On the absolute motion in the inertial systems

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Abstract

- Relativistic Mechanics states the relativity of the motion. But, the vacuum is the frame of the motion of the bodies. Thus, the motion is absolute like Newton said, since an observer, inside an inertial system, fully insulated from the outside, may determine whether his system is in motion and measure its speed, in absolute terms, by generate inside his system, two orthogonal electromagnetic waves, for detect the Doppler. In its absence he proves that the inertial system is in absolute rest. However, this Doppler in the nature no exists because the source of the wave, in the address of the motion, remains in rest with relation to the observer. But, as is possible that the system is moving, the Doppler it can induce by the use of a Decelerator of Photons of the class of Lene Hau that allows the system can travel with a speed greater than the speed of the electromagnetic wave. Then, since the entry of the wave to the Decelerator and until its output, in each cycle, before that the wave reaches one wavelength, the system moves a greater distance in the vacuum. On the observer, these waves produce a induced Doppler.

Introduction

- The Classical Physics presents the contradiction between the concept of Isaac Newton of the space as a structure containing of the Universe, in absolute rest, by which it would be possible to establish absolute motion of the bodies and the principle of the relativity of Galileo Galilei of the covariance of the laws of the Mechanics, in the inertial systems. Since for an inside observer in an inertial system, completely isolated from the outside, he cannot through mechanical experiments prove the absolute motion, prevails the Galilei´s postulate of the relative motion. However, with the theory of Huygens on the nature of the electromagnetic wave was introduced the aether (there is not aether, exists vacuum, exactly, quantum vacuum) as the mediums of its propagation. Thus, an electromagnetic experiment could establish the absolute motion, since the aether (the vacuum is the perfect replacement for the aether), used as a universal frame, permits to measure absolute speeds.

Introduction

- Since the Earth orbits the Sun through of the aether (actually through of the vacuum), Michelson and Morley tried to measure the absolute speed relative to the stationary aether [1], [2]. In this experiment, using optical interference methods, they found that the speed c, of electromagnetic wave in vacuum, is a universal invariant. To the Classical Mechanic the speed of the electromagnetic wave always must vary: For an aether fixed and an interior observer according the theory on the absolute motion or for the dragged aether and an exterior observer according the theory on the relative motion.

Introduction

- Albert Einstein, in his theory of the Special Relativity, joins the invariance of c with the covariance of Galilee, that he extends to "all laws of nature" [3] (Mechanics and electromagnetism), in the Global Lorentz´s covariance, only applied to inertial systems. Later, in his theory of the General Relativity, Einstein reaches its general covariance (Local Lorentz covariance), where the laws of nature govern in all the systems of reference (Included the gravity, that is modeled by means of an affine connection of a Lorentzian manifold), although only is valid within of an infinitesimal lapse of the space-time at every event (Semi-riemannian metric), using the tangent Minkowskian space [1].

The problem

- It is true that the Michelson-Morley experiment could not prove the absolute motion, since the speed of the electromagnetic wave c is invariant, as for a interior observer as for a exterior observer, with respect to the motion of the source. But as an inertial system can be in moving at the vacuum, it can induce the Doppler, through of a Decelerator of Photons, and prove the absolute motion, as the electromagnetic wave emitted, in the same address of the movement suffers a change of frequency and wavelength with respect to the electromagnetic wave emitted in the perpendicular address. Under that "The vacuum is something because if the vacuum is nothing then the vacuum does not would exist", Aristoteles.

The thought experiment

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- An observer in rest inside an inertial system (according Minkowski´s metric) in the event that his system is moving, his system does not drag (since it tends to 0) the vacuum (we replace the aether by the vacuum). Thus, the observer may determine the state of rest or absolute motion and measure the speed, of his inertial system, by the Doppler Effect of the electromagnetic wave in the address of the motion, generated inside his system, for reach an interior point through of a Decelerator, and know the wavelength λd (first Laser Longitudinal Ray with Doppler since it has component in the direction of the movement). Also, it must generate a perpendicular electromagnetic wave (second Laser Perpendicular Ray without the Doppler since it has no component in the direction of movement, either transversely) to the longitudinal wave, with the object of know the emitted wavelength (λe). Alternatively this experiment can be performed with two longitudinal rays, one subjected to the effect of a Decelerator (with wavelength λd) while the other does not (with wavelength λe).

