Dual and dynamic nature of space - space is both absolute and relative- absolute motion without absolute space

The laws and phenomena of nature (physics) depend on the (absolute) velocity of physical systems themselves and are independent of any motion of the observer or reference frames.
Galileo's invariance principle holds only in steady state condition where as absolute motion applies in all conditions (steady state and non steady state).

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Abstract

Space (or motion) has dual properties: absolute and relative. The change from absolute nature to relative nature (or vice versa) is governed by dynamic nature of space. Absolute motion is absolute and has no connection with relative motion. Absolute motion is evident only from the changes in the laws and phenomena of nature (physics). Absolute motion is relative to a dynamic absolute reference frame, but this reference frame itself depends on absolute motion! The laws and phenomena of nature (physics) exist in their simplest forms in physical systems that are at absolute rest and become distorted / transformed in physical systems that are in absolute motion. The behavior of physical systems (such as Michelson - Morley's apparatus) can be predicted correctly only in their associated dynamic absolute reference frames. The laws and phenomena of nature (physics) depend on the absolute motion of physical systems.
The relative speed of the observer or (inertial) reference frame is irrelevant in determining the laws and phenomena of physics, and this is in accordance with Galilean invariance principle (and Einstein's two postulates).Only (absolute) motion of a physical system itself has significance. A physical system is affected by its own absolute motion and not by its motion relative motion or by the motion of an observer. In steady state, the speed of light is always equal to C, independent of the speed of the source and of the speed of the observer, in accordance with Einstein's light postulate. However, the speed of light is equal to $C\pm V_{abs}$ in non-inertial conditions, in the imaginary dynamic absolute reference frame [1], where V_{abs} is the absolute velocity of the physical system (such as MM device).
The speed of the light beam in the MM device is the same C for all other inertial detectors (observers) but the speed of the same light beam is $C\pm V_{abs}$ for the detector in the MM device. This can be explained by the dual property hypothesis: space is both absolute and relative. The behavior (fringe shift) of the MM device depends only on its own (absolute) velocity and any relative velocity of the device is irrelevant in determining the fringe shift. The behavior of physical systems (such as MM device) can be predicted correctly in the associated dynamic absolute reference frame (in all conditions, steady state or non-steady state). At steady state, the absolute velocity of the MM device is zero.
Galileo's invariance principle holds only in steady state condition. But then how else can the speed of light be the same for two observers that are in relative motion, other than the length contraction time dilation hypothesis? The theory 'Relativity of Electromagnetic Fields' [2] proposed by the present author explains this. The absolute motion of Michelson-Morley device (and hence its behavior, i.e. fringe shift) has no connection with any relative motion of the device (relative to the sun or relative to an observer's reference frame). Absolute motion of the

Michelson-Morley (MM) device is evident only from a fringe shift and can be predicted only in the imaginary dynamic absolute reference frame, but this reference frame itself depends on absolute motion of the device! The unexpected null fringe shift only shows that the absolute velocity of the MM device is zero and not invalidity of absolute motion. This theory has the potential to explain and reconcile the results of many of the experiments and phenomena associated with the nature of the speed of light including the Michelson Morley experiment, Sagnac effect, Stellar aberration, 'GPS corrections': slow down or speed up of clocks may be connected with absolute motion and experiments confirming the source speed independence of the speed of light. This theory might also be applied to better understand planetary systems, such phenomena as 'elliptic' orbits and Mercury perihelion advance. Mercury perihelion advance and elliptic orbits may be affected by absolute motion of the solar system. This theory reconciles the ever existing notion of absolute motion with Galilean invariance principle and Einstein's two postulates.
This theory gives a hint on consciousness! A paradox in this theory can be resolved if parts of a physical system 'know' that they are parts of the system! Physical systems may have 'consciousness'! The notion of absolute motion gives hint on the mystery of consciousness!

