in philosophy, science and physics it is still an enigma [8] because “We really do not know what spacetime” [9]. “The proponents of General Relativity believe space is non-physical and describe the dynamic activity of space by employing the term geometro-dynamics, thereby underscoring the fact that Einstein’s space is a mathematical construct —a 4-dimensional geometrized space-time. The foundation of general relativity is a four coordinate mathematical space” [10]. “Space and time are philosophically suspect theoretical entities, based on an illegitimate “inference to the best explanation” [5].

The philosophical theories supported by the mathematical model, $G_{\mu\nu} = kT_{\mu\nu}$, of the General Relativity are strictly restricted to:

- To dualistic idealist substantivalism, spacetime is a metaphysical fundamental entity, i.e., an entity immaterial whose curvature is the static gravitational field, i.e., a geometric property of spacetime; therefore spacetime and gravitational field are nothing.

- To idealist relationalism, spacetime is a thinking category that expresses metric relations codified in the static gravitational static field, which is a geometric field; therefore they are nothing.

The other theories that endow of materiality to spacetime or to gravitational field require of a mathematical model of the form $G_{\mu\nu} = k(T_{\mu\nu} + t_{\mu\nu})$, proper of the Entwurf theory previous to General Relativity. Let's remember that the Einstein equations of General Relativity are without the term $t_{\mu\nu}$.

- To monistic materialist substantivalism, spacetime is a special substance belonging to material substances whose curvature is the static gravitational field, i.e., a geometric property of material spacetime; therefore gravitational static field is nothing as in Schaffer, 2009; Turishev, 2011; Worden, 2012 and Delplace, 2014.

- To materialist relationalism, spacetime is a thinking category that expresses metric relations codified in the gravitational field, which is a dynamic material field; therefore spacetime is nothing, as indirectly in Lorentz, 1916; Weyl, 1918; Eddington, 1920 due to that they considered $g_{\mu\nu}$ generated by the relativistic aether and directly in Cala, 2006; Bain, 2014, etc., due to that they do not differentiate between the static gravitational field of the metric tensor and the dynamic gravitational field that would be of the energy-momentum tensor.

Of other hand, to the author the spacetime is the geometric structural form of the dynamic matter [11], therefore spacetime are not conditions of existence of the matter but geometric properties of it, because any real thing, in the Universe, have dynamic existence with spatial properties and as process with temporal duration.

3. General considerations to elaborate a concept of the material motion

The current definition of motion in geometric terms is a fictitious concept since it does not correspond to the material motion comprising mass, momentum, energy and force. Thus, it must be defined by dynamic. Contrarily to kinematics the motion as material phenomenon must be absolute, considered itself, without need of a preferred frame of reference, since momentum and kinetic energy change in function of speed. If in the universe exist particles or bodies at absolute rest then they must lack of momentum and kinetic energy. Too, particles or bodies animated of different speeds they must have different momentum and kinetic energy. Through of the inertia in function of mass and speed will be possible calculate absolute speeds.

With the objective of find the equation of the absolute speed it presents the definitions of the intervenient variables according to Newtonian mechanic and their revision in the relativist mechanic.

a) Mass

Mass is the intrinsic property of the material particles or bodies of resistance to a change in its state of motion as consequence of the action of an interactive force on them.

According standard model theory, the generation of the mass of the elementary particles is through of the scalar Higgs boson with spin zero, without mediate in gauge interactions. It couples to elementary particles proportionally to their masses excluding directly to photons and gluons since would lack mass. “However, couplings can be induced in an indirect way through quantum fluctuations during Heisenberg’s uncertainty lapse, the Higgs boson can emit pairs of very heavy particles (such as top quarks for instance) and immediately absorb them; but these virtual particles can, in the meantime, emit photons or gluons” [12].

The mass of the elementary particles is constant, that is, during the time that the particles exist, their mass is the same and, therefore, the mass of the bodies is constant.

The mass is measured choosing one amount of mass as standard, S, and then any mass (X) is the ratio of the mass (X), to mass(S), i.e. in units of mass(S). The international prototype of the mass is kilogram in the system meter-kilogram-second or the gram in the system centimeter-gram-second [13].

In the Special Relativity the motion in spacetime leads to consider inertial mass as a general property shared by all forms of energy. "The law of inertial motion reflects the underlying symmetries of spacetime" [14]. Also, the equivalence between energy and mass from Energy = mass x c^2 led to distinguish between rest mass invariant in the transformations of reference frames and relativistic mass depending of the velocity of the observers. In Modern Relativity is considered a mistake because only is possible physically mass of magnitude constant and invariant. However, other as the recognized physicists Philip Gibbs (1997), Jim Carr (1998) and Don Koks (2012) manifest that relativistic mass continues being useful.