The thought experiment

- In normal conditions of laboratory (to a distance of few meters), the source and the observer are almost instantly connected through the electromagnetic wave, but with the introduction of the Decelerator the source and the observer move away in direct proportion to the fall of the speed of the wave, while the Decelerator effect lasts, for be connected again almost instantly. Although the source of electromagnetic waves is maintained at rest with respect to the observer, all the time at a constant distance, but as the inertial system can travel in the vacuum at a speed greater than the electromagnetic wave within of Decelerator (there is not Cerenkov radiation as they travel in different mediums), in such case while the wave propagates in the Decelerator exists the process of absorption-emission of its photons, caught from vacuum and delivered to vacuum, by the electrons of the condensed state of Bose-Einstein. This process occurs according the coordinates of space-time of vacuum which change in function to system speed and wave speed. By the induced Doppler, the longitudinal wave will suffer blue shifted due to the increase or red shifted due to the decrease of photons that are arriving to the observer, as result that the inertial system is moving with a speed greater than the speed of the Laser Ray, in its same address and same sense or contrary sense.

The thought experiment

- The absolute speed of the inertial system is measured in relation to the coordinates of an interior point at rest (allocated to the observer). The resulting speed must be: ($v = c (\lambda e / \lambda d - 1)$ or $v = c [(\lambda e / \lambda d)^2 - 1] / [(\lambda e / \lambda d)^2 + 1]$ in the Lorentz case). The two Laser Rays are generated in different time with the same device; therefore they are generated with the same wavelength and frequency. In a time is measured λe of the Laser Perpendicular Ray. And in other time is measured λd of the Laser Longitudinal Ray. The two wavelengths are obtained with High Accuracy Interferometry (Detector instead of observer) where "the yard-stick, that is, the length-scale of the measurement, is the wavelength of light itself". The "measurement accuracy reaches levels smaller than the radius of a hydrogen atom, below 0.5-Å, or 50 picometers, 50 trillionths of a meter." [4] (For example, using EXFO's WA-4550 Pulsed Wavemeter® laser wavelength meter). With the objective of induce the Doppler, between Laser Longitudinal Ray and Detector will be used a Decelerator of Photons (close to stop the photons), according scheme: Source of Laser Longitudinal Ray-Vacuum-Decelerator of Photons-Vacuum-Detector.

The Decelerator of Photons

- For induce the Doppler Effect, it must use a Decelerator of Photons of the class of Lene Hau tuned close to stop the photons. The Decelerator of Photons generates a process of production of Doppler for any speeds of the inertial system greater than the speed of the electromagnetic wave, from its entry and while it propagates in its interior, during a maximum of 1.5 seconds. Due to the motion of the inertial system, in each cycle, before that the electromagnetic wave reaches one wavelength inside of the Decelerator, the inertial system moves in the vacuum to a position advanced of more of one wavelength. On the Detector, the group of electromagnetic waves radiated from different distances of the vacuum produces the Doppler.

Induced Effect Doppler

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- The electromagnetic wave radiated by the source of the Laser Longitudinal Ray, propagates in the vacuum, and enters almost instantly to Decelerator of Photons. In this is reduced its wavelength in equal proportion to fallen of its speed, during a time maximum of 1.5 seconds. Always that the inertial system is in rest, in each cycle, the wave enters to Decelerator at all time (t_1, t_2, t_3…) from the same position (p_1) of vacuum and to the exit, of the Decelerator of Photons, back to vacuum, the wave conserves its frequency and recovers its speed c and also its wavelength, since the coordinates space-time do not change between cycles. Almost instantly the wave enters in the Detector without suffering any shift.

Induced Effect Doppler

- If the inertial system is moving, the near $4.48*10^{14}$ Hz of the electromagnetic wave (for example, Red Laser with λ=670 nm), multiplied by the time during its pass by the Decelerator of Photons (maximum 1.5 seconds) then the wave enters from different positions of vacuum and during its propagation inside of the Decelerator, in each cycle, before that the wave reaches one wavelength, the system, it moves a greater distance, due to that the system moves with a speed (v) > speed of the wave inside of the Decelerator (c´). To the exit of Decelerator of Photons, the electromagnetic wave recuperates its speed c, but it changes its frequency and wavelength, and the wave enters almost instantly to the Detector, where it is detected, like Doppler because the cause of the frequency change are the changes of the coordinates space-time of the wave in the vacuum due to the motion of the system and the wave, according to one of the following two cases:

Induced Effect Doppler

- Case 1: the system (observer) is moving in the contrary sense to wave motion, therefore the system moves to the left according negative positions while wave moves to the right according positive positions. In each cycle, these waves come to the Decelerator, in different time from a different position (p_1t_1, p_2t_2, p_3t_3…). From the instant of entry of the wave to the Decelerator, its total delay (td) according the advance of the inertial system, is equal to the difference of their speeds (wave speed-system speed)* time of the wave at the Decelerator ((c´-v)*t), the delay by cycle (dp) is ((c´-v)* $4.48*10^{-14}$second) and the instantaneous delay (dd/dt) is d((c´-v)*t)/dt. Then critical coordinate p_i is (p_i+n*dp+(dd/dt)), n is the iteration number of cycle propagating inside the decelerator, at entry n=0 to (td/dp) at exit. When the waves enter in the Detector, is detected red shift.

