Co-existence of Absolute Motion and Relativity and Constancy of the Speed of Light - Scientific Proof of God

How the phenomenon of stellar aberration completely hides the effect of absolute motion.

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Abstract

Centuries of experimental and theoretical investigations on the speed of light have shown that light does not behave consistently in the various experiments. In some experiments light appeared to behave according to classical ether theory, in other experiments it appeared to behave according to emission theory, and yet in other experiments according to neither theory. In some experiments the speed of light appeared to be constant and in other experiments it appeared to be variable. These confusions have also been expressed in other ways. Is it only the two-way speed or the one-way speed of light also that is constant (or not constant)? Does the speed of light depend on observer's velocity? Does the speed of light depend on mirror velocity? In this paper, we propose and show that the constancy of the vacuum speed of light, regardless of source/observer/ mirror uniform or non-uniform motions, underlies all the apparent contradictions in the behavior of the speed of light. The fact that some experiments showed non-constancy of the speed of light is only apparent and the speed of light is fundamentally constant c in vacuum for all observers. According to the new theory, Apparent Source Theory (AST), the speed of light is constant and absolute motion exists at the same time. AST reveals a new distinction that the ether doesn't exist but absolute motion does exist. Albert Einstein correctly proposed the constancy of the speed of light. However, his interpretation of the light postulate, which is the relativity of space and time, is logically inconsistent and has been disproved experimentally. In this paper, we propose a new interpretation that the constancy of the speed of light points to an intelligent being, God, Who always adjusts the point in space where light is emitted and the velocity of the center of the wave fronts, so that the speed of light in vacuum is always constant c relative to all observers. Profoundly, it will be shown how the phenomenon of stellar aberration completely hides the effect of absolute motion. In this paper, absolute motion and relativity can co-exist, with a new interpretation for each.

Introduction

The problem of absolute motion and the speed of light is a long standing one that is at least three centuries old in its modern form. It began when Galileo stated his principle of relativity, with his thought experiment, that no mechanical experiment existed that could reveal one's (absolute) motion. He argued that an observer inside a closed room in a steadily sailing ship will observe all physical phenomena as an observer at rest, regardless of the speed of the ship.

However, another phenomenon seemed to contradict Galileo's principle of relativity. Beginning with Isaac Newton, scientists wondered about the nature of light for centuries. Newton proposed that light was stream of tiny particles. Christian Huygens, on the other hand, proposed the wave theory of light, which contradicted Newton's corpuscular view. It was like searching in the dark in an era when few experimental evidences existed. In 1804 Thomas Young's double slit experiment eventually shed light on this problem; it revealed that light was actually a wave phenomenon, causing the abandonment of Newton's view. The triumph of the wave theory implied a medium (ether) for light transmission, which in turn implied the existence of absolute motion.

Thus was born the fundamental problem of absolute motion and the speed of light that would confound science for centuries. The success of Newton's laws of motion and gravitation, in which the principle of relativity was implicit, appeared to prove Galileo right, thereby implying Newton's corpuscular theory of light. On the other hand, the success of wave theory of light appeared to prove absolute motion (ether) theory. Moreover, James Clerk Maxwell formulated his equations that predicted the speed of light which was close to the known speed of light, which had been determined from Roamer's observation, from Bradley's stellar aberration and also from terrestrial experiments. Maxwell's equations were based on the assumption of the ether. Confirmation of Maxwell's equations thus appeared to be a proof of the ether. These contradictions created a dilemma between wave theory and particle (emission) theory of light.

In 1720 James Bradley discovered the phenomenon of stellar aberration, unexpectedly, while searching for stellar parallax. He observed that he had to tilt his telescope slightly forward to see the stars due to an apparent change in the position of the stars. The phenomenon was related to the velocity of the Earth in its orbit around the Sun. He explained this phenomenon by the corpuscular theory of light, by the law of addition of velocities. This appeared to support Newton's corpuscular theory. Actually, Bradley's experiment, together with the earlier Roamer experiment, succeeded in determining the order of magnitude of the speed of light.

In 1810 François Arago figured out an experiment that he thought could prove emission theory. He believed that light from different stars had different velocities and this would manifest as different angles of refraction of star light incident upon a glass prism put in front of a telescope. For this he would first observer a star with a telescope. Then he would put the glass prism in front of the telescope, which would cause loss of the star image, and turn the telescope until he observed the star again, and note the angle through which the telescope was turned. From this he could infer the angle of refraction of light from the different stars. Arago observed that the angle of refraction of light was the same for all stars and he concluded that light from all stars had the same velocity regardless of the velocity of the stars. This disproved the particle theory of light, and seemed to imply ether theory. Arago then repeated the experiment to test ether theory. While he observed light from different stars in his first experiment, in his second experiment he observed light from the same star at different times of the year, expecting to observe variations in refraction angle of star light due to motion of the Earth through the ether in its orbit around the Sun. Again he did not observe any variation in the angle of refraction, implying that the speed of light is constant independent of motion of the observer. His observations were consistent neither with corpuscular theory nor with ether theory. The speed of light appeared to be constant independent of source or observer velocity. In 1871 George Biddell Airy repeated the Arago experiment using water filled telescope and obtained a null result. Arago's experiment was the first experiment that clearly established the paradoxical nature of the speed of light.

In order to explain the null result of the Arago experiment, in 1818 Augustin-Jean Fresnel proposed ether drag hypothesis in which the ether is dragged by transparent media such as glass and water in such a way as to cancel out the effect of absolute motion[1]. Although Fresnel's hypothesis was found to be wrong as it led to some conceptual problems, the Fresnel ether drag coefficient was curiously confirmed in the 1851 Fizeau experiment. This was a turning point in the history of physics as it led physicists to think that any future theory of light should explain the Fresnel drag coefficient, which became the center of subsequent theoretical developments. Lorentz, and later Einstein, developed the Lorentz transformation in an effort to explain the Arago and the Fizeau experiments.

In 1881 A. Michelson set out to measure the velocity of the Earth relative to the ether, and settle the light speed problem. He used an optical interferometer in which light from a source is split into two orthogonal beams by a beam splitter. The longitudinal and transverse beams are then reflected from mirrors back to a detector where an interference pattern is formed. Michelson figured out that motion of the apparatus relative to the ether would induce change in the path length of each beam, with the longitudinal beam more affected than the transverse beam, which would show as a fringe shift. Michelson predicted a fringe shift of at least 0.04 corresponding to the velocity of the Earth relative to the Sun which is 30km/s. However, to his great disappointment, Michelson did not observe the expected fringe shift. He observed fringe shifts much smaller than the predicted value. In 1887 Michelson and Morley undertook an exhaustive repetition the experiment. They were so influenced by the 1881 null result that they took much care and increased the light path length tenfold to increase the sensitivity of the experiment. As it turned out, the outcome of the 1887 experiment was even 'worse' than the 1881 experiment. Unlike the 1881 experiment, the observed fringe shift was even much smaller than the predicted value. Since the fringe shifts were much smaller than predicted, they were interpreted as null ever since, and considered experimental errors. The 'null' result of the Michelson-Morley experiment brought the already puzzling problem of the speed of light to its climax.

Lorentz abandoned the Fresnel's theory of ether dragging, but adopted the Fresnel drag coefficient in his search for a new theory. He created the so-called 'local time' in order to give an alternative explanation to the Arago experiment and the Fizeau experiment, hence the Fresnel drag coefficient. The use of local time enabled Lorentz to keep Maxwell's equations invariant in a system moving relative to the ether, to first order in V/c, and enabled him to explain first order experiments. However, the Michelson-Morley experiment was a second order experiment which could not be explained by Lorentz's local time. The Lorentz-Fitzgerald length contraction hypothesis was then invented and added to explain the Michelson-Morley null result. However, based on the principle of relativity that no absolute motion effect should be detected for all orders of V/c and for all physical phenomenon, Lorentz, Larmor and Poincare subsequently developed the complete Lorentz transformation we know today. Under this transformation, Maxwell's equations, and hence the speed of light, are covariant/invariant for *all* orders of V/c. The constancy of the speed of light in all reference frames can explain all the null results observed so far. There is a subtle difference between Einstein’s theory that postulates absolute motion does not exist and Lorentz’s theory that asserts absolute motion exists but is undetectable.

One of the experiments being cited as evidence of relativity are the modern ‘Michelson-Morley’ experiments using optical cavity resonators that give (almost) complete null results. The problem is that physicists have been pursuing only those experiments that give null results and keeping pushing the limits, and ignoring those experiments that give evidence of absolute motion.

Einstein’s relativity (and Lorentz’s ether theory) is crucially based on the *assumption* that absolute motion will never be detected by any mechanical, electromagnetic or optical experiment. This means that a single experiment that can successfully detect absolute motion can invalidate the whole of relativistic physics. Einstein was aware of this and expressed his serious concern when Miller reported small but consistent fringe shifts.