But, in the General Relativity the material systems with mass require have mass-energy-momentum density tensor $T_{\mu\nu}$ (energy tensor) associated with them. $T_{\mu\nu}$ is not an intrinsic property of matter due to that the metric field $g_{\mu\nu}$ is fundamental in obtain the energy tensor. "Since $g_{\mu\nu}$ represents the geometry of spacetime itself, the properties of mass, stress, energy and momentum should not be seen as intrinsic properties of matter, but as relational properties that material systems have only in virtue of their relation to spacetime structure" [15].

b) Energy

The energy is the capacity to doing work which in the mechanic the work done is force by distance manifesting in:

- Potential energy as energy of position inside a force field which in its absence it does not exist.

- Kinetic energy as the energy of motion that a particle or body has at a given point in spacetime. Kinetic energy = ½ mass x velocity². In Special Relativity is $E_k = mc^2 + \frac{1}{2} m v^2$

Mechanical energy is the sum of the kinetic and potential energy.

c) Force

The force is always result of an interaction, associated with the particles or their aggregates (bodies), still they are in motion, always in the same direction as the velocity, changing when the velocity is changing and it is cero when the particles or bodies are in rest [16].

d) Dynamic according to Newton's laws of motion [7].

1 Everybody perseveres in its state of rest, or of uniform motion in a right line, except insofar as it is compelled to change its state by the action of a force. Too, it is valid in Relativity.

2 The alteration of motion is ever proportional to the acting force; in the direction of the right line in which that force is impressed, i.e., change of the momentum = mass x velocity,

$p = mv$

therefore, force = mass x acceleration,

$f=ma$

The law isn't correct if relative motion is used. That's why Newton introduced absolute motion.

In Relativity, this law is valid if it takes rest mass and uses the relativistic momentum.

In the Special Relativity for a massive particle or body, the four-momentum, p^μ, is invariant mass, m, multiplied by the four-velocity, v^μ,

$p^\mu = mv^\mu$

where v^μ is the relativistic velocity = γ (x^μ / t) at each axis of spacetime, therefore, (v^0, v^1, v^2, v^3) = γ (c, v^i) and x is distance, t is time, i is (1, 2, 3), γ is the Lorentz factor (associated with the speed v) since mechanical work increases mechanical energy being impossible reach speed c in relativity, therefore, to bodies is only possible speed (0, <c), c is the speed of electromagnetic wave at vacuum,

$$\gamma = \frac{1}{\sqrt{1-\frac{v_i^2}{c^2}}}$$

So, $force^\mu = \partial p^\mu / \partial t$, i.e., $force^\mu$ = rest mass x $acceleration^\mu$

In the General Relativity for a massive particle or body, the four-momentum is a four-vector defined in a local coordinate frame, so: p^μ, is time-like $g_{00}(P^0)^2$ more spacetime-like $g_{0i}P^0P^i$ more space-like $g_{ij}P^iP^j$, therefore:

$$g_{00}(P^0)^2 + 2g_{0i}P^0P^i + g_{ij}P^iP^j = (mc)^2 \quad i,j = (1, 2, 3)$$

General Relativity currently is their equations, moreover gravity as the geometric tensor without its generator from energy tensor lacks of physical reality [17].

3 To every action there is always opposed an equal reaction; or the mutual actions of two particles or bodies upon each other are always equal, and directed to contrary parts.

In Relativity this law does not apply between references frames in relative motion due to the relativity of simultaneity, so observers would see those forces applied at different times.

“In particular the first law gives a criterion to find out whether an unbalanced force acts on the body or not. The second law, while giving us the unit of force also gives the quantitative measure of the unbalanced force. But still they both do not tell us anything about the physical cause of the force. The third law tells us that the force is a result of interaction” [16].

4. Stablishing absolute motion

Particles and bodies in motion have momentum, kinetic energy and, undoubtedly, its inertia increasing with velocity, tested on particle accelerators.

Einstein in "The evolution of physics" wrote: "A body at rest has mass but no kinetic energy, that is, energy of motion. A moving body has both mass and kinetic energy. It resists change of velocity more strongly than the resting body. It seems as though the kinetic energy of the moving body increases its resistance. If two bodies have the same rest mass, the one with the greater kinetic energy resists the action of an external force more strongly" [18]. How? We do not know yet.

Therefore, it will be used the relativistic equation:

$\text{force}^{\mu} = \text{mass}\ \gamma\ \text{acceleration}^{\mu}$

If previous equation it applies to one-dimension, for example, a body moves in the x-direction, subject to a force in the x-direction then it obtains the simplified expression:

force = mass γ acceleration where γ is the Lorentz factor,

$f = m\gamma a$

From previous equation it can obtain the relative speed of a body, for example, in the earth's frame, at some particular instant, a body is in relative rest. A moment later the body will be in motion by the action of a force.

Assumptions:

It is included only the increment of the inertia on the inertia of the mass of the body as due to the speed of the reference frame.