Induced Effect Doppler

- Case 2: the system (observer) in the vacuum is moving in the same sense to wave motion, therefore the system and wave move to the right according positive positions. In each cycle, these wave come to the Decelerator, in different time from a different position (p_1t_1, p_2t_2, p_3t_3…). From the instant of entry of the wave to the Decelerator, its total advance (ta) according the advance of the inertial system, is equal to the sum of their speeds * time of the wave at the Decelerator ((c´+v)*t), the advance by cycle (ap) is ((c´+v)* $4.48*10^{-14}$second) and the instantaneous advance (da/dt) is d((c´+v)*t)/dt. Then critical coordinate p_i is (p_i+n*ap+(da/dt)), at entry n=0 to (ta/ap) at exit. When the waves enter in the Detector, is detected blue shift.

Mathematical demonstrations

- $f_1 = c/\lambda_1$ then $1/f_1 = \lambda_1/c$ is the time of the emission of one wave. Where f_1 is the frequency of the wave in the vacuum, c the speed of the wave in the vacuum and λ_1 is the wavelength in the vacuum.

- $f_2 = c´/\lambda_2$. Where f_2 is the frequency of the wave in the Decelerator of Photons, c´ the speed of the wave in the Decelerator of Photons and λ_2 is the wavelength in the Decelerator of Photons.

- As $f_1 = f_2$ then $s_2 = \lambda_1/c * c´$ is the distance that travels the wave in the Decelerator during the time of emission of one wave in the vacuum.

- $s_3 = \lambda_1/c * v$. Where s_3 is the distance that the inertial system travels in the vacuum during the time of emission of one wave in the vacuum and v is the speed of the inertial system.

- As $v > c´$ then $s_3 > s_2$.

The change of the frequency

- The frame is the vacuum. In an inertial system in movement, a Laser Longitudinal Ray is emitting to a Detector to a fixed distance, in the address of the z coordinate, through of a Decelerator of Photons in rest. Thus, we consider the two cases following:

- Case 1: When the system is moving in the opposite sense of the Laser Longitudinal Ray the photons arrive to the Detector, with the $frequency_2 = frequency_1 * \gamma * (c´-v) / c´$; therefore, the $frequency_2 < frequency_1$ and the energy that arrives to Detector is less than the energy radiated by the Laser that causes the red shift.

- Case 2: When the system is moving in the same sense of the Laser Longitudinal Ray the photons arrive to the Detector, with the $frequency_3 = frequency_1 * \gamma * (c´+v)/c´$; therefore, $frequency_3 > frequency_1$ and the energy that arrives to Detector is greater than the energy radiated by the Laser that causes the blue shift.

- Where: v is speed of the system, c´ is the speed of the wave in the Decelerator and γ is the factor of Lorentz.

A good value for c

- Lene Hau stopped electromagnetic wave during one second and half using a condensate of Bose-Einstein. But, electromagnetic wave do not it must stop since that the equation of frequency it becomes indeterminate. A good value for the speed of electromagnetic wave, in the Decelerator of Photons, can be: 17 meters/second that Lene Hau reached at 1999 [5]. In this case the equation of the $frequency_2 = frequency_1 * \gamma * (17 \text{ meters/second} \pm v) / 17 \text{ meters/second}$ and it can measure speeds > 17 meters/second. Where v is the speed of inertial system, + wave and system travel in same sense and – wave and system travel in contrary sense.

Formulates of the Doppler Effect [6] and the absolute speed

- The Doppler on the longitudinal electromagnetic wave, submitted to Decelerator effect, in the Newton case is:

- $fd = [(c' \pm v) / c'] * fe$
- Where fe is the emitted frequency (Laser Perpendicular Ray), fd is the detected frequency (Laser Longitudinal Ray), v is the absolute velocity of the inertial system in the vacuum, c´ is the speed of the electromagnetic wave in the Decelerator, + if the inertial system and wave travel same sense, - if the inertial system and wave travel contrary sense, Newton case is when the distance between the source and Detector is large relative to the wavelength and v/c tend to 0, Lorentz case v/c tend to 1.

- For the absolute speed: $v = c (fd / fe - 1)$ and $fe = c/ \lambda e$ and $fd = c/ \lambda d$ $\rightarrow$ $v = c (\lambda e / \lambda d - 1)$
- In the Lorentz case is $v = c [(\lambda e / \lambda d)^2 - 1] / [(\lambda e / \lambda d)^2 + 1]$
- Detected wavelength λd and emitted wavelength λe are obtained by interferometry in the Detector

Conclusions

- The motion is absolute (thus it proves the Doppler Effect on the longitudinal electromagnetic wave between two perpendicular electromagnetic waves).
- There is a privileged frame motion: The vacuum (the vacuum is real, aether is fictitious).
- The equivalence between rest and rectilinear uniform motion does not exist.

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