Absolute motion has been observed in the Miller experiments, the Sagnac effect, the Marinov experiment, the Silvertooth experiment, the CMBR anisotropy experiment, the Roland De Witte experiment and others. Profoundly, the Silvertooth experiment measured almost the same magnitude and direction as the CMBR anisotropy experiment, 378 km/s towards Leo constellation.

Some experiments have also disproved other aspects of special relativity (SRT). A recent experiment [2] has apparently disproved the light postulate of SRT. The assertion by SRT that no information can travel faster than light has also been disproved by another experiment [3]. Astronomical observations have also found galaxies moving up to nine times the speed of light.

In this paper, we propose a new theory called Apparent Source Theory [4][5][6] that can successfully solve many of the problems of (absolute) motion and the speed of light. In the various experiments and observations carried out over decades and centuries, light has behaved in apparently contradictory ways. In some experiments, light appeared to behave according to ether theory, and in other experiments it appeared to behave according to ether theory. The physics community should have recognized and addressed these apparent inconsistencies in the nature of the speed of light, instead of trying to promote only those experiments that support relativity and suppressing those that do not. It turns out that, as we will see in this paper, the solution lies in the problem itself: apparent contradictions. As the saying goes, identifying the problem is halfway towards the solution.

Although absolute motion has been detected in several experiments, it should also be noted that ether theory could not explain them all consistently. One example is the Silvertooth experiment. Silvertooth himself could not provide a clear theoretical explanation for the effect he observed.

After all, the ether theory has been disproved by the Michelson-Morley experiment. Although the Miller experiments detected small fringe shifts, on the contrary, modern Michelson-Morley type experiments using optical cavity resonators have given complete null results.

The Michelson-Morley experiment appears to be a strong evidence of emission theory. There is also a less known experiment that appears to agree with the emission (ballistic) theory. This is the Venus planet radar range anomaly which was analyzed and exposed by Bryan G Wallace. Ironically, the Shapiro experiment was designed to test Einstein's gravitational time dilation. Radar pulses were sent to Venus and reflected back to Earth at a time when the Earth, the Sun and Venus were on a straight line so that the radar pulses could pass through Sun's gravitational field. Far from confirming gravitational time dilation, the time delays agreed with ballistic theory of light in which the speed of light depended on mirror velocity.

On the contrary, the A.Michelson moving mirror experiment and the Q.Majorana moving mirror and moving source experiments have disproved emission theory. According to emission theory, the wave length of light remains constant regardless of motion of the source and motion of the mirror. This hypothesis has been disproved by the Q. Majorana moving source and moving mirror experiments. A. Michelson in his moving mirror experiment tested the hypothesis that the velocity of light depended on mirror velocity and disproved it. That the speed of light is independent of source velocity has also been confirmed in the modern 'positron annihilation in flight' experiment.

However, there are still some experiments that cannot be explained by classical theories at all and, curiously, agree with Einstein's relativity. One of these is the Ives-Stilwell experiment. Another is the limiting light speed experiment.

Crucially, many of the experiments mentioned so far can be explained *either* by emission theory *or* by ether theory. As we shall see later, this could be a hint that the correct model of the speed of light that eluded physicists for centuries is some form of fusion of ether theory and emission theory.

In this paper, a new theory of motion and the speed of light is proposed. The new theory is a combination of two theories:

1. A new interpretation of absolute motion
2. A new interpretation of relativity

Experiments such as the Michelson-Morley, the Silvertooth , the Marinov experiments are absolute motion problems. Doppler effect, stellar aberration, the moving magnet-conductor problem are relative motion problems. A new theory called Exponential Doppler Effect Theory has been proposed in my other papers [4][5][6]. Mercury perihelion advance may also be a relative motion effect that might be explained by Weber's electrodynamics.

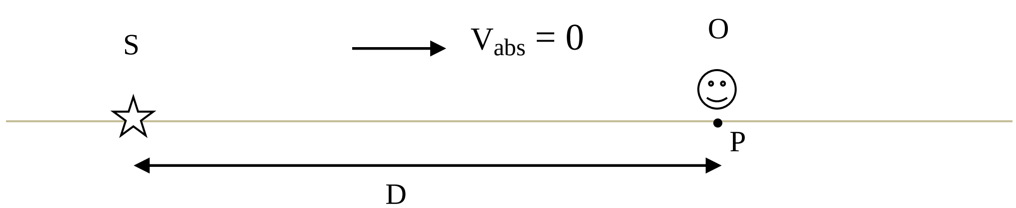
The new theory of absolute motion (Apparent Source Theory) is a novel, seamless unification of features of ether theory, emission theory and the postulates of special relativity: constancy of the speed of light.

Apparent Source Theory

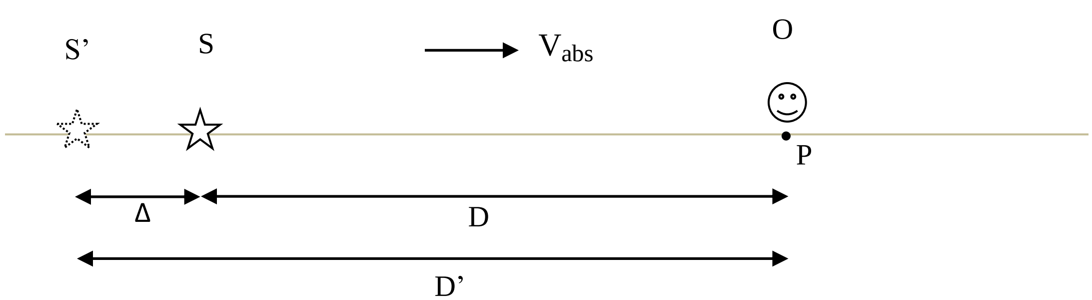
One of the questions that have puzzled physicists for centuries is why experiments such as the Michelson-Morley experiments gave null results? This paper reveals this centuries old mystery.

Consider co-moving light source S and observer O, separated by distance D. Obviously, when they are both at absolute rest, the time taken by an emitted light pulse to reach the observer is:

$$t = \frac{D}{c}$$



Now assume that the co-moving source and observer are in absolute motion, with velocity V_{abs} to the right, as shown below.



According to Apparent Source Theory, the effect of absolute motion of the co-moving light source and observer is just to create an apparent change in position of the source as seen by the observer. In this case, the position of the source apparently changes from S to S', with S' being at the center of the wave fronts as seen by observer O. It should be noted that S' is the center of the wave fronts only for observer O and the apparent position of the source will be different for observers at different distances. Since the apparent source S' and the observer are co-moving, and since the speed of light is constant *c* relative to the apparent source, it follows that the speed of light is also constant relative to the observer, regardless of the absolute velocity of the observer.

For now we postulate that:

$$D' = D\ \frac{c}{c - V_{abs}}$$

and

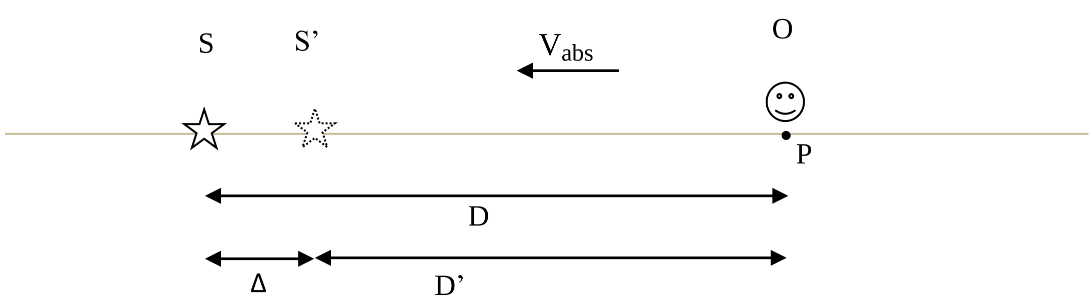
$$\Delta = D\ \frac{V_{abs}}{c - V_{abs}}$$

The time taken by light to move from the (apparent) source to observer is, therefore:

$$t = \frac{D'}{c} = \frac{D\ \frac{c}{c - V_{abs}}}{c} = \frac{D}{c - V_{abs}}$$

Therefore, the effect of absolute motion for co-moving light source and observer is just to create a change in the time delay of light, and not a change in the speed of light relative to the observer.

Next we consider the case of co-moving light source and observer with absolute velocity directed to the left, that is with the observer behind the source.



In this case also the effect of absolute motion of co-moving source and observer is to create an apparent change in the position of the source as seen by the observer. In this case, the source position apparently changes to be nearer to the observer than the actual/physical source position.

