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Review Article

Aurora Effect Contradicts Fundamental Postulate of Relativity

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Abstract

Experimental physics plays a vital role in science from the beginning. The scientific method requires that all theories should be checked against data coming from physical tests. However, some ground-level experiments destroy those well-established theories. This article shows one such experiment and explains it in detail.

Inertial Motion and Wave Propagation

The theory of relativity is one of the most well-known theories now. Science used that theory for more than a century to build new branches of knowledge and confirm the theory by more and better experiments.

However, there is a relevant experiment hidden even today from the scientific community. That experiment looks so "strange" that no one from the official science likes to even think about it.

To understand the experiment, we need to come back to the most fundamental categories used in modern physics and the human mind. One of them is the category of so-called "Time."

We have not defined a common "time" for A and B, for the latter cannot be defined at all unless we establish by definition that the "time" required by light to travel from A to B equals the "time" it requires to travel from B to A [1] (statement EA).

That is the cornerstone of Relativity and the central postulate of the theory. It has a direct reference to light and a hidden reference to its propagation through something that they call "space."

Statement (EA) looks logically correct for any observer who keeps motionless location in space or something else that supports propagation of light (electromagnetic radiation).

Here appears the first problem of thoughts. In case of an Earth-bound observer, motion can be easily described and understood by a reference to the Erath surface. If an object keeps its motionless location regarding the Earth surface, then it can be understood as a "motionless object." Otherwise, it becomes a moving object. In both cases, the decision depends on the location of a given object.

If an object changes its location regarding the Earth surface, then it should be understood as a moving thing. Otherwise, that object becomes a motionless thing. Here appears another question. What is a detectable motion of an object regarding the Earth surface? A common observation of a moving object depends on two aspects. The first aspect requires an observable motion of the object regarding the Earth surface. It does possible for an ordinary observer by a comparison of a given object location regarding other objects located on the Earth surface or elements of the Earth surface itself.

The second aspect usually requires some changes in the object location regarding the observer who keeps his motionless location of the Earth surface. In that case, the observer takes himself as a motionless reference frame associated with the Earth surface.

Suppose now this. An object and the observer take their positions at a cart that moves on the Earth surface. In that case, the

observer detects his motion regarding the Earth surface, explained above, and reaches the decision that he and the object keep straight uniform motion regarding the Earth surface. In that case, the mutual location of the object and the observer does not change. However, the observer understands his motion regarding the Earth surface.

Suppose now this. The Earth surface becomes flat and polished like a transparent glass. Moreover, there is not any other object on the Earth surface except the object and the observer. The cart is also becoming invisible.

Is it possible for the observer to distinguish his straight uniform motion from a motionless location on the Earth surface?

It does impossible in that case because the only visible object for the observer shows no changes regarding the location of the observer. Therefore,

A common way of motion detection by a reference frame becomes useless in case when a reference frame becomes unobservable. (statement A)

Suppose now this. There are two observers, A and B, who share the same invisible cart mentioned above. The observer A throws a stone toward the observer B. At that moment, the observer A keeps location A_1 in some motionless undetectable reference frame. The stone goes toward the observer B. From the observer's point of view (or in the reference frame bound to them), the stone moves along the straight line connecting two observers. That is the AB line.

However, in the invisible motionless reference frame (or in the reference frame at rest), all objects keep their straight uniform motion. The observer A keeps moving along the line A_1A_3. The observer B keeps moving along the line B_1B_3, and the stone keeps moving along the line A_1B_2. The stone keeps straight uniform motion after interaction with the observer A at the point A_1.

All objects keep their motion for a while, and that process of motion has some duration. After that, the stone reaches the observer B at the point B_2. That point has meaning to the invisible reference frame at rest because both observers do not comprehend the presence of that undetectable reference frame. Therefore, they think the stone comes to observer B by the straight line AB (that connects both observers at their reference frame).