Introduction

The notion of absolute motion existed for centuries since the time of Newton. Despite Galileo's and Einstein's relativity, the notion of absolute motion always had intuitive base and experimental evidences, such as the Sagnac effect. However, its true meaning has been hidden for centuries although its existence has always been perceived intuitively.
Whenever one starts to think about absolute motion, a question arises automatically: 'relative to what?'
This (wrong) question has been the source of confusion for centuries. Newton at best thought of absolute motion as *relative* to distant stars and obviously he would always be in doubt with this. The ether theory, which prevailed during the nineteenth century, was developed in an attempt to better understand absolute motion. However, there has been no theory that explained the meaning of absolute motion which truly satisfied anyone who thought about it.
The discovery of Maxwell's equations revealed a constant (C) speed of light and this brought the ever existing problem of absolute motion to the fore front of physics. The response of the scientific community was again ' *relative* to what?' Then, in the second half of the nineteenth century, one of the most brilliant experiments, the Michelson-Morley (MM) experiment, unexpectedly confirmed the absence of the ether. The unexpected null fringe shift of the MM experiment brought the problem of absolute motion to its climax. Thus, the inability to comprehend absolute motion together with the unexpected result of MM experiment (and the Genius of Einstein) created a sufficient condition for the revolution in physics that took place at the beginning of the twentieth century: the special theory of relativity. Einstein then had sufficient reason to deny the notion of absolute motion altogether. Although Einstein revolutionized our understanding of one aspect of the universe (relativity), his rejection of the notion of absolute motion resulted in a wrong theory: length contraction and time dilation.

In the next section the dual and dynamic nature of space and the universe will be discussed. The same ideas may have been repeated in slightly different ways to emphasize the core ideas of the theory.

Discussion

We learn about motion from our everyday lives and we have always experienced that an object that is moving is in motion relative to other objects. Thus when we started thinking about (absolute) motion as a scientific problem, we instinctively tried to understand it within the framework of our knowledge about relative motion: 'relative to what?'. The ether theory was a result of this.

The word 'absolute' has a special meaning in philosophy and religion. 'Absolute' means absolute. Absolute motion is not defined relative to any physical object or hypothetical matter (the ether). However, we can think of absolute motion as motion relative to some dynamic, imaginary absolute reference frame[1]. Absolute motion is relative to a dynamic absolute reference frame but this reference frame itself depends on absolute motion!

All ideas that are based on some common medium (ether or absolute space) have been conceptually tested exhaustively and were unable to reconcile the many experiments and phenomena regarding the speed of light and the notions of absolute motion and relativity. This resulted in a new discovery which is promising to solve many problems: there is no ether or absolute space at all; however, absolute motion exists even if absolute space doesn't; this means that physical systems behave as if they are moving in absolute space where there is no such absolute space. This can be restated as : dual and dynamic nature of space.

Space / motion has dual properties: absolute and relative. The change from absolute nature to relative nature (or vice versa) is governed by dynamic nature of space. The co-existence of absolute and relative natures of space may be understood as: space is relative (or nothing / empty) but in some cases it acts as if it is absolute. In other words this means: 'absolute motion without absolute space'. Space is empty but in some cases acts as if it is absolute. Absolute space (or the ether) does not exist, but absolute motion exists.

Absolute motion is absolute and has no connection with relative motion. This may be restated as: Two objects may be at rest relative to each other but may have different absolute velocities or may be in motion relative to each other and yet may have the same absolute velocities. Absolute motion is relative to an imaginary (dynamic) absolute reference frame associated with every physical object or physical system in the universe. There is no universal static absolute reference frame.

Absolute motion arises from acceleration or rotation of physical objects or systems. Rotational motion is always absolute and hence static. Absolute translational motion is dynamic.

Absolute motion is evident only from the changes in the laws and phenomena of nature (physics). The laws and phenomena of nature (physics) exist in their simplest forms in physical systems that are at absolute rest and become distorted / transformed in physical systems that are in absolute motion.

A physical system is in absolute motion in non-steady state (non-inertial) conditions. A physical system is in inertial (steady state) condition if it has been in uniform rectilinear motion for a long enough time [1].

The behavior of physical systems (such as Michelson - Morley's apparatus) can be predicted correctly only in their associated dynamic absolute reference frames (both in steady state and non-steady state conditions). But this reference frame itself depends on the absolute motion the

physical system/object. Hence absolute motion is evident only by observing changes in the laws and phenomena of physics. And it may be predicted based on the history of motion (acceleration) of the object/system.

Galilean invariance principle (and Einstein's two postulates) applies correctly only in steady state conditions. In steady state condition, the MM device can be considered to be at rest and this can explain the null result. But in non-steady state conditions, the MM device will show a fringe shift (this hypothesis is yet to be tested experimentally) even in a uniform rectilinear motion of the device and this cannot be explained by Galileo's invariance principle (and Einstein's postulates). This can only be explained by the new theory : dual and dynamic nature of absolute motion.