In this case,

$$D' = D\ \frac{c}{c + V_{abs}}$$

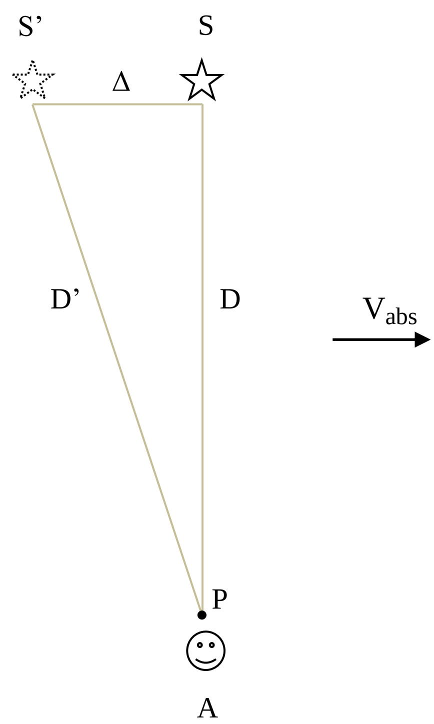
and

$$\Delta = D\,\frac{V_{abs}}{c + V_{abs}}$$

The time taken by light to move from the (apparent) source to observer is, therefore:

$$t = \frac{D'}{c} = \frac{D\,\frac{c}{c + V_{abs}}}{c} = \frac{D}{c + V_{abs}}$$

Next we will consider the case when the line connecting the light source and the observer is orthogonal to the observer’s absolute velocity.



In this case, we postulate that:

$$D' = D\,\frac{c}{\sqrt{c^2 - {V_{abs}}^2}}$$

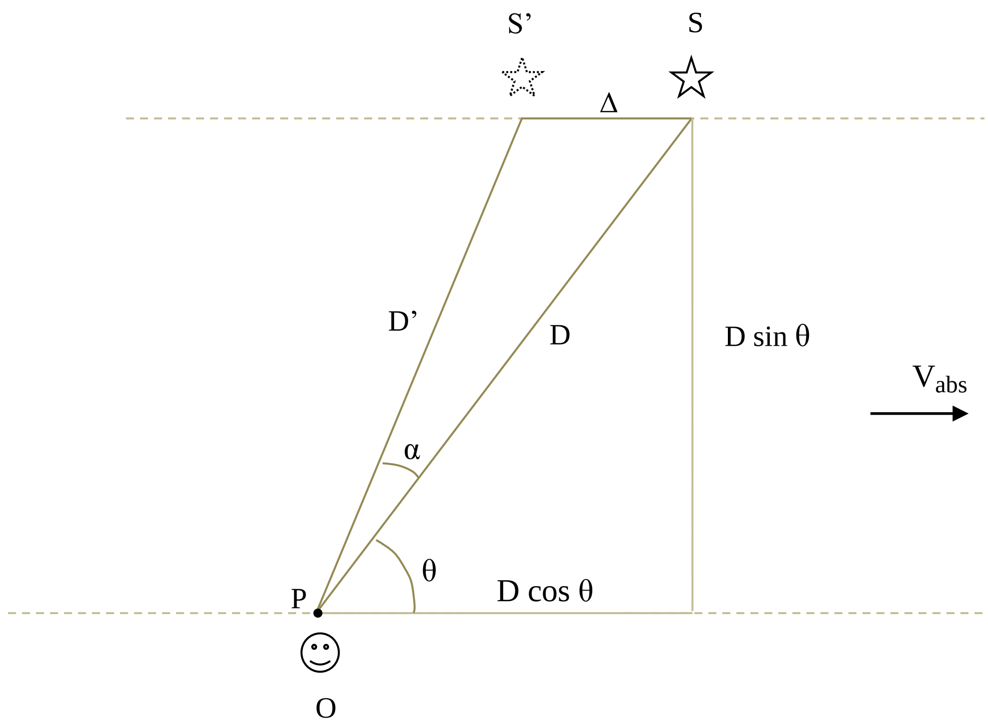
and

$$\Delta = D\,\frac{V_{abs}}{\sqrt{c^2 - {V_{abs}}^2}}$$

Therefore,

$$t = \frac{D'}{c} = \frac{D \dfrac{c}{\sqrt{c^2 - {V_{abs}}^2}}}{c} = \frac{D}{\sqrt{c^2 - {V_{abs}}^2}}$$

Consider the general case in which the observer O is at an arbitrary point relative to the source at the instant of light emission ($t = 0$) , as shown below.



To determine the point in space where light is emitted for the observer, we proceed as follows.

During the time that the center of the wave fronts 'moves' from S' to S, the light moves from S' to point P.

Therefore,

$$\frac{D'}{c} = \frac{\Delta}{V_{abs}}$$

where

$$\Delta = D cos\theta - \sqrt{D'^2 - D^2 sin^2\theta}$$

From the above two equations,

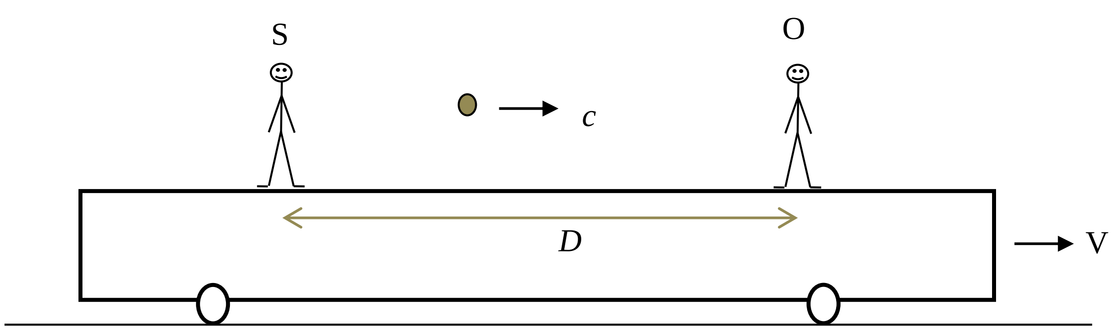
$$D'^2\left(1-\frac{{V_{abs}}^2}{c^2}\right)+\frac{2DV_{abs}}{c}\ cos\theta\ \ D'\ -\ D^2=0$$

which is a quadratic equation from which D' can be determined, which in turn enables the determination of Δ and α.

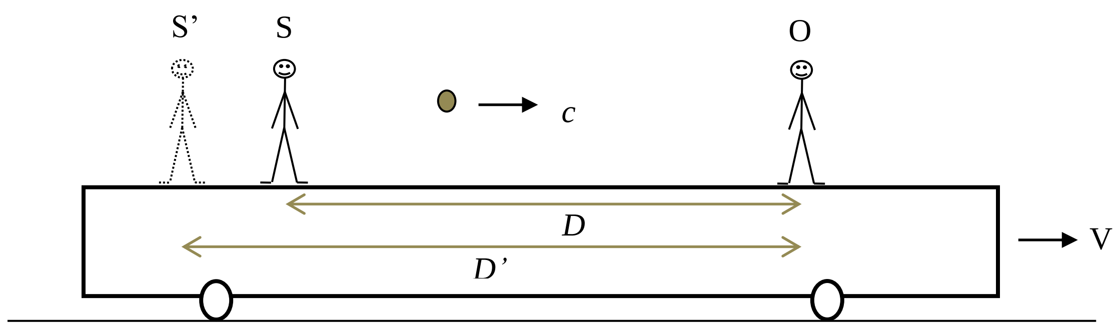
In all the cases we discussed so far, the trick of nature is that, light is not emitted from the actual/physical position of the source, but from a point S' , which is at a distance *D'* away from the moving observer. Light is emitted from distance *D'* , with the center of the wave fronts moving with the same velocity as the absolute velocity of the observer. The light is actually emitted from an apparent source S', which is moving with velocity V_{abs} . The speed of light is constant *c* relative to this apparent source. Since both the observer and the apparent source, which is at the center of the wave fronts, are moving with the same velocity, the speed of light is constant *c* relative to the observer. The apparent source S' will always have the same velocity as the absolute velocity of the observer, so the speed of light relative to the observer will always be constant *c* regardless of the observer's absolute velocity.

Therefore, the effect of absolute motion of an observer is just to change the point in space where light was emitted. This means that the velocity of light relative to the observer will not change because of observer's absolute motion; it is always constant *c*. The change in time of arrival of light is not because the speed of light has changed relative to the observer, but because the point of light emission has changed. This theory is a seamless fusion of ether theory and emission theory.

For further clarification of the new theory, consider an analogy. Two persons S and O are standing on a moving cart. Person S acts as a source throwing balls towards person O who acts as an observer. Assume that S always throws balls with constant velocity *c* relative to himself/herself. Two synchronized clocks, one at S another at O, are used to measure the time delay of a ball going from S to O. Now we want the ball to behave both according to emission theory and according to ether theory, at the same time.



At first assume that the cart is at rest. Let the distance between the source and the observer be *D*. When the cart is at rest, the time taken by the ball to move from S to O is, $t = D/c$. Now suppose that the cart starts moving to the right with velocity *V*. Since the velocity of the ball relative to the source S is always constant *c* , then the time *t* will still be equal to *D/c*, regardless of the velocity of the cart. But we want the time delay *t* to change due to the motion of the cart, to make the ball appear to behave according to ether theory also. How can this be done? To make the ball behave according to ether (absolute motion) theory, the ball should take more time to catch up with observer O when the cart is in motion. Since the source S always throws the ball with constant velocity *c* relative to himself (relative to the cart), the only way to make the time *t* longer is for the source S to move back away from observer O, to a point a distance *D'* away, as shown below.