The experiment continues, and the observer B throws the stone toward the observer A. From their point of view, the stone comes back to the observer A by the same trajectory or along the straight line BA.

However, in the undetectable reference frame at rest, the stone uses the trajectory B_2A_3.

The speed of the stone in both cases remains constant in the Observer-bound Reference Frame (ORF). Therefore, both experiments show the equal duration of motion of the stone back and forth between observers.

There is one more critical aspect here that the observers do not comprehend. The speed of the stone remains constant only in their reference frame (ORF). The speed of the stone becomes variable in the undetectable reference frame at rest in both experiments.

That happens because the velocity of the stone in the un- detectable reference frame at rest becomes the sum of the proper velocities of the observer in that reference frame (A_1A_3 direction) and the velocity of the stone in AB direction. There is not any other possibility for the stone to come to observer B and meet him at the point B_2.

In that case, the sum of velocities gives a result as velocity with a higher magnitude. In the second case, when the stone comes back to the observer A by the trajectory B_2A_3, the sum of velocities in the reference frame at rest gives a lower value of its magnitude.

That happens because a stone is an inertial object that does exist before and after the experiment. Therefore,

Only the force interaction between the observer and the inertial object (or between two or more inertial objects) follows the law of velocities (statement B)

The thought experiment mentioned above can be conducted at any point in the Universe. The presence of a planetary sur- face is not obligatory for the observers. Therefore, the experiment can be conducted with a similar result in case of straight uniform motion of the observers.

The Problem of Simultaneity

Suppose now this. The observers like to conduct the same experiment with a signal. A signal, unlike an object, follows the Huygens' Principle. As a result, a signal waterfront forms a perfect sphere in a medium that supports propagation of that signal regardless motion of the wave (signal) source in the same medium.

Suppose also this. In the first experiment, the speed of the signal coincides with the speed of the object moving from the observer A to the observer B. In that case, the signal and the object leave the observer A simultaneously and reach the observer B also simultaneously. That happens because the signal path coincides with the trajectory of the object A_1B_2. Therefore, distance covered by the object and the signal in reference to the medium that supports propagation of that signal becomes equal for the object and the signal.

Suppose now this. Observer B likes to conduct a similar experiment and sends an object and the signal from him toward the observer A. In that case, the signal and the object starts their motion toward the observer A simultaneously. The signal keeps the same speed of its propagation in the medium because of Huygens' Principle. Unlike the signal, the object changes its velocity and magnitude of that velocity by the law of velocities. As a result, the object changes the direction and magnitude of its velocity.

The signal the object and the observers continue their motion through the medium. That process takes some duration.

At some moment, observer A meets the signal at the point A_X. That point has a significant meaning. The observer A covers the distance A_2A_X, and the signal covers the distance B_2A_X. The distance B_2A_X is N times greater than the distance A_2A_X because the signal has N times higher speed in the medium than the speed of the observer in the same medium regarding the medium.

The observer A needs some extra duration to wait until the object comes back to the observer and meet him at the point A_3 (regarding the medium). At that very moment, the signal that the observer detects at the point AX reaches the point A_Y

($A_1B_2 = B_2A_Y$). In other words,

Events happen simultaneously in a given direction for the propagation of a wave and motion of an inertial object lose their simultaneity in any other direction in a general case of the observer to medium relative motion. (Statement C)

As mentioned above, that happens because an inertial object follows the law of velocities, and a wave does not. It is time to look back at the statement (EA).

Philosophy Beyond Einstein's Illusions

The explanation given in the previous section applies to any signal-medium combination without any exception because it has not any reference to any particular attribute of a given signal or a medium. Therefore, it does apply to light in the form of electromagnetic radiation and something that supports the propagation of light (EM-radiation in a general case).

Therefore, the statement (C) shows an internal inconsistency of the statement (EA). Strictly speaking, statement (EA) tries to use the law of velocities applicable to inertial objects to waves that are not inertial objects (as explained above).