- To anybody, in rest relative respect to its frame of reference in rest absolute, subject to the action of a force, due to that its inertia is only determined by its mass, the equation of its relative speed respect to its frame of reference is:

force = mass x acceleration → relative speed of body respect to its reference frame = time x force / mass,

v_b= tf/m

The effect of the augment of the inertia in a reference frame from the speed of the reference frame according to the Lorentz factor for a minimum speed of 29 kilometer/second, as approximately is the speed of translation of the Earth around of the Sun, is of $1x10^{-9}$ since in such case it values is 1,00000000467222, which shall cause a decrease in the speed of anybody set in motion from the relative rest respect that frame, equal to the multiplicative term 0,9999999953. Therefore, the calculated relative speed of body respect to its reference frame in absolute rest must exactly coincide, minimum to nine decimal digits, for test the possible effect of inertia from the speed of reference frame according previous consideration, with the true speed which will be the observed speed. On the contrary the reference frame will be in absolute motion, i.e:

Observed speed of body = tf/m

Else the previous equation will be:

Observed speed of body < tf/m

Due to the composed inertia by the inertia of the mass of the body + the inertia derived of the speed of the reference frame

- To anybody, in rest relative respect to its frame of reference in absolute motion, subject to the action of a force, due to that its inertia is determined by both mass and speed of its frame of reference the equation of its relative speed respect to its frame of reference is:

force = mass γ acceleration

Where in γ: v^2/c^2 and v = speed of the frame of reference

Therefore, the general equation to calculate the speed of the frame of reference is:

$$Speed_{reference\,frame} = c\sqrt{1-\left(\frac{mass\;x\;observed\;speed_{body}}{t\;force}\right)^2}$$

The relative speed of the body respect to reference frame is the observed speed of the body, minimum to nine decimal digits. Mass, time and force the values corresponding to observed speed of the body.

5. Conclusions

According our thesis, the inertia of anybody attached to a reference frame will be in function of both mass of body and absolute speed of its reference frame. So, it will be possible stablish the absolute speed of the reference frame through of set in motion to a body in relative rest respect reference frame.

The foundation of the classic physics arises of the false principle of the relative motion derived of the kinematic which reduces motion to the geometric motion lacking of physical reality.

References

[1] Pisano, Giampaolo. (2013). Absolute vs. Relative Space I,II,III/III: Jodrell Bank Centre for Astrophysics, University of Manchester.

[2] Guillén Gómez, Alfonso León. (2017). In General Relativity, gravity is effect of coordinates with change of geometry of spacetime: ResearchGate

[3] Kuhne, Rainer W. (2002). General Relativity Requires Absolute Space and Time. Lechstr. 63, 38120 Braunschweig, Germany

[4] Guillén Gómez, Alfonso León. (2011). On the Absolute Motion in the Inertial Systems: IJFPS, Vol 3, No 3

[5] DiSalle, Robert. (2016). True motion, relative motion, and universal gravity: Newton's theory of relativity: "The University of Western Ontario" CHPS, University of Colorado

[6] Newton, Isaac. (1999). The Principia: Mathematical Principles of Natural Philosophy. University of California Press. Translation by I. Bernard Cohen and Anne Whitman.

[7] Pisano, Giampaolo. (2013). Absolute vs. Relative Space I/III: Jodrell Bank Centre for Astrophysics, University of Manchester

[8] Lorente, M. (2007). El espacio-tiempo sigue siendo un enigma para la ciencia y la filosofía: Tendencias 21

[9] Odenwald, S. (2015).What happens to the fabric of space-time when an object moves through it near the speed of light?: Gravity Probe B

[10] Ranzan, Conrad. (2005 rev 2009-10). Relativity of Time in the Aether Medium of the DSSU –Absolute Motion and Intrinsic Time: Published on the Cellular Universe

[11] Guillén Gómez, Alfonso León. (2010). Spacetime structural property of matter in movement: Contributed papers, Petrov`s Symposium, pages 101-109, Kazan, Russian Federation

[12] Djouadi, Abdelhak. (2011). The Higgs Mechanism and the Origin of Mass: Fundamental Theories of Physics, Vol 162, Springer Science+Business Media B.V.

[13] Davis, Richard S. (2011). Mass Metrology and the International System of Units (SI): Fundamental Theories of Physics, Vol 162, Springer Science+Business Media B.V.

[14] Lehmkuhl, Dennis. (2008). Mass-Energy-Momentum in General Relativity. Only there because of Spacetime?: Oriel College, Oxford University

[15] Jaekel, Marc-Thierry and Reynaud, Serge. (2011). Mass, Inertia, and Gravitation: Fundamental Theories of Physics, Vol 162, Springer Science+Business Media B.V

[16] Jadhao, V. G. and Parida, B. K. The Concept of Force: Regional Institute of Education, Bhopal, India, Bhubaneswar, India

[17] Guillén Gómez, Alfonso León. (2015). Einstein's gravitation is Einstein-Grossmann's equations: Journal of Advances in Physics. Vol. 11, No. 3

[18] Einstein, Albert and Infeld, Leopold. (2005).The evolution of physics: Cambridge University Press Bentley house, Euston road London, N.W. I