In this case, the time taken by the ball will be:

$$t = \frac{D'}{c}$$

Therefore, the velocity of the ball relative to the (apparent) source is still equal to *c* , but the point of ball 'emission' has changed from S to S'. Thus, the effect of 'absolute' motion of the cart is to change the point of 'emission' of the ball. The velocity of the ball relative to the observer O is always constant *c*, regardless of the 'absolute' velocity of the cart.

Now, for the ball to exactly simulate its 'wave' nature, i.e. to behave according to ether theory, the time delay should be as predicted by ether theory. According to ether theory, the time delay is equal to the actual distance *D* divided by the velocity of the wave relative to the observer O, which is equal to $c - V$ in this case. Therefore:

$$t = \frac{D}{c - V}$$

From the above two equations,

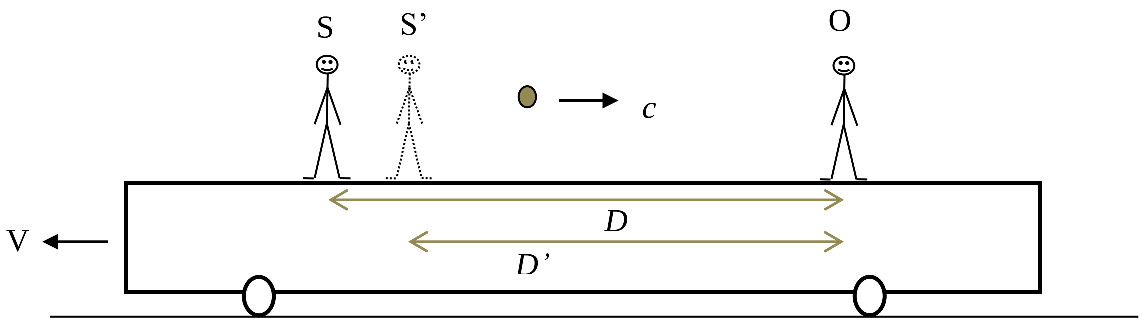
$$\frac{D'}{c} = \frac{D}{c - V}$$

From which,

$$D' = D\frac{c}{c - V}$$

Note that the velocity of the ball as 'seen' by an 'observer' at rest on the ground is equal to $c + V$.

In the above analogy, we have assumed that the observer O is in front of the source S , with respect to the velocity of the cart. Next we consider the case when the observer is behind the source. For this we assume the same arrangement as above except that the cart moves to the left in this case, as shown below.

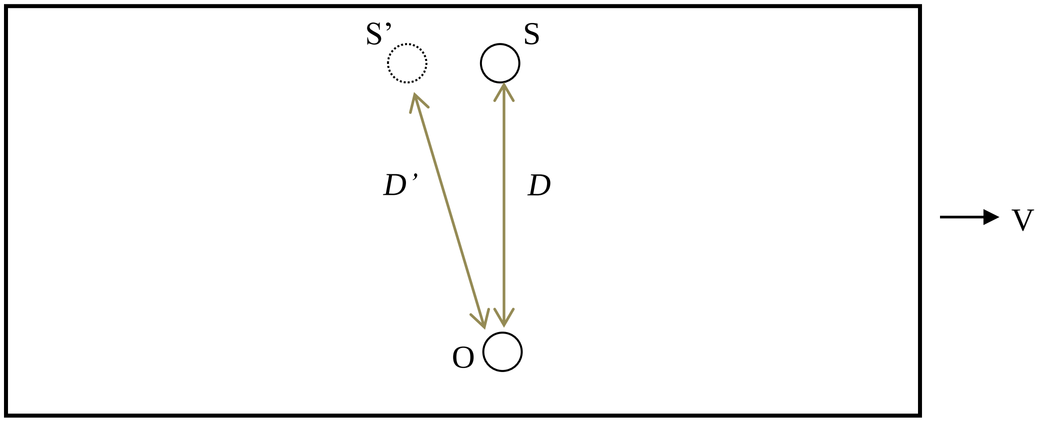


In this case, motion of the cart will make the time delay *t* shorter. By the same argument as above, the source needs to change its position to a distance *D'*, where:

$$D' = D\frac{c}{c+V}$$

The profound result we found is that the speed of the ball is always constant relative to the observer O, regardless of the velocity of the cart. Light behaves in the same way as the ball in the above analogy.

We can repeat the above analogy for other positions of the observer relative to the source, with respect to their common absolute velocity. In the above two cases, we have considered the cases when the line connecting the source and the observer is parallel to the velocity vector. Now consider the case when the line connecting the source and the observer is orthogonal to the velocity vector, as shown in the figure below, which is the top view of the cart.



With the same arguments as above, it can be shown that:

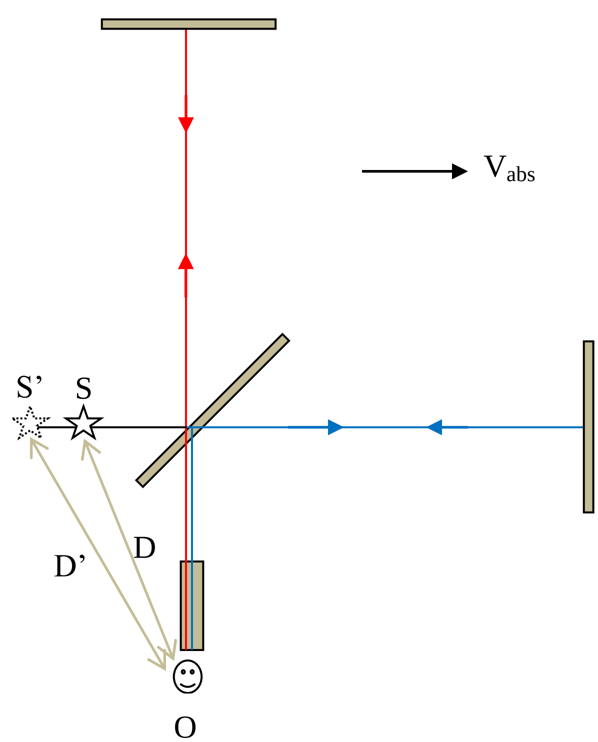
$$D' = D \frac{c}{\sqrt{c^2 - V^2}}$$

This theoretical model reveals the mystery of the speed of light and why the Michelson-Morley experiment gave a null result and failed to detect absolute motion. One can imagine doing a 'Michelson-Morley' experiment and can see why it gives 'null' results.

This theory is called Apparent Source Theory. We formulate Apparent Source Theory for inertially co-moving light source and observer as follows.

The effect of absolute motion for inertially co-moving light source and observer is to create a change in the point of light emission relative to the observer. According to Apparent Source Theory, unlike ether theory, the effect of absolute motion for co-moving light source and observer is to change the point of light emission as seen by the observer, and not to change the speed of light relative to the observer. The speed of light relative to the observer is always constant c , regardless of absolute motion of the observer. The center of the light wave fronts is always co-moving with the observer.

With this theory, we can gain an intuitive understanding of why the Michelson-Morley (MM) experiment gives 'null' results. 'Null' has been quoted here because the MM experiment gives complete null results only for some orientations of the interferometer relative to the absolute velocity vector, and gives small fringe shifts for other orientations.



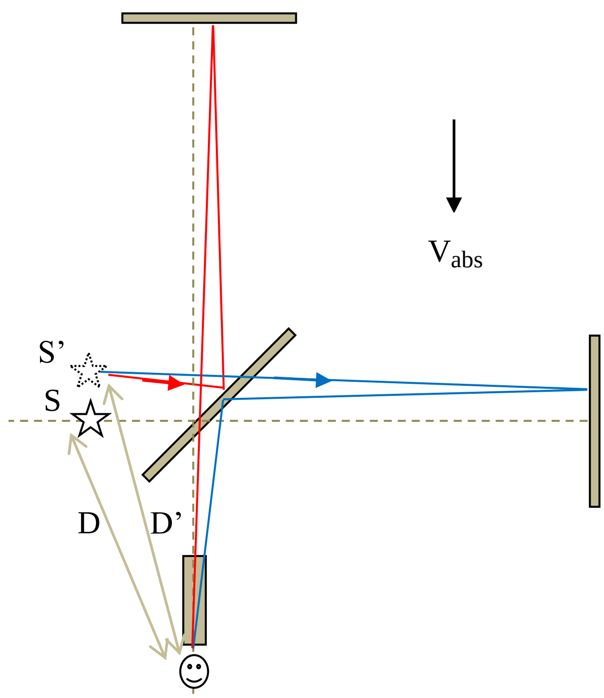
As we can see from the above diagram, absolute motion of the Michelson-Morley interferometer causes only an apparent change in the point of light emission relative to the observer, from S to

S'. The velocity of light is always constant *c* relative to the observer, regardless of the absolute velocity of the interferometer.