The wave nature of light was known before Einstein. How- ever, Einstein starts his speculations in direct violation of that knowledge. In other words, Einstein starts his speculations from a wrong point of view.

As a result, the entire theory became affected by that logical and philosophical problem coming from its ground level. There are many textbooks published later that permanently explain the same problem that light never shows any attribute of a bullet in case of propagation. All such speculations re- peat the same problem, again and again, trying to explain the propagation of a wave by the law of velocities that do not apply to a wave.

As a result, the entire theory becomes twisted with an enormous number of "paradoxes" coming from a critical mis- understanding of the physical process and categories at the ground level.

One of those categories is the category of so-called Time. The explanation given in the previous section needs not any of such category. Propagation of waves in a medium needs some duration for that physical process and nothing more. In other words, so-called Time as a representation of that duration becomes a function of wave propagation or distance covered by a wave in a given medium in a reverence frame bound to the medium. That reference frame becomes the Wave Reference Frame (WRF). A given wave makes propagation through that medium by physical interaction with the medium. Therefore,

The speed of propagation of a wave in a given medium depends on the physical attributes of that medium and independent of anything else, including source-to-medium relative motion. (Statement D)

Einstein made one more grave-mistake. He used a reference for the so-called Time without a definition of that category. That is an unforgivable mistake for a philosopher.

A category without a clear definition shows a problem of comprehension of a given thinker. (Statement E)

That problem raises a lot of consequent problems that make distortion of the theory even worse.

However, Einstein tries to make his theory "compatible" with ground-level categories of the human mind, which were "popular" at that time (the beginning of the 20th century). That was one more violation of the scientific method.

The scientific method aimed at the destruction of human illusions by physical experiments instead of supporting them by thoughts. (Statement F)

Einstein used his famous way of "gedankenexperiment" or thought-experiment instead of real experiments in a lab. That way ever leads a thinker to a wrong path of thoughts because it never shows him inconsistency of his thoughts and results of physical tests.

The best example is this. There are modern thermometers that make temperature measurements by the determination of electromagnetic radiation coming from a distant physical body. If those thermometers were pointed to the same object, then all of them show the same temperature of that object. That means the physical interaction of a measurement device and the physical value that should be measured. Any changes in the body temperature immediately change readings of those thermometers that confirm physical interaction between a measurement device and a physical aspect subjected to measurement.

There is nothing similar to that way of measurement in case of clocks. If an observer turn on any number of clocks, their initial readings mean nothing. They need a human action to set a "correct indication." That "correct indication" comes from the human comprehension of a given moment of so-called Time instead of physical measurement of a given value of Time itself.

If clocks measure of physical Time by interaction with that Time, then all of them show ever an exactly correct indication of Time passed from the zero point of creation of that Time (the mo-

ment of creation of the Universe or something else like that). Such clocks need not any "synchronization" with the help of a human being. Moreover, they should do that measurement at any point in the Universe because "the flow of so-called time passes through the universe at every point."

Such point of view is incorrect because there is not a clock that follows that way of measurement.

In other words, statement (EA) becomes incorrect in reference to the physical duration of signal propagation between observers in case of observer-to-medium relative motion and in reference to "mythical" time. Moreover, there is a physical experiment that destroys statement (EA) by physical measurements.

De Witte Experiment and Explanation

In 1991 Roland De Witte carried out an experiment in Brussels in which variations in the one-way speed of radio-frequency (RF) waves through a coaxial cable were recorded. He used two atomic clocks with cesium-based oscillation devices to make those measurements.

Figure 2 shows variations in twice the one-way travel time, in ns, for an RF (radio-frequency) signal to travel 1.5 km through a buried coaxial cable between Rue du Marais and Rue de la Paille, Brussels, by subtracting the Paille Street phase shift data from the Marais Street phase shift data. An offset has been used such that the average is zero. The cable has a North-South orientation, and the data is difference of the travel times for NS and SN propagation [2].