Thus Galileo's invariance principle should be restated as:

the laws of physics are the same in all inertial reference frames *in steady state condition*.

According to the notion of absolute motion that existed for centuries, there is a common medium in the universe with respect to which absolute motion of all objects is determined and measured. With this view, there is always a connection between absolute motion and relative motion and no two objects that are in relative motion would have the same absolute velocity and two objects that are at rest relative to each other would share the same absolute velocity. This view has always been the basis for arguments in favor of or against absolute motion.

According to the new theory proposed in this paper, two objects share the same (or related/ connected) absolute velocity only if their motions are connected systematically. Absolute motion arises from acceleration or rotation of physical objects and systems. There is no common medium (the ether) at all. For example, a light source and a detector both fixed to a space shuttle are part of the same source-detector system. Therefore, both share this same absolute velocity at all times. A second detector that just happened to be at rest relative to the space shuttle but not fixed to it has an independent motion and its absolute velocity is not connected with any motion of the space shuttle and hence would have its own absolute velocity that depends only on its own (history of) accelerations. Thus, even if the two detectors are at rest relative to each other, there is no connection between their absolute velocities. There is no common medium for the two detectors.

Galileo's invariance principle holds only in steady state condition. But then how else can the speed of light be the same for two observers that are in relative motion, other than by the 'length contraction time dilation' hypothesis? The theory 'Relativity of Electromagnetic Fields' [2] proposed by the present author can explain this.

Absolute motion arises from acceleration or rotation. This has been explained in the theory of 'Dynamic Absolute Space' proposed earlier by the present author [1]. The MM device has to be accelerated in order to develop an (dynamic) absolute velocity (and hence a fringe shift). The absolute motion of Michelson-Morley device (and hence its behavior, i.e. fringe shift) has no connection with any relative motion of the device (relative to the sun or relative to an observer's reference frame). Absolute motion of the Michelson-Morley (MM) device depends only on its own (history of) acceleration and is evident only from a fringe shift.

The unexpected null fringe shift shows that the absolute velocity of the MM device is nearly zero and not the invalidity of absolute motion.

Imagine a light source S and an observer O that are inside a space shuttle moving in space, both stationary in the rest frame of the space shuttle. Suppose that the space shuttle is accelerating or has just stopped accelerating. Hence it would acquire an absolute velocity, according to the theory of 'Dynamic Absolute Space' [1] proposed earlier by the present author. As the space shuttle, the source S and observer O all are moving as a system (their motions are connected), they will have the same absolute velocities V_{abs}, as all have the same and connected accelerations or history of motions at all times. Thus O will measure the speed of light to be $C\pm V_{abs}$ because O is moving with absolute velocity V_{abs} in the dynamic absolute reference frame and the speed of light is equal to C in that absolute frame. The effect of the absolute velocity of O is not only on the speed of light ($C\pm V_{abs}$) but also on the behavior of O himself/herself. Perhaps the biological processes of O may change. The absolute velocity of S (V_{abs}) will also have effect on S itself : the speed of light from S becomes anisotropic.

If O is moving with constant velocity in the rest frame of the space shuttle, this will have no effect on the absolute velocities of O and hence no change to the speed of light measured by O ($C\pm V_{abs}$) and the behavior of O (biological processes) will remain to be the same. If S is also moving with constant velocity in the rest frame of the space shuttle, this will have no additional effect on the anisotropy of light from S. Note that the above statements are true only in steady state conditions. i.e. not only constant velocity but also O and S must have been in this state for a long enough time.

If O is accelerating in the rest frame of the space shuttle, his total absolute velocity would be $V_{abs} \pm V_{abs1}$, where V_{abs} is due to the absolute motion of the space shuttle (that resulted from acceleration of the space shuttle) and V_{abs1} is the additional absolute velocity that resulted from the additional acceleration of O in the rest frame of the space shuttle. One distinction of the new theory is this: the speed of light measured by O in this case is still $C\pm V_{abs}$ and it will not be affected by the additional V_{abs1} because V_{abs1} is independent of (or has no connection with) the motion of the space shuttle. The effect of V_{abs1} is to change the behavior of O herself (perhaps her biological processes). The change in the biological process of O is irrelevant to the speed of light measured by her. If S is accelerating in the rest frame of the space shuttle, the anisotropy of the speed of light from S will be increased additionally.