The best way to clarify this is to ask: will changing the position of the source from S to S' (instead of setting the interferometer in absolute motion) cause any fringe shift ? Obviously, the answer is NO, because both the longitudinal and transverse waves will be delayed by the same amount and hence no fringe shift will occur.

Note that the velocity of light as 'seen' by an 'observer' at absolute rest is equal to $c + V_{abs}$. However, this velocity ($c + V_{abs}$) is only an illusion because the *real observer* is the one who is actually *detecting* the light, which is observer O. This is what makes the behavior of light extremely elusive. Therefore, according to AST, when we say the velocity of light is constant *c* relative to all *observers*, we mean observers who are actually detecting the light. The source of all the confusions caused in physics during the last century is the fallacy of trying to make the speed of light constant relative to some third 'observer' who is not actually detecting the light. In special relativity, this 'observer' is the reference frame. Special relativity states that the speed of light is constant in all inertial reference frames.

What about the small fringe shifts observed in the Miller experiments? For absolute velocities parallel to the longitudinal axis of the interferometer, the fringe shift caused by absolute velocity is completely null. However, fringe shifts can occur for absolute velocities not parallel to the longitudinal axis. For example, for absolute velocity perpendicular to the longitudinal axis and directed downwards, the situation is as follows.

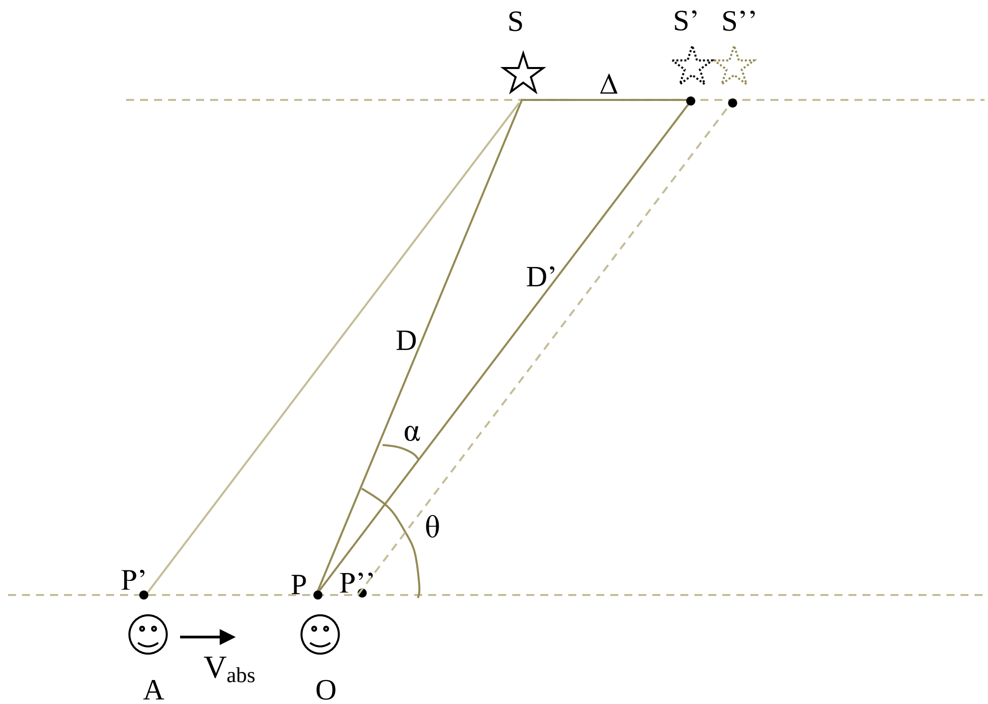


The path lengths of the longitudinal (blue) and the transverse (red) light beams are changed slightly *differently* due to absolute motion, and hence causing a small fringe shift.

Stellar aberration

Apparent Source Theory (AST) successfully explains the Michelson-Morley experiment, the Marinov experiment, the Silvertooth experiment, the Venus planet radar range data anomaly, and the Sagnac effect. However, the phenomenon of stellar aberration remained a challenge for AST. Stellar aberration contradicted the initial formulation of AST. The solution to this puzzle finally came from the solution to the quantum puzzle [7][8]. The ultimate mystery behind the problem of the speed of light and the quantum puzzle turned out to be the same.

Consider a stationary light source S and an observer O who is at rest at point P. Another observer A is moving with absolute velocity V_{abs} to the right. Suppose that the source emits a short light pulse at time $t = 0$, and that at the instant of light emission observer A is at point P'.



Suppose that the time it takes light to travel from S to point P is equal to the time taken by observer A to move from point P' to point P. This means that at the instant observer A reaches point P, observer O detects the light. Conventionally, since observer A is also at point P (just passing through point P) at the instant of light detection by observer O, observer A will also detect the light. The new finding in this paper is that, *although moving observer A is at point P at the instant of light detection by observer O, observer A will not detect the light at point P.* This is because, as we postulate in this paper, the light will travel the path SP for observer O, whereas the light will travel the path SP' (or path S'P or path S''P'') for observer A. We can see that the length of line SP' is greater than the length of line SP. We postulate that the light is emitted at the same instant of time ($t = 0$) for both observers. However, since line SP' is longer than line SP, moving observer A will detect the light *later* than stationary observer O, at some point P''.

Moving observer A will detect the light τ seconds later than stationary observer O, where:

$$\tau = \frac{length\ of\ line\ S'P}{the\ speed\ of\ light} - \frac{length\ of\ line\ SP}{the\ speed\ of\ light}$$

$$\tau = \frac{length\ of\ line\ S'P - \ length\ of\ line\ SP}{c} = \frac{D' - D}{c}$$

This means that moving observer A detects the light at point P'' , where the distance between P and P'' is:

$$distance\ between\ P\ and\ P'' \quad = \quad observer\ velocity\ *\ \tau \quad = \ V_{abs}\, \tau$$

The above analysis is based on the new postulate that for an inertially moving observer, *the time taken by light to travel from the source to the observer is determined by the source-observer distance <u>at the instant of light emission</u>. Also, the direction of the light rays (the direction of the source) at the instant of light detection is the same as the direction of the source relative to the observer at the instant of light emission*.

Accordingly, for moving observer A, the direction of the source relative to the observer at the instant of light emission is parallel to line SP'. The direction of the light rays at the instant of light detection will remain parallel to line SP'.

For the stationary observer O, the source is at S and the wave fronts are *fixed* at S. For moving observer A, the center of the wave fronts starts from S at the instant of light emission, moving to the right with the same velocity (V_{abs}) as the velocity of the observer. By the time observer A reaches point P, the center of the wave fronts reaches S' and light is detected by observer O. By the time observer A reaches point P'', the center of the wave fronts reaches S'', and light is detected by observer A at point P''.

In this paper, we assume that the apparent source S' is real and is not an illusion. Conventionally, the change in the position of the source due to stellar aberration is only an illusion. When we say 'real' , we mean the effect is as if it was real. We can see that, due to the phenomenon of stellar aberration, the direction of the (apparent) source at the instant of light detection is the same as the direction of the source at the instant of light emission relative to observer A. This means that line P'S , line PS' and line P'' S'' are parallel.

It should be noted again that at the instant of light detection at point P by observer O, the moving observer A and the center of the wave fronts (S') are co-moving to the right. In other words, the center of the wave fronts is moving with the same velocity V_{abs} as the velocity of the observer.

Now we see that stellar aberration has the effect of hiding (the effect of) absolute motion because absolute motion of the observer does not create a change in the direction of light; the direction of the source at the instant of light emission and the direction of the apparent source at the instant of light detection are the same and not affected by (absolute) motion of the observer. The time delay of light also will not be affected by the absolute velocity of the observer because the co-moving (apparent) source is considered to be real and light always travels the path length S'P regardless of the motion of the observer. Therefore, stellar aberration has the effect of completely hiding the absolute motion of the observer.

This means that, for a light source and an observer in an inertially moving closed room, with both the source and the observer at rest relative to the room (hence relative to each other), there will be no way to detect the absolute motion of the room. This means that the direction of the source relative to the observer and the time of flight of a light pulse will not be changed due to absolute velocity of the room. We have seen that the phenomenon of stellar aberration will keep the direction of the light the same. Interpreting the apparent source as the real source for the moving observer also hides the effect of absolute motion by making the time of flight of light to be independent of motion of the room, and will always be source observer distance divided by the speed of light *c*.

To provide a quantitative analysis, consider a stationary light source S emitting a short light pulse at $t = 0$, as shown in the following figure. The line SP is perpendicular to the absolute velocity vector. At the instant of light emission, stationary observer O is at absolute rest at point P and observer A is moving to the right with absolute velocity V_{abs} at point P'.