Figure 1: An example of wave propagation.

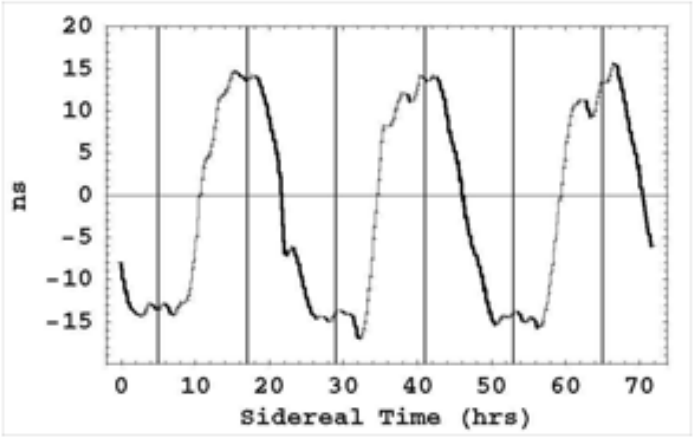

Figure 2: The one-way travel time deviation in comparison with Side- real Time.

That experiment shows a few critical aspects of RF propagation.

1. The duration of forward propagation is never equal to the duration of backward propagation.
2. The duration of each on-way propagation depends on the orientation of the Instrumental System regarding the direction of its absolute motion in the given medium. (Statements G)

The result (G.1) destroys completely Einstein's speculation about signal propagation in case of observer-to-medium relative motion and his postulate (EA) (mentioned above). Moreover, that result comes from a physical experiment in- stead of pointless speculations. Therefore, it coincides with the scientific method, unlike "famous gedankenexperiment," which contradicts that method because data coming from such experiments come from the human mind instead of physical reality.

Einstein has not any idea of atomic clocks at the time of the creation of his theory. In other words, he had not any idea about the possibility of the creation of such measurement devices. As a result, he tries to cover the physical inability of the technical (engineering) level of his time by his speculations and "gedankenexperiments." That is the wrong way of a thinker. Every suggestion made on such an "experiment" sup- posed to be wrong because of the lack of physical proof. As a result, the first one-way experiment eliminated all illusions in that area.

Statement (G.2) can be interpreted at first glance as a weird idea that time itself depends on the orientation of the device regarding some invisible direction. It is possible for a "time-dependent" mind.

The mind that stays beyond the idea of physical "time" understands that the difference comes from the different distance covered by the radio-frequency in different directions. The duration itself becomes only a function of some distance covered by RF signal in some medium that supports its propagation.

Moreover, that medium is independent of the observer as any other medium and keeps the speed of RF propagation by the physical interaction of waves and the medium. That makes no difference in light (or other electromagnetic radiation) propagation in that medium and propagation of another signal in any other signal-medium combination.

Discussion and Conclusion

The point of view shown in this article cannot come from modern physics based on Einstein's postulates.

It does come from Z-Theory published in the form of a book in the US and UK in 2011 (ISBN 10: 1452018936/ISBN 13: 9781452018935). That theory is entirely independent of fundamental categories like the so-called time or space. The theory explains many phenomena that cannot be explained in another way (or by the time-dependent way). For example, the phenomenon shown in Figure 2 becomes Aurora Effect according to that theory. In can be detected all around the globe by any pair of atomic clocks.

The author has one more observation regarding modern physics. The Aurora Effect is detectable for any pair of atomic clocks separated by some distance. However, there is not any- one from a scientific personnel of any lab which shows that phenomenon for the scientific community by the approved method (like scientific articles, lectures, dissertations, and discussions).

In other words, the scientific community pretends that nothing exists beyond a "well-established" theory and try to suppress all research in that area of easily detectable phenomena at any cost.

That contradicts the general idea of science.

Acknowledgement

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Conflict of Interest

No conflict of interest.

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