The speed of light measured by O ($C\pm V_{abs}$) will depend only on the absolute motion of the space shuttle (source-observer system). The space shuttle, the observer and the source will share this same absolute velocity, V_{abs}. Any additional absolute velocity of the observer or the source (V_{abs1}) that resulted from acceleration of O (or S) in the rest frame of the space shuttle affects only the behavior of O (or S) themselves and is irrelevant to the sped of light measured by O.

If the space shuttle is at absolute rest (i.e zero absolute velocity), all observers in the space shuttle will measure the speed of light to be equal to C, irrespective of their velocities in the rest frame of the space shuttle. If the space shuttle is moving with absolute velocity V_{abs} , then all observers in the space shuttle will measure the speed of light to be $C\pm V_{abs}$ (depending on whether the observer is ahead or behind the source as seen in the direction of absolute velocity of the space shuttle), irrespective of their velocity in the rest frame of the space shuttle.

Let us repeat the above discussion in a slightly different way to further clarify the new theory:

Imagine a light source 'S' and three observers 'O', 'P' and 'Q'. Imagine that observer O and the light source S are in a space shuttle moving in space and that they are placed in line in the direction of the velocity of the space shuttle and suppose that both O and S are at rest relative to the space shuttle. Suppose that the space shuttle has just stopped accelerating and hence would have developed an absolute velocity according to the theory of 'Dynamic Absolute Space' [1] proposed earlier by the present author. Thus O and S will share this same absolute velocity because their motions are always connected with the motion of the space shuttle.

Assume that observer P and observer Q are not in the space shuttle but P just happened to be at rest relative to it and Q is in motion relative to the space shuttle. What velocity of light would the three observers measure? Observer Q would measure C (in accordance with the light postulate). Observer P also would measure C, again in accordance with the light postulate. But observer O would measure the speed of light to be $C \pm V_{abs}$, where V_{abs} is the absolute velocity of the space shuttle, observer O and S. If observer O is in front of the light source S as seen in the direction of the velocity of the space shuttle, observer O would measure $C - V_{abs}$ and would measure $C + V_{abs}$ if O is behind the source. Thus, although both O and P are at rest in the reference frame of the space shuttle, they would measure different or independent velocities of light!

But why does O measure $C \pm V_{abs}$? This is because O is part of a space shuttle-source-observer system that is in absolute motion (O and S are on the space shuttle and always share the motion of the space shuttle). Although P just happened to be at rest relative to (or moving together with) the space shuttle, it has independent motion as its motion has no systematic connection with the motion of the space shuttle. P will have his own independent absolute motion (and absolute reference frame) and his (absolute) velocity in this reference frame doesn't affect the speed of the light (C) from S measured by him.

The absolute velocity of an observer affects the speed of light measured by her only if the motions of the source and the observer are connected (say both are inside a space shuttle that is in absolute motion).

O and P will measure the same speed of light C only in inertial (steady state) condition, i.e when the space shuttle has lost its absolute velocity.

The absolute velocity of O in the absolute reference frame of the system (space shuttle-source-observer system) not only affects the speed of light measured by O but also affects observer O herself, say by changing her biological processes; absolute motion has real effect. The speed of light measured by O is a behavior of the source-observer system where as the anisotropy of the speed of light from source S or the change of biological processes of the observer O are the behaviors of the source and the observer, respectively.

The above discussion can be applied to an MM device containing the detector 'D' of the MM device , the light source 'S' of the MM device and another detector 'd' that is just at rest relative to the device but whose motion has no systematic connection with the motion of the MM device.

The behavior of a physical system can be predicted correctly only in its own dynamic absolute reference frame. Thus the MM device will have its own dynamic absolute reference frame. No

two separate and independent physical systems (that have no systematic connection between their motions) can have the same absolute reference frame. Two physical systems (sub systems) have the same absolute reference frame only if their motions have systematic connection. In this sense, a source is a (sub) system itself and so is an observer. If a source and an observer are on a space shuttle, all phenomena regarding the speed of light in this system will be analyzed in the absolute reference frame of the system and all the parts of this system will also share absolute velocity as the system. Note that, as discussed previously, the source (and the observer) may have additional independent absolute velocity of its own in another absolute frame, but these do not affect the behavior of the source-observer system.