Assume that the time it takes light to travel from S to point P (for observer O) is equal to the time taken by observer A to move from P' to P. This means that arrival of observer A at point P, arrival of the light pulse at point P and detection of the light pulse by observer O happen simultaneously at point P. However, as we have postulated already, although moving observer A is also at (or passing through) point P at the instant of light detection by observer O, observer A will not detect the light pulse yet. This is because the light has to travel length of path SP' (or path S'P or path S'' P'') for observer A, whereas the light has to travel length of path SP for observer O. Since length of path SP' is greater than length of path SP, observer A will detect the light pulse *later* than observer O, at some point P''.

Now, during the time interval observer A moves from P' to P, the light pulse moves from S to P.

$$time\ taken\ by\ observer\ A\ to\ move\ from\ P'\ to\ P\ =\ time\ taken\ by\ light\ to\ move\ from\ S\ to\ P$$

$$\Rightarrow \quad \frac{\Delta}{V_{abs}} = \frac{D}{c}$$

$$\Rightarrow \quad \Delta = \frac{V_{abs}}{c}\ D$$

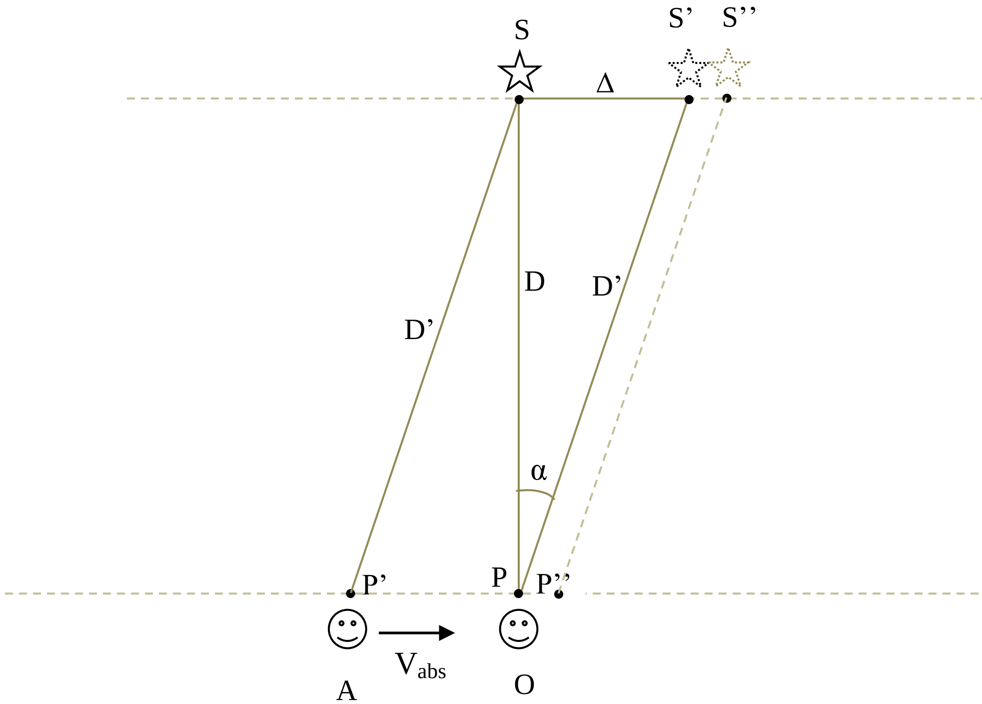
But,

$$D' = \sqrt{\Delta^2 + D^2}$$

From the last two equations:

$$D' \; = \; \sqrt{(\frac{V_{abs}}{c} \; D \quad)^2 + D^2} \; = \; D \sqrt{(\frac{V_{abs}}{c})^2 + 1}$$

$$\Longrightarrow \quad D' = D \sqrt{1 + \frac{{V_{abs}}^2}{c^2}}$$



Therefore, the time delay of light for observer O will be:

$$t_0 \; = \; \frac{D}{c}$$

whereas the time delay of light for moving observer A will be:

$$t_1 \; = \; \frac{D'}{c} = \frac{D \sqrt{1 + \frac{{V_{abs}}^2}{c^2}}}{c}$$

As we have discussed already, moving observer A will detect the light pulse τ seconds later than stationary observer O, where:

$$\tau = t_1 - t_0 = \frac{D\sqrt{1+\frac{{V_{abs}}^2}{c^2}}}{c} - \frac{D}{c} = \frac{D}{c}\left(\sqrt{1+\frac{{V_{abs}}^2}{c^2}} - 1\right)$$

Therefore, the distance between point P and point P'', that is the distance between points of light detection by the two observers, is:

$$distance\ between\ point\ P\ and\ point\ P'' = V_{abs}\,\tau$$

Let us apply this to aberration of sunlight due to the velocity of the Earth in its orbit around the Sun, which is 30 km/s.

D = 150 x 10^6 km , V_{abs} = 30 km/s , c = 300,000 km/s

$$\tau = \frac{D}{c}\left(\sqrt{1+\frac{{V_{abs}}^2}{c^2}} - 1\right) = \frac{150{,}000{,}000}{300{,}000}\left(\sqrt{1+\frac{30^2}{300000^2}} - 1\right) = 2.5\ \mu s$$

$$distance\ between\ point\ P\ and\ point\ P'' = V_{abs}\,\tau = 30\,\frac{km}{s} * 2.5\ \mu s = 0.075m = 7.5\ cm$$

For a star one million light years away,

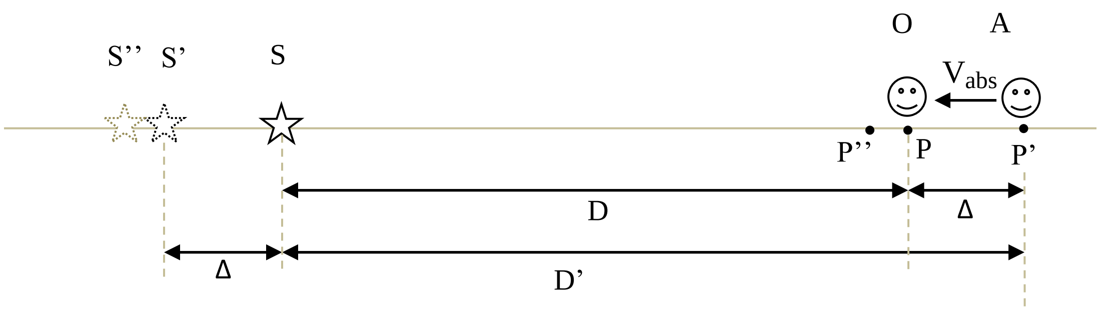
D = 9.4608 x 10^{18} km , V_{abs} = 30 km/s , c = 300,000 km/s

$$\tau = \frac{D}{c}\left(\sqrt{1+\frac{{V_{abs}}^2}{c^2}} - 1\right) = \frac{9.4608 * 10^{18}}{300{,}000}\left(\sqrt{1+\frac{30^2}{300000^2}} - 1\right)$$

$$\Longrightarrow \tau = 1.5768 * 10^5\ seconds$$

$$distance\ between\ point\ P\ and\ point\ P'' = V_{abs}\,\tau = 30\,\frac{km}{s} * 1.5768 * 10^5\ s$$
$$= 4.7304 * 10^6\ km$$

Next consider the following case. At time $t = 0$ the source S emits a short light pulse.



At the instant of emission, stationary observer O is at absolute rest at point P and observer A is moving with absolute velocity V_{abs} to the left at point P'.

As before, assume that the time taken by light to move from S to P is equal to the time taken by observer A to move from P' to P. This means that the arrival of observer A and the light pulse at point P , and the detection of the light pulse by stationary observer O will occur simultaneously. As we postulated already, although observer A is just at point P when observer O is detecting the light pulse, unconventionally, observer A will not detect the light pulse yet. This is because the light has to travel the length of path SP for stationary observer O, whereas the light has to travel length of path SP' (or path S'P or path S''P'') for moving observer A.

