Intrinsic Absolute Motion Paradigm and Apparent Source Theory-Distinction Between Translational and Rotational Motions

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Abstract

One of the most confusing problems in physics is whether there is fundamental distinction between translational and rotational motions. The conventional view seems to be that there is no distinction. It is suggested in this paper that the failure to make this distinction is deeply rooted in 'ether thinking' because according to ether theory there is no distinction. Despite all claims that modern physics has got rid of the ether, physicists, including Albert Einstein, have never been able to truly escape the ether 'trap'. It is proposed in this paper that translational motion and rotational motion are fundamentally different and should be treated differently. It was years of struggle to explain the Michelson-Morley experiment and the Sagnac effect within the same theoretical framework that finally led to this conclusion. There are two possible interpretations of the Michelson-Morley experiment (MMX): the 'null' interpretation and the non-null interpretation. From the point of view of stationary ether theory, the MMX result is essentially null because the observed fringe shift is much smaller than the expected value. On the contrary, the MMX result is non-null from the perspective of relativity theories, mainly the classical emission theory and the Special Relativity Theory (SRT) because there was always a small but significant fringe shift observed, as in the Miller experiments. Therefore, the MMX disproves not only the ether theory, but also the emission theory and SRT. A correct theory of the speed of light, therefore, should account not only for the 'null' interpretation, but also for the non-null interpretation. To this date there is no such known, accepted theory of light. A new theory called Apparent Source Theory (AST) I have already proposed has resolved this century old puzzle, even though not yet known to the majority of the scientific community. AST predicts the small fringe shifts observed in MM experiments. In this paper it will be shown that AST predicts a maximum fringe shift of about 0.013 fringes for the 1881 Michelson experiment. Michelson measured a maximum fringe shift of about 0.018 fringes ! The discrepancy may be reduced if more details of the dimensions of the apparatus are obtained. AST successfully resolved the enigmatic contradiction between the Michelson-Morley experiment and the Sagnac effect. No known existing theory of light has truly achieved this. For years, I chose to treat the Sagnac effect basically as a translational motion. However, with this approach I could not develop a complete and convincing explanation of the Sagnac effect, leading to the conclusion that rotational motion must be distinct from translational motion, implying distinction between translational AST and rotational AST. On the other hand, Apparent Source Theory was found to be in conflict with stellar aberration, a simple analysis I overlooked for years. These apparent contradictions may be resolved by resorting to a new paradigm: Intrinsic Absolute Motion (IAM). The ether doesn't exist, as disproved by the Michelson-Morley experiment, but absolute motion does exist, as proved by the Silvertooth and other experiments. Absolute motion without the ether could be conceived only if absolute (translational and rotational) motion is intrinsic to physical entities. The application of AST to electrostatics also hinted at the need for the IAM paradigm. Mercury perihelion advance anomaly also hinted at the distinction between rotational and translational motions. Distinction between translational and rotational motions implies intrinsic nature of absolute motion. Therefore, Intrinsic Absolute Motion paradigm completes Apparent Source Theory. IAM paradigm makes distinction between *equal* velocities and *same* velocity of two bodies.

Introduction

According to the principle of relativity, no experiment (optical, electromagnetic or mechanical) exists that can detect absolute motion. This presumption has already been conclusively disproved experimentally, such as by the Silvertooth experiment. The failure of conventional first and second order experiments to detect absolute motion of the Earth was not because absolute motion doesn't exist, but because the experimental setups or their understanding were flawed or the sensitivity of the experiments was very small.

I have already developed a new theoretical frame work[1], of which Apparent Source Theory (AST) is one component, that can explain the outcomes of many experiments that have succeeded and failed to detect absolute motion.

Despite the successful application of Apparent Source Theory to many light speed experiments, electrostatic and gravitational phenomenon, some problems persistently kept popping up all the time. Some of these were:

- The explanation of Sagnac effect by Apparent Source Theory was not complete and convincing
- The explanation of Mercury's perihelion advance also seemed to be incomplete
- A contradiction existed between Apparent Source Theory with the phenomenon of stellar aberration.
- There was a conceptual problem with the application of Apparent Source Theory to a charge and observer in independent motions

Considering the successes of AST, therefore, these problems should be viewed as showing that AST is a correct but incomplete theory. It turns out all these problems may have been hinting at yet another profound mystery of the universe.

Apparent Source Theory (AST)

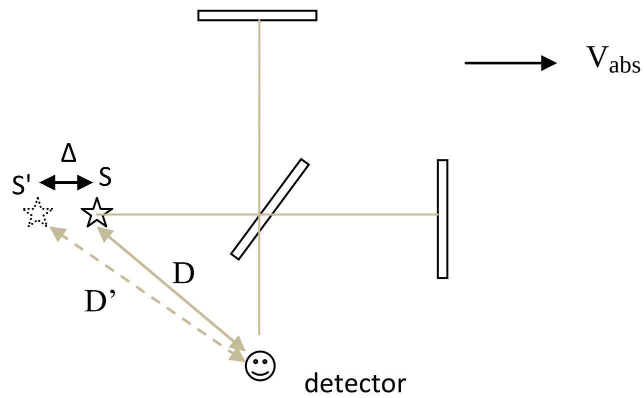
The new theory[1], Apparent Source Theory (AST), of the speed of light that successfully reconciled the Sagnac effect and the Michelson-Morley experiment is formulated below.