The MM and Sagnac's experiments are concerned with the behavior of a system (MM device and Sagnac device respectively), and hence should be analyzed in their own (dynamic) absolute reference frames. In the phenomena of stellar aberration, there is no source -observer (star-earth) system. Stellar aberration is explained by the finite speed of light (in the reference frame of the star) and by light time correction (in the reference frame of the observer).

The appropriate (preferred) reference frame to correctly predict the fringe shift in Sagnac's effect is the non-rotating reference frame centered on the rotational center of the device (for simplicity). (Of course, the fringe shift can be predicted correctly in any inertial frame). The fringe shift is due to the difference in path length of the two beams, which resulted from (absolute) rotation of the device. There is no absolute space or ether but the Sagnac device behaves as if there is absolute space. Therefore, it should also be possible to observe a linear (translational) Sagnac effect with a linear Sagnac device that is in absolute translational motion since what matters is only the difference in path length, with a source placed between and in line with two detectors, one in the forward and the other in the back ward directions. A difference in the time delay of detecting the light pulse by the two detectors will confirm absolute translational motion of the linear Sagnac effect (fringe shift is not possible because the two beams are not going in a closed path so it is not possible to bring them to the same point. Or fringe shifts may be observed if there is a sufficiently stable and coherent reference light source, so that change in phase difference that arises from change in time delay may be observed as a change in fringe shift). However, the linear Sagnac device will have a dynamic behavior, i.e. fringe shift gradually decays to zero if the device stops accelerating.

Imagine a Sagnac device encompassing the orbit of the earth around the sun with the source and detector parts on the earth and the mirrors located at appropriate points in the orbit and suppose that the gigantic device is rotating. Assume that the detector in the gigantic Sagnac device is also part of an MM device that is meant to detect the absolute motion of the earth. Thus a paradox arises: the same detector, as part of the Sagnac device is in absolute motion but is (nearly) at absolute rest as part of the MM device. This is one of the series of reasonings that led to the discovery of the present theory: absolute space (as it is known so far, i.e. static universal absolute space) or the ether does not exist. This led to the new idea: although static universal absolute space does not exist, absolute motion exists. Absolute motion doesn't require absolute space or the ether. The detector has two distinct absolute motions: absolute motion due to rotation and absolute motion due to (centripetal) acceleration. As part of the gigantic Sagnac apparatus, the detector is in absolute motion and hence detects fringe shift. But as part of the MM apparatus its acceleration is very small and it detects nearly a null fringe shift. These two kinds of absolute velocities have fundamentally different causes (acceleration and rotation) and are defined in different absolute reference frames and hence cannot be added together, unlike the absolute velocities discussed previously ($V_{abs} \pm$ Vabs1).

The appropriate reference frame to predict the fringe shift in the Michelson-Morley experiment is the imaginary dynamic absolute reference frame associated with the MM device.

This theory has the potential to explain and reconcile the results of many of the experiments and phenomena associated with the nature of the speed of light:

- Michelson Morley experiment
- Sagnac effect
- Stellar aberration
- 'GPS corrections': slow down or speed up of clocks may be connected with absolute motion
- Experiments confirming the source speed independence of the speed of light

This theory may also be applied to better understand planetary systems, such phenomena as 'elliptic' orbits and Mercury perihelion advance. Absolute motion may have effect on Mercury perihelion advance and elliptic orbits.

This theory may reconcile the ever existing notion of absolute motion with Galilean invariance principle and Einstein's two postulates.

Conclusion

Einstein is (rightly) considered to be one of the most genius persons of all time. However, he is a genius who made some mistake. But his mistake should not be called 'mistake'. His 'mistake' was that he didn't discover the mysterious dual and dynamic nature of space or motion.
The dual nature of space/ motion is just what we have to accept if it is the nature of the universe, just as we have accepted the dual nature of the electron. Absolute motion exists without absolute space and absolute motion does not exist with absolute space.

This theory gives a hint on consciousness! A paradox in this theory can be resolved if parts of a physical system 'know' that they are parts of the system! Physical systems may have consciousness! This will be further studied and presented in the next versions of this paper.

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