Therefore,

$$time\ taken\ by\ light\ to\ move\ from\ S\ to\ P\ =\ time\ taken\ by\ observer\ A\ to\ move\ from\ P'\ to\ P$$

$$\Longrightarrow\quad \frac{D}{c} = \frac{\Delta}{V_{abs}}$$

$$\Longrightarrow\quad \Delta = D\,\frac{V_{abs}}{c}$$

But

$$D' = D + \Delta$$

$$\Longrightarrow\quad D' = D + D\,\frac{V_{abs}}{c} = D\,(1 + \frac{V_{abs}}{c})$$

Therefore, the time delay of light for observer O will be:

$$t_0 = \frac{D}{c}$$

whereas the time delay of light for moving observer A will be:

$$t_1 = \frac{D'}{c} = \frac{D\left(1 + \frac{V_{abs}}{c}\right)}{c}$$

Therefore, moving observer A will detect the light pulse τ seconds later than stationary observer O, where:

$$\tau = t_1 - t_0 = \frac{D\left(1 + \frac{V_{abs}}{c}\right)}{c} - \frac{D}{c} = \frac{D}{c}\left(\left(1 + \frac{V_{abs}}{c}\right) - 1\right) = \frac{D}{c} * \frac{V_{abs}}{c} = D\ \frac{V_{abs}}{c^2}$$

Therefore, the distance between point P and point P'', that is the distance between points of light detection by the two observers, is:

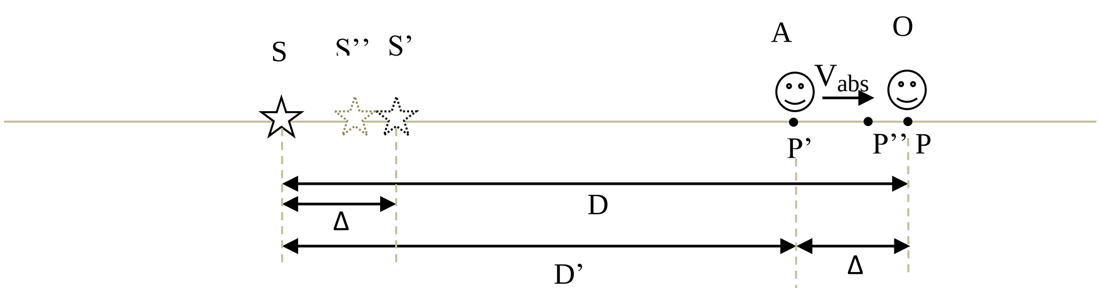
$$distance\ between\ point\ P\ and\ point\ P'' = V_{abs}\,\tau = V_{abs} * D\ \frac{V_{abs}}{c^2} = D\ \frac{{V_{abs}}^2}{c^2}$$

For comparison, let D = 150,000,000 km , V_{abs} = 30 km/s , c = 300,000 km/s

$$\tau = D\ \frac{V_{abs}}{c^2} = 150{,}000{,}000\ km * \frac{30\,\frac{km}{s}}{\left(300{,}000\,\frac{km}{s}\right)^2} = 0.05\ s$$

$$distance\ between\ point\ P\ and\ point\ P'' = V_{abs}\,\tau = 30\,\frac{km}{s} * 0.05\ s = 1.5\ km$$

Next consider the case when the observer is moving to the right. At t = 0 the source S emits a short light pulse.



At the instant of emission, stationary observer O is at absolute rest at point P and observer A is moving with absolute velocity V_{abs} to the right at point P'.

As before, assume that the time taken by light to move from S to P is equal to the time taken by observer A to move from P' to P. This means that the arrival of observer A and the light pulse at point P, and the detection of the light pulse by stationary observer O will occur simultaneously. As we postulated already, although observer A is just at point P when observer O is detecting the light pulse, unconventionally, observer A will not detect the light pulse because observer A has already detected the light at point P''. This is because the light has to travel the length of path SP for stationary observer O, whereas the light has to travel length of path SP' (or path S'P or path S''P'') for moving observer A.

Therefore,

$$time\ taken\ by\ light\ to\ move\ from\ S\ to\ P\ =\ time\ taken\ by\ observer\ A\ to\ move\ from\ P'\ to\ P$$

$$\Rightarrow \quad \frac{D}{c} = \frac{\Delta}{V_{abs}}$$

$$\Rightarrow \quad \Delta = D\,\frac{V_{abs}}{c}$$

But

$$D' = D - \Delta$$

$$\Rightarrow \quad D' = D - D\,\frac{V_{abs}}{c} = D\,(\,1 - \frac{V_{abs}}{c}\,)$$

Therefore, the time delay of light for observer O will be:

$$t_0 = \frac{D}{c}$$

whereas the time delay of light for moving observer A will be:

$$t_1 = \frac{D'}{c} = \frac{D\,(\,1 - \frac{V_{abs}}{c}\,)}{c}$$

Therefore, moving observer A will detect the light pulse τ seconds *earlier* than stationary observer O, where:

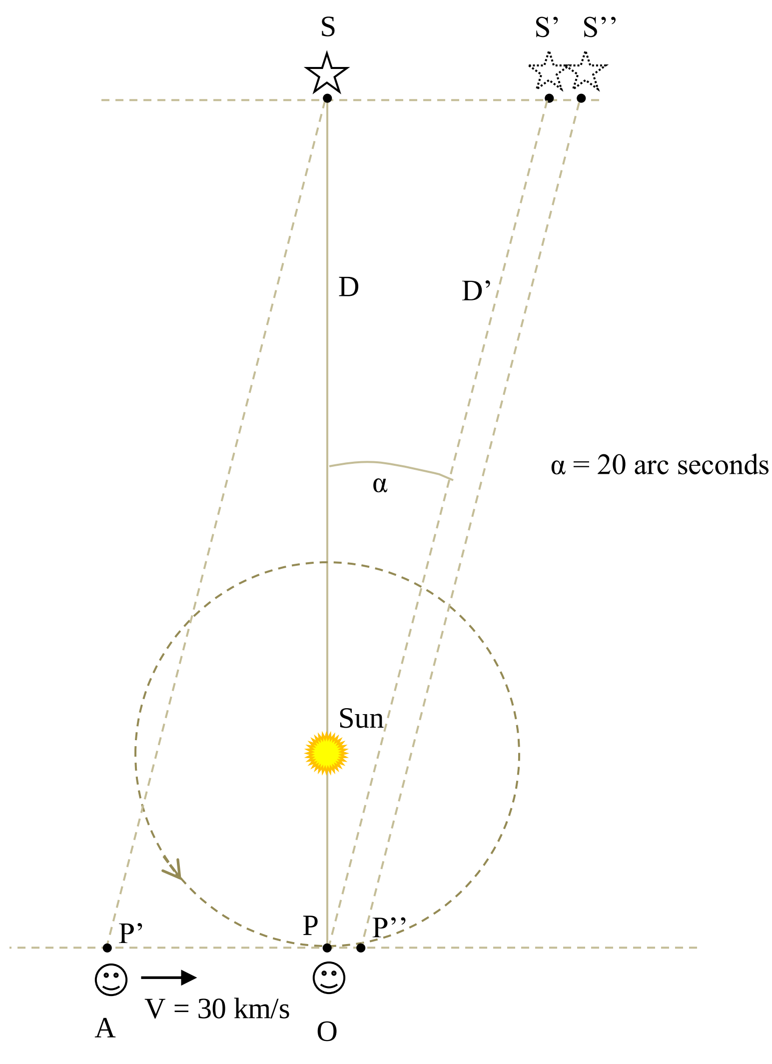
$$\tau = t_0 - t_1 = \frac{D}{c} - \frac{D\left(1 - \frac{V_{abs}}{c}\right)}{c} = \frac{D}{c}\left(1 - \left(1 - \frac{V_{abs}}{c}\right)\right) = \frac{D}{c} * \frac{V_{abs}}{c} = D\,\frac{V_{abs}}{c^2}$$

Therefore, the distance between point P and point P'', that is the distance between points of light detection by the two observers, is:

$$distance\ between\ point\ P\ and\ point\ P''\ =\ V_{abs}\,\tau\ = V_{abs} *\ D\,\frac{V_{abs}}{c^2} = D\,\frac{{V_{abs}}^2}{c^2}$$

We can now apply the above theory to the phenomenon of stellar aberration. Assume that the star is one million light years away. Suppose that at the instant of light emission stationary observer O is at point P and moving observer A is at point P', as shown in the following figure.

Suppose that during the time interval that light travels from S to point P, observer A moves from point P' to point P. This means that at the instant observer O detects the light pulse, observer A is just passing through point P. As discussed already, unconventionally, although observer A is also at point P at the instant of light detection by observer O, observer A will not detect the light yet. This is because, for observer O light travels a shorter path SP, whereas for observer A light travels longer path SP' (or path S'P or path S''P'').



As we have already calculated, observer A will detect the light at point P'', τ seconds later than observer A, where $\tau = 1.5768 \times 10^5$ seconds = 43.8 hours , and the distance between points P and P' is 4.7304×10^6 km.

Note again that the center of the wave fronts is co-moving with observer A, and is just at point S'' at the instant of light detection by observer A at point P''. This ensures constancy of the speed of light relative to observer A regardless of absolute velocity of observer A. Since the speed of light is constant *c* relative to the center of the wave fronts and since the observer and the center of the wave fronts are co-moving, the speed of light is always constant *c* relative to the observer.