The effect of absolution motion for co-moving light source and observer/detector is to create an apparent change in position of the source relative to (as seen by) the observer. The apparent change in position of the source depends on the direct source-observer distance and the orientation of the source-observer line relative to the absolute velocity vector and the magnitude of the absolute velocity. The procedure of analysis of light speed experiments is:

1. Replace the real light source by an apparent light source
2. Analyze the experiment by assuming that the speed of light is constant relative to the apparent source.

A comprehensive description of AST is found in my previous papers[1].

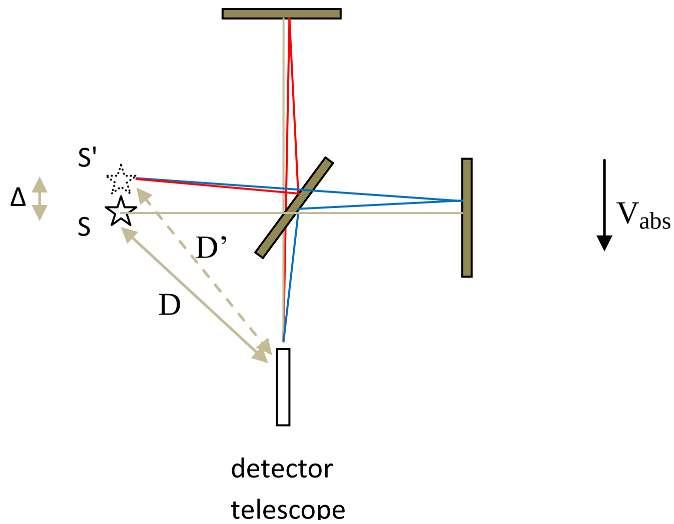
We will see that this theory (AST) can easily explain the Michelson-Morley experiment null result.



According to Apparent Source Theory, there will be an apparent change in position of the light source as seen by the detector. The apparent change in source position is determined by the source-detector <u>direct</u> distance D, the magnitude and direction of the absolute velocity V_{abs} .

As shown in the above figure, for absolute velocities directed to the right, the apparent change in source position (which is to the left) will not result in any fringe shift for the same reason that no fringe shift will occur if the source position was *actually*, *physically* shifted slightly because both the longitudinal and transverse (virtual) light beams would be affected (delayed or advanced) identically. We can see that, according to AST, for absolute velocities directed to the right or to the left, the Michelson-Morley experiment result is literally null.

In general, there may be small but significant fringe shifts for other directions of absolute velocities. For example, for absolute velocity directed downwards, there will be an apparent change of source position upwards as shown below. There will be difference in change of path length of the two light beams, the red and the blue. The path lengths are calculated by assuming an actual/physical change of source position from S to S' , which should result in a small fringe shift. The actual calculation of the difference of the two path lengths is a straightforward, elementary optics problem, but somewhat involved. Note that the law of reflection (angle of incidence equals angle of reflection) applies to the virtual light rays as for real light rays.



We can see from the diagram above that, according to AST, the effect of absolute motion is not only to create a change in path difference but also misalignment of the two light beams.

Next we will attempt to calculate the fringe shift in the 1881 Michelson ether drift experiment.

L1 = 1.2m , L2 = 1.2m , H1 = 20cm , H2 = 10cm , λ= 575 nm

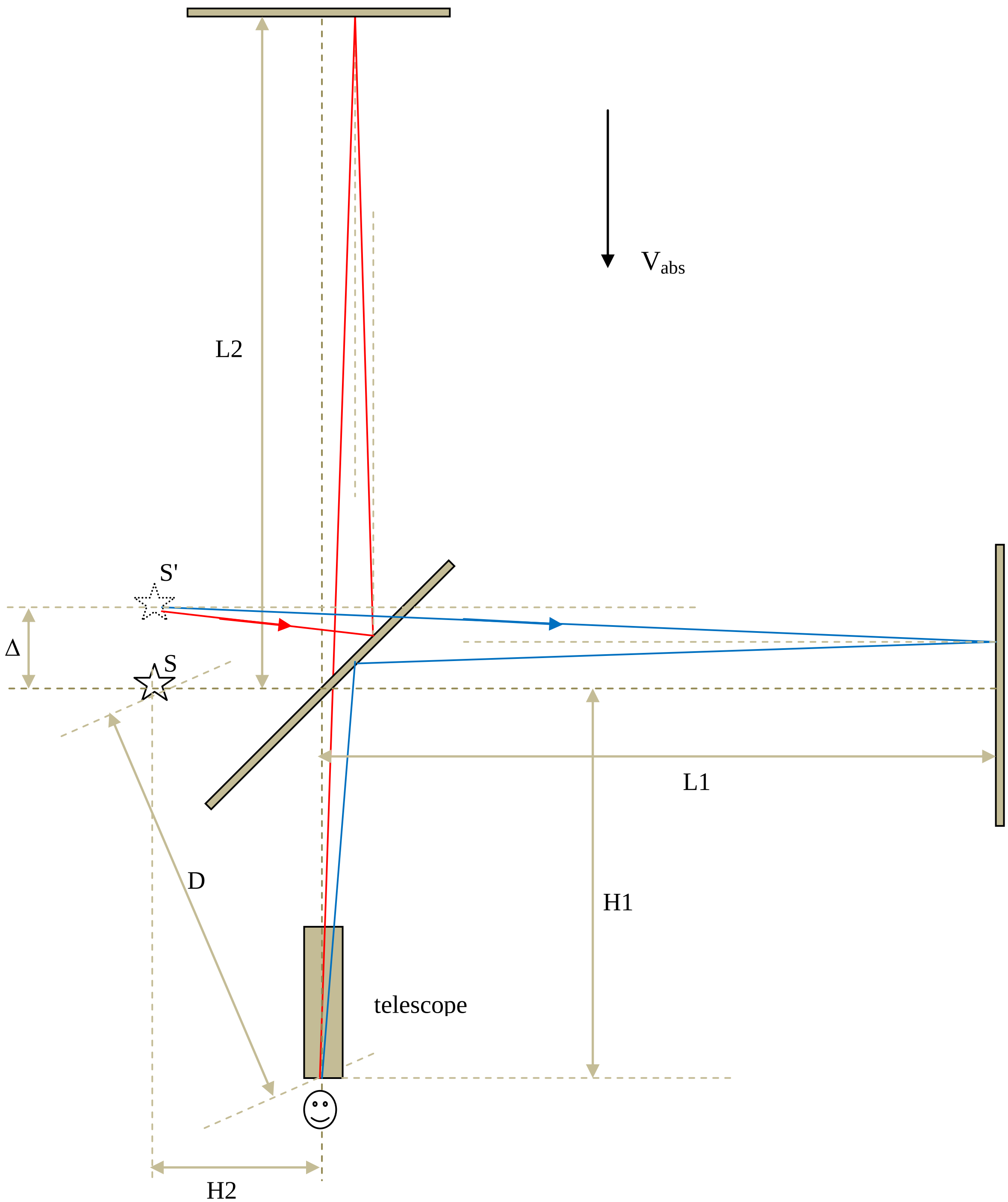
The values for H1 and H2 are just guessed. We will also assume the absolute velocity of the Solar System, which is about 390 Km/s .

The distance D is calculated as:

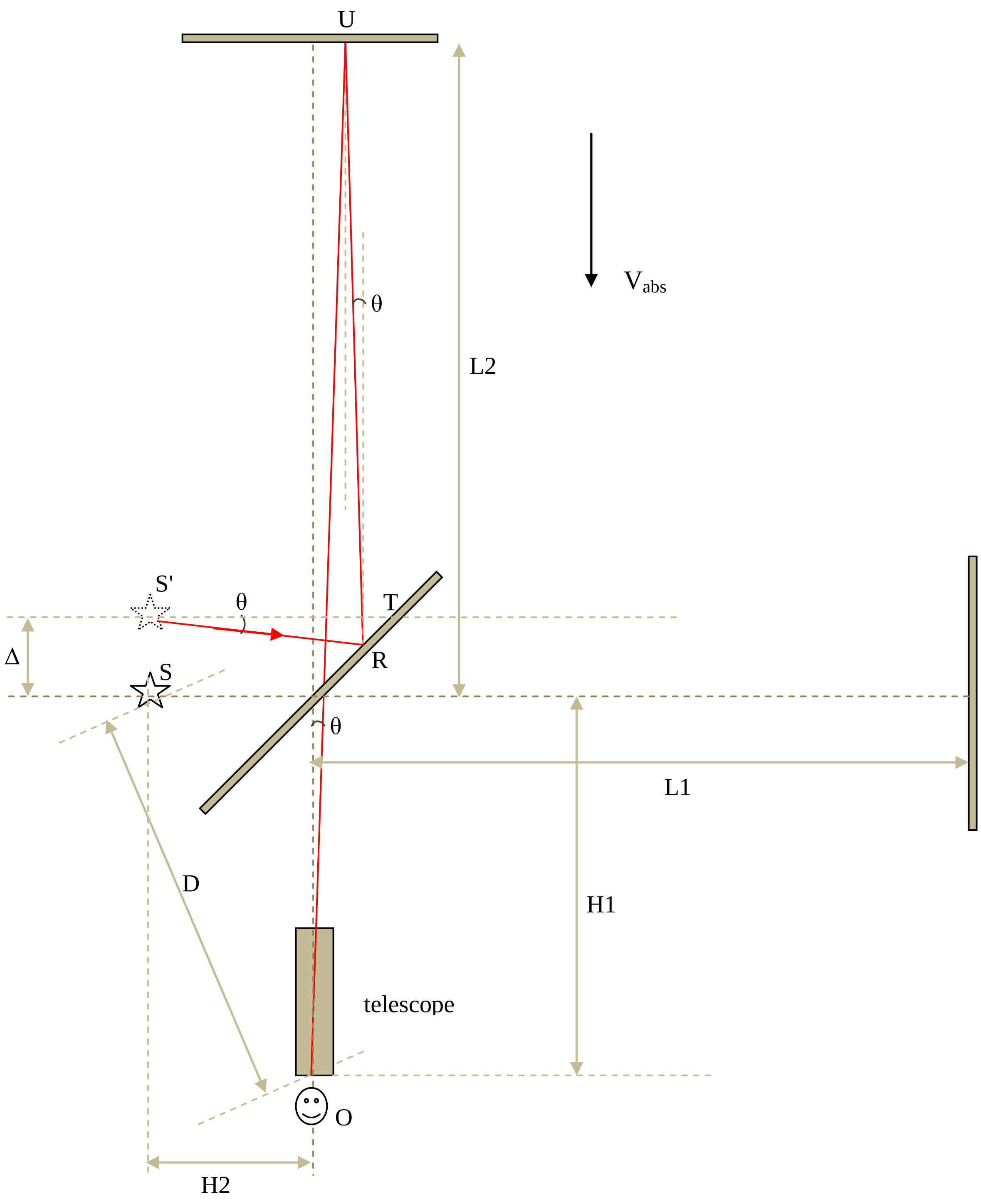
$$D = \sqrt{H1^2 + H2^2} = 10\sqrt{5}\ cm = 22.36\ cm$$

From my previous paper[1] Δ can be approximated by

$$\Delta \cong \frac{V_{abs}}{c} D = \frac{390\ Km/s}{300000 Km/s} * 22.36cm = 290.68\ \mu m$$

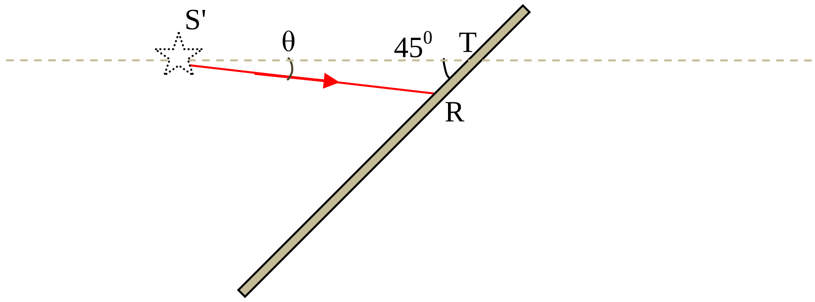


Next we determine the path length of the red light beam.



Note that the angles marked θ in the above diagram can be easily shown to be equal.

Consider the triangle S'TR .



We can determine the length of the red light beam, i.e. side S'R of the triangle as follows.

$$\frac{\sin(180^0 - 45^0 - \theta)}{S'T} = \frac{\sin 45^0}{S'R}$$

But

$$S'T \ = \ H2 \ + \ \Delta \tan 45^0$$

Substituting this value in the previous equation:

$$S'R \ = \ \sin 45^0 \ * \ \frac{S'T}{\sin(180^0 - 45^0 - \theta)} = \ \sin 45^0 \frac{S'T}{\sin(135^0 - \theta)}$$

From the previous diagram it is easy to figure out that:

$$(S'R \ \sin\theta \ + (\ L2 - \Delta))\tan\theta \ + \ (\ L2 + H1\ )\tan\theta \quad = \quad S'R\cos\theta - \ H2$$

Substituting the previous value of S'R in the above equation:

$$(\frac{S'T}{\sin(135^0 - \theta)}\ \sin\theta\sin 45^0 + (\ L2 - \Delta))\tan\theta \ + \ (\ L2 + H1\ )\tan\theta \ = \ \frac{S'T}{\sin(135^0 - \theta)}\cos\theta\ \sin 45^0 - \ H2$$

Since S'T is known (given H2 and Δ), the only unknown in the above equation is θ. Once θ is determined, the lengths of all the component parts (S'R , RU , UO) of the red light beam can be calculated as follows.

Again from the diagram it can be seen that:

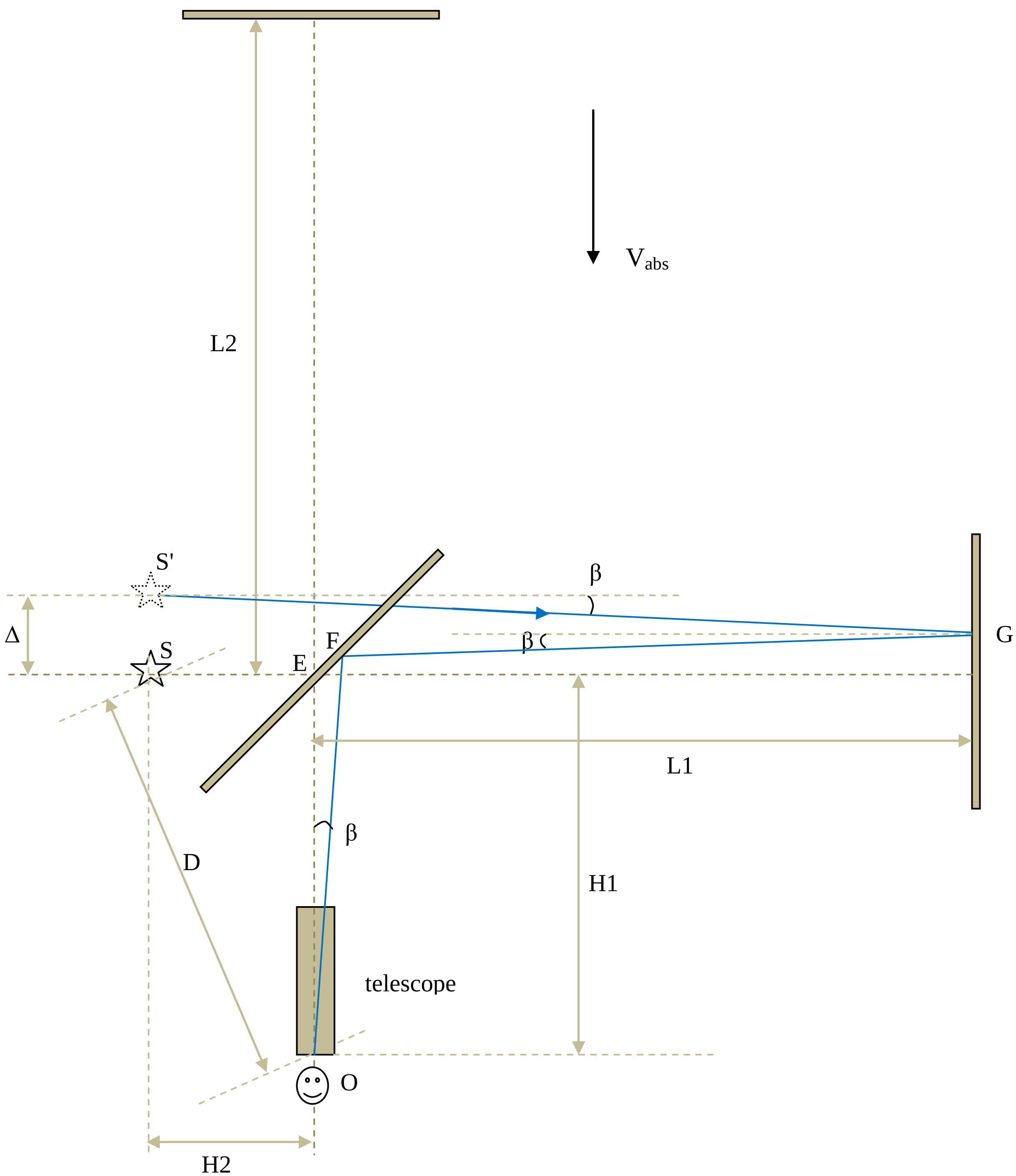
$$RU \ = \ S'R \ \sin\theta \ \ + \ \ (\ L2 - \ \Delta\ )$$

and

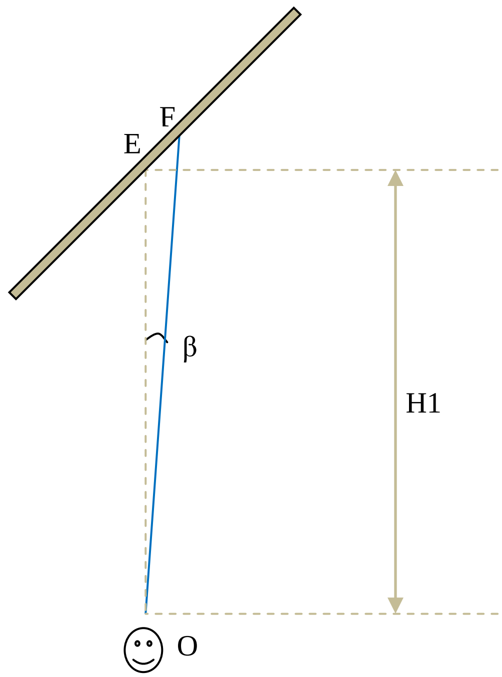
$$UO = \frac{L2 + H1}{\cos\theta}$$

We will not use analytical method here as it is very tedious; we will use Excel to solve the above equations.

Next we make these calculations for the blue light beam. Note again that the angles marked β can be easily shown to be equal.



Consider the triangle OEF below.



We can easily see that angle E is equal to 135^0 (because the beam splitter has 45^0 inclination). Therefore, angle F will be equal to $180^0 - 135^0 - \beta = 45^0 - \beta$.

To determine the length of the light ray OF we use the relationship:

$$\frac{\sin(45^0 - \beta)}{H1} = \frac{\sin 135^0}{OF}$$

From which

$$OF = \frac{H1}{\sin(45^0 - \beta)} \sin 135^0$$

With some thought we can see that:

$$(L1 - OF \sin\beta) \tan\beta + (L1 + H2) \tan\beta = (H1 + \Delta) - OF \cos\beta$$

We substitute the value of OF in the above equation:

$$(L1 - \frac{H1}{\sin(45^0 - \beta)} \sin 135^0 \sin\beta) \tan\beta + (L1 + H2) \tan\beta = (H1 + \Delta) - \frac{H1}{\sin(45^0 - \beta)} \sin 135^0 \cos\beta$$

The only unknown in the above equation is β .

Once β is determined, the lengths of all the three components of the blue ray (OF , FG , S'G) can be determined.

$$FG = \frac{L1 - OF\sin\beta}{\cos\beta}$$

Substituting the value of OF in the above equation:

$$FG = \frac{L1 - \frac{H1}{\sin(45^0 - \beta)}\sin 135^0 \sin\beta}{\cos\beta}$$

And

$$S'G = \frac{L1 + H2}{\cos\beta}$$

We will use Excel to solve the above equations.

Once the path lengths of the red and blue light beams is determined, we can calculate the fringe shift from the difference in path lengths.

I used Excel to solve the equations for θ and β .

$$\left(\frac{S'T}{\sin(135^0 - \theta)}\sin\theta\sin 45^0 + (L2 - \Delta)\right)\tan\theta + (L2 + H1)\tan\theta = \frac{S'T}{\sin(135^0 - \theta)}\cos\theta\sin 45^0 - H2$$

$$\left(L1 - \frac{H1}{\sin(45^0 - \beta)}\sin 135^0\sin\beta\right)\tan\beta + (L1 + H2)\tan\beta = (H1 + \Delta) - \frac{H1}{\sin(45^0 - \beta)}\sin 135^0\cos\beta$$

By substituting the values of the dimensions for L1, L2, H1, H2 we assumed earlier, i.e.

L1 = 1.2m, L2 = 1.2m , H1 = 20cm , H2 = 10cm, λ = 575 nm, Δ = 290.68μm

I obtained the values of θ and β using Excel.

θ = 0.0001211 radians and β = 0.00012638 radians

from which I calculated the path lengths of components of the red and the blue light.

The components of the red light beam are:

S'R = 0.100280271247555m RU = 1.1997197292927m UO = 1.4000000075424 m

The total path length of the red light beam will be the sum of the above three components:

red light ray total path length = 2.70000000808265m

The components of the blue light beam are:

OF = 0.200021534877466m   FG = 1.19997847323555m   S'G = 1.30000000753352 m

The total path length of the blue light beam will be the sum of the above three components:

blue light ray total path length = 2.70000001564654 m

The difference in path lengths of the red and blue light beams will be:

path difference caused by absolute motion = 7.56388907063865 nm

The fringe shift will be:

fringe shift = path difference / wavelength = **7.56388907063865 nm / 575 nm**

= 0.01315 fringes

Note that Michelson in his 1881 experiment measured a maximum average fringe shift of 0.018 fringes ! The discrepancy might be because we used roughly estimated values for H1 and H2 .

We can see how complicated it would be to analyze (using AST) the 1887 Michelson-Morley experiment (MMX) in which the two light beams undergo many reflections before combining at the detector. In this paper we have analyzed the 1881 Michelson experiment.

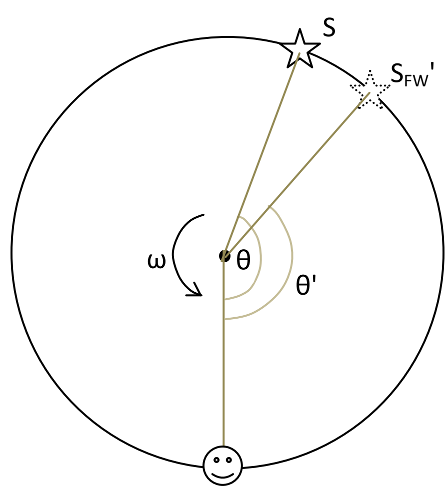
I would like to refer the reader to a modified Michelson-Morley experiment I proposed [3] which is many orders of magnitude more sensitive than conventional MMX.

The Sagnac effect

Despite the fact that I got the initial insight of AST while pondering the Sagnac effect, for years I found it hard to apply AST to the Sagnac effect as formulated above. The key problem was that I could not conceive of any idea how to determine the apparent position of the light source in the case of a rotating Sagnac device. Using the direct source-observer distance as in the Michelson-Morley experiment would lead to wrong and complicated result which is not compatible with the simple Sagnac formula we know. In hind sight, the correct approach would have been to treat the Sagnac effect differently from the Michelson-Morley experiment. This means that Apparent Source Theory should be applied differently for absolute translational motion and for rotational motion. I always avoided this approach because I was stuck with the view that a good theory is one that treats both with the same procedure. I thought that experiments involving rotational motion should basically be treated as translational motion problems. However, despite several years of work, I couldn't develop a convincing explanation of the Sagnac effect by this approach. There were always flaws found in those explanations.

This led to the final conclusion that the Sagnac effect should be treated somewhat differently. However, it should be noted that even if we use different procedures, the two experiments are still treated within the same theoretical framework: Apparent Source Theory. Therefore, there would be two forms of Apparent Source Theory: translational AST and rotational AST.

Next we formulate rotational AST. Consider a light source and observer rotating about a common center.

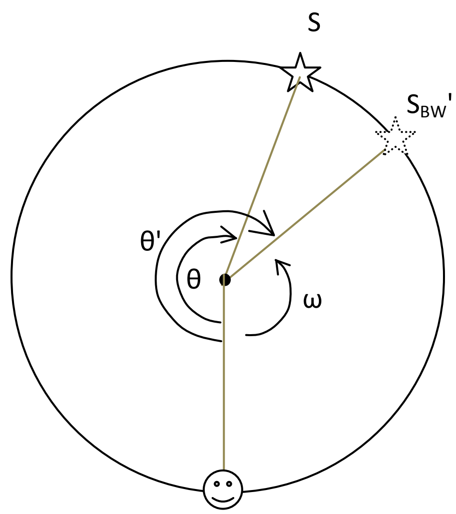


For the case of the observer looking forward, Rotational Apparent Source Theory is formulated as follows.

$$\theta' = \theta \frac{c}{c + \omega R}$$

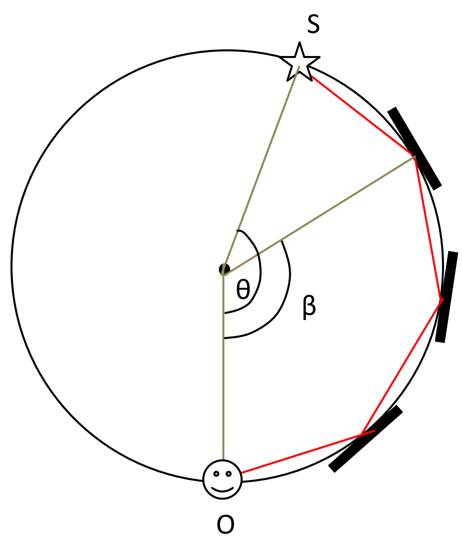
where θ is the angular position of the actual light source (S) relative to the observer, θ' is the angular position of the apparent source (S')relative to the observer and R is the radius of the circular path of the source.

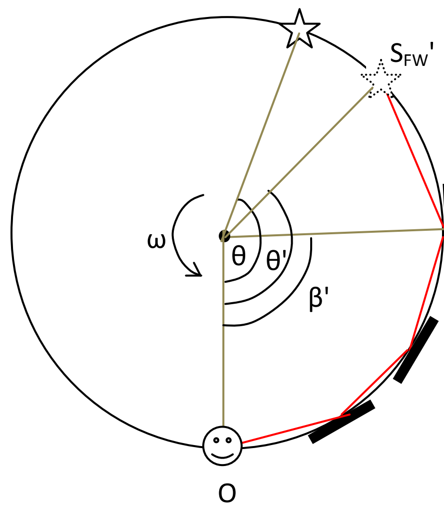
For the case of the observer looking in the backward direction, Rotational Apparent Source Theory is formulated as follows.



$$\theta' = \theta \frac{c}{c - \omega R}$$

Consider the following case involving mirrors.





The top figure represents a device at rest (not rotating). The bottom figure represents a rotating device.

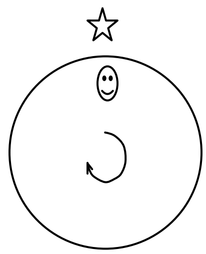
The apparent position of the mirrors is determined by similar formula as for the light source.

$$\beta' = \beta \frac{c}{c + \omega R}$$

where β is the actual/physical angular position of a mirror relative to (as seen by) the observer, β' is the apparent position of the mirror relative to the observer and R is the radius of the circular path of the mirror.

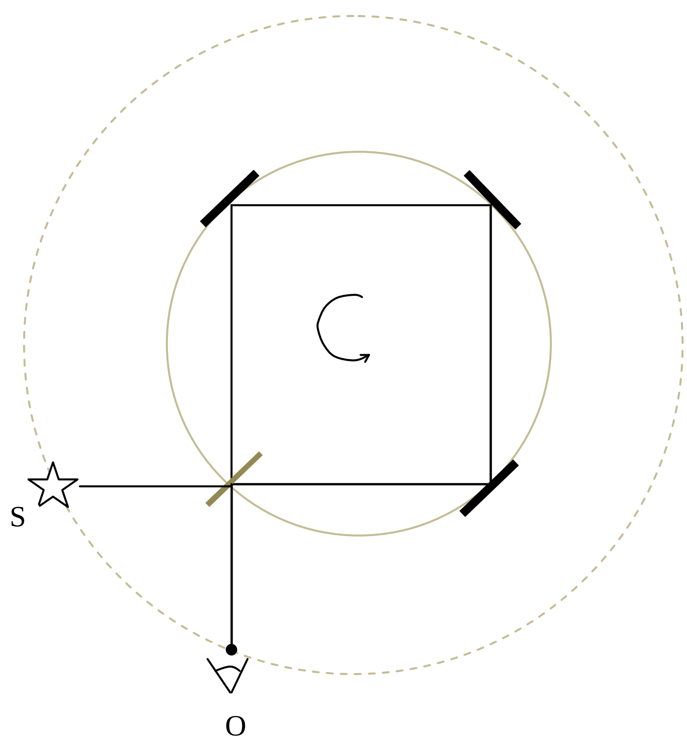
In the case of the Michelson-Morley apparatus, apparent change in position will apply only to the light source, not to the mirrors. Since we are applying different treatments to the Sagnac effect and the Michelson-Morley devices, this may not necessarily be seen as an inconsistency. It should be noted that both experiments are treated within the same theoretical framework: Apparent Source Theory (AST). Rotational AST applies to the Sagnac effect, whereas translational AST applies to the Michelson-Morley experiment. I cannot give a clear explanation for such difference in treatments for now. The formulation of rotational AST has been guided by empirical evidence : the simple Sagnac formula. However, it should be noted that, even though the light source, the mirrors and the detector can be said to be at rest relative to each other in the case of a rotating Sagnac device, this is different from the case of the Michelson-Morley apparatus in absolute motion.

Now consider a hypothetical Sagnac interferometer, with light propagating in a circular path by continuous reflection from a circular mirror.



According to the postulate of the constancy of the phase velocity of light[1], there will not be any fringe shift in such a device. The only way to explain the fringe shift in the Sagnac effect is to assume an apparent change in position of the light source as seen by the detector. The light source apparently shifts towards the observer/detector when 'looking' in the forward direction, and away from the detector when looking in the backward direction. The detector is at rest relative to the two apparent sources (when looking forward and backward) , the apparent path lengths of the forward and backward light beams will differ and hence a fringe shift will occur. This is the new theory, Apparent Source Theory (AST) , already proposed in [1] by this author.

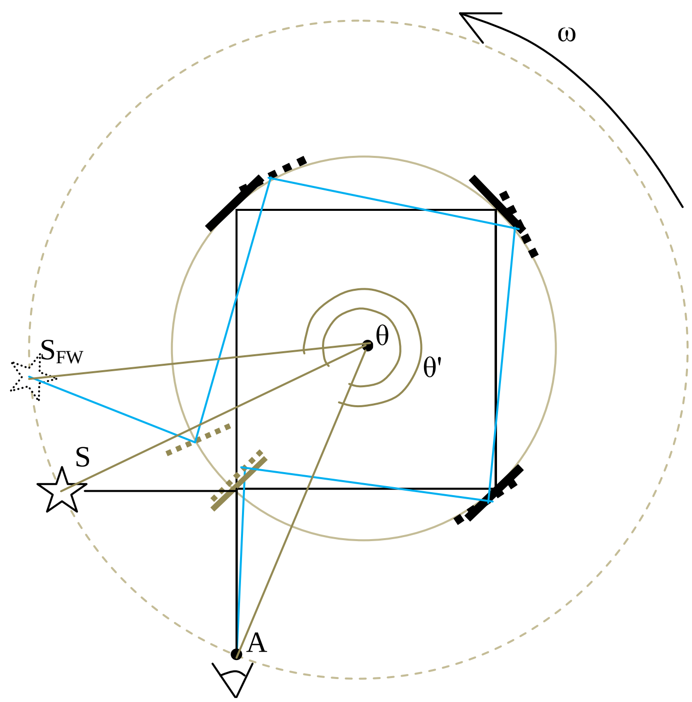
Now let us consider the real Sagnac device, as shown below.



For years, I treated the Sagnac effect as a translational problem. With this approach, it was easy to analyze the simple hypothetical Sagnac experiment discussed above. The complete application of AST to the real Sagnac device, however, in contrast to the hypothetical case, has been difficult. This difficulty led me to the conclusion that absolute translational motion and absolute rotational motion must be fundamentally different. Both the Michelson-Morley experiment and the Sagnac effect are analyzed within the same theoretical framework: Apparent Source Theory (AST). However, they will be treated differently : translational AST and rotational AST.

Since rotational AST is distinct from translational AST, we can directly postulate rotational AST as we did for translational AST. There will be no 'derivation' of rotational AST from translational AST. We have postulated rotational AST based on empirical evidence alone: i.e. the simple Sagnac effect we know from experiments.

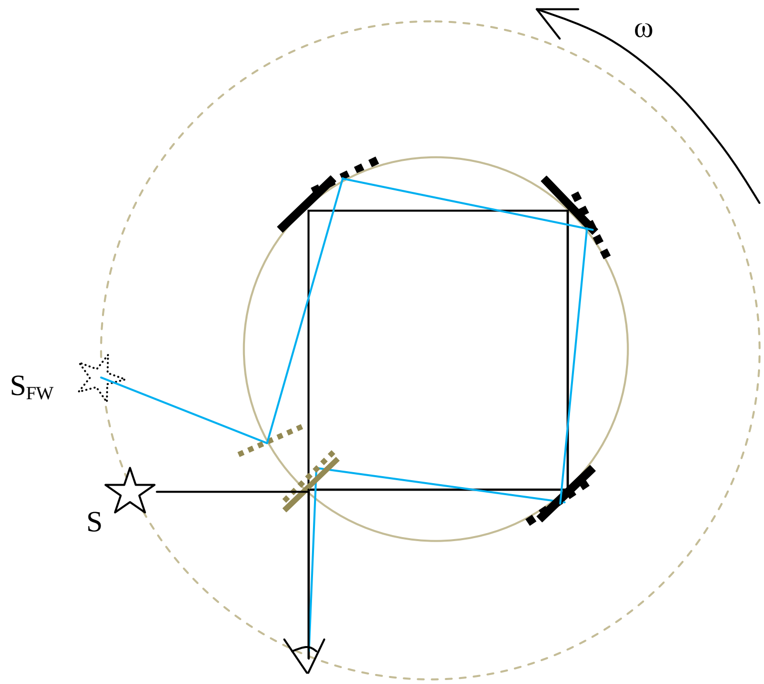
Consider a Sagnac interferometer rotating in the counterclockwise direction, as shown below.

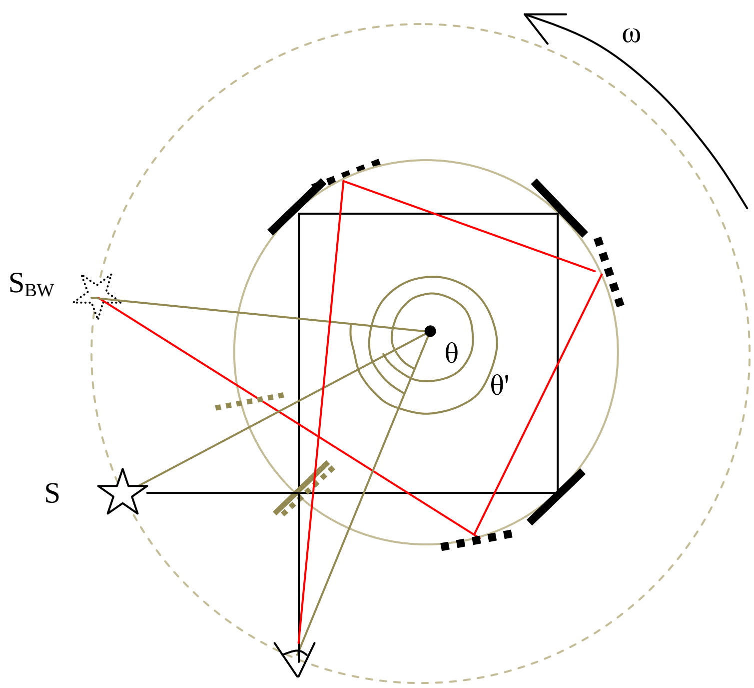