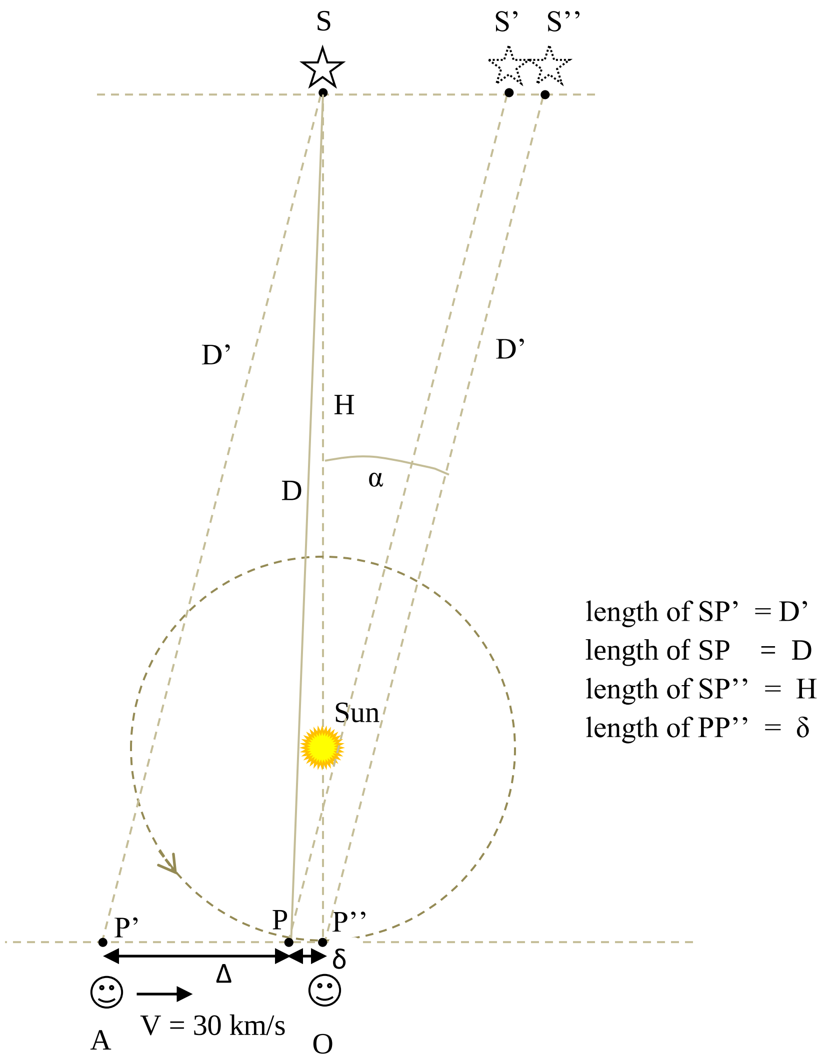
To see how this theory can be a scientific proof of God, suppose that observer A , instead of moving, is also at rest at point P while the light is in transit (for about one million years). Assume that, just before the light reaches point P, observer A accelerates instantaneously to a velocity of 30 km/s, in the vicinity of point P.

Now, we know that if observer A remained at rest at point P, he/she would observe the light as coming from S, just like observer O. However, since observer A has accelerated to 30 km/s he/she observes the light while moving with a velocity of 30 km/s , therefore he/she will see the star light as coming from the direction parallel to S''P''.

We can see a paradox here. Observer A was at rest at point P for almost one million years, until just before the light reached point P. So the light for observer A, like the light for observer O, must have come all the way from S, along the path SP. However, after observer A accelerated to 30 km/s instantaneously, the light appears to come from S'' , along the path S''P''. Did the acceleration of observer A have the effect of going back in time and changing where light was emitted ? No.

This paradox can be resolved as follows. One million years ago, God made the star emit light for observer A from S, with the center of the wave fronts moving to the right with the velocity 30 km/s, because God had/has a foreknowledge that observer A would instantly accelerate to 30 km/s at some instant of time after one million years, just before the light reaches point P. So the light for observer A never came from S along the path SP in the first place, but from S'' that is moving to the right with velocity 30 km/s.

In the above analysis of stellar aberration, the moving observer detects the light at point P'' which is not precisely on the orbit. For a precise analysis, we start by assuming that the moving observer detects the light at a point P'' precisely on the orbit. The stationary observer will be at point P that is not on the orbit.



Then the problem will be to determine the distances of points P and P' relative to point P'', that is to determine Δ and δ .

$$time\ taken\ by\ light\ to\ move\ from\ S\ to\ P\ = time\ taken\ by\ observer\ to\ move\ from\ P'to\ P$$

$$\frac{D}{c} = \frac{\Delta}{V_{abs}} \quad \Longrightarrow \quad \Delta\ = D\ \frac{V_{abs}}{c}$$

And

$$\delta = \ V_{abs}\ (\frac{D'}{c} - \frac{D}{c}\ )$$

Also,

$$\sqrt{H^2 + \delta^2} = D$$

and

$$\delta = \sqrt{D'^2 - H^2} - \Delta$$

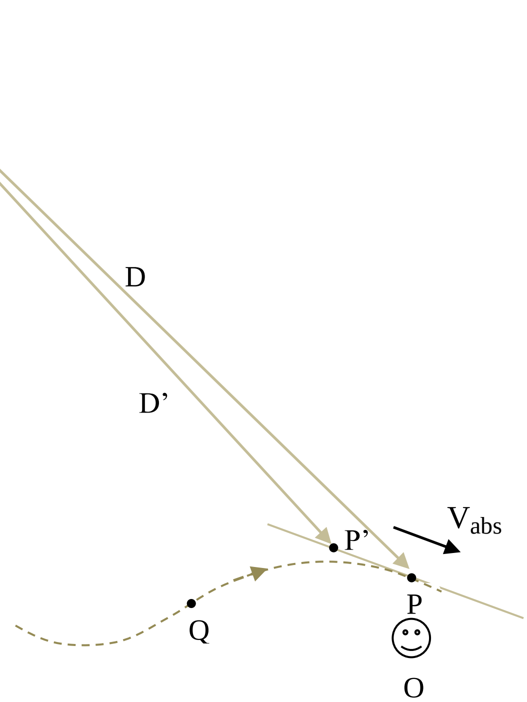
From the last four equations, D, D', Δ and δ can be determined, for a given H and V_{abs} = 30 km/s.

$$\sin\alpha = \frac{\Delta + \delta}{D'}$$

Acceleration

So far we discussed the case of inertial observers.

Now let us consider the case of a non-inertial observer. Suppose that a stationary source S emits a short light pulse at time *t* = 0. A non-inertial (accelerating) observer is at point Q at the instant of light emission. The dotted line is the path of the non-inertial observer. The magnitude and direction of the observer's absolute velocity continuously changes.



The point P where the light pulse and the non-inertial observer 'meet' is determined from the equation of motion of the observer, or by using numerical method. Assume that the non-inertial observer and the light pulse arrive simultaneously at point P and, as we have stated already, an observer O at rest at point P will detect the light pulse at this instant. However, the moving observer, although just passing through point P at this instant, will not detect the light pulse at point P because he/she has either detected the light already or will detect the light yet, and we will shortly see which of these cases it will be.

Therefore, the time taken by the non-inertial observer to move from point Q to point P is equal to the time taken by light to move from S to point P.

$$time\ taken\ by\ non-inertial\ observer\ to\ move\ from\ Q\ to\ P$$
$$= time\ taken\ by\ light\ to\ move\ from\ S\ to\ P$$

$$\frac{lenth\ of\ curved\ path\ QP}{average\ speed\ of\ observer\ between\ Q\ and\ P} = \frac{length\ of\ path\ SP}{light\ speed}$$

From the above equation the time delay t_0 of light for an observer O who is at absolute rest at point P can be determined.

Therefore, the procedure of analysis is first to determine the time interval t_0 of detection of light by stationary observer O. This includes the determination of point P along the path of the non-inertial observer. Once we have determined point P, we draw a tangent line through point P. We then assume an imaginary inertial observer A' that has been moving along the tangent line, with absolute velocity equal to the instantaneous velocity (V_{abs}) of the non-inertial observer at point P. From the time delay of light (t_0) obtained for observer O, we can determine the point P' where the imaginary inertial observer A' was at the instant of light emission.

Therefore,

$$length\ of\ line\ PP' = V_{abs}\, t_0$$

We can see that the path length (D') of light for the imaginary observer is less than the path length (D) of light for observer O. Therefore, imaginary inertial observer A' will detect the light at some point P'' earlier than observer O. Once we have determined point P and the position of observer A' at the instant of light emission (which is point P'), the rest of the analysis is the same as discussed already.

Conclusion

Absolute motion and relative motion have always been seen as mutually exclusive. In this paper, we have proposed that absolute motion and relativity can co-exist. We have shown how absolute motion can exist and the speed of light can be constant at the same time. We have provided a new interpretation of absolute motion and relativity. The relativity we proposed is unlike Galileo's or Einstein's, both of which are based on the reference frame concept. The new interpretation of absolute motion is also unlike ether theory. All the theories of absolute motion and relativity discussed in this paper directly point to nature's foreknowledge of future observer motions, which implies the intervention of God in all light speed phenomena.

Glory be to Almighty God Jesus Christ and His Mother, Our Lady Saint Virgin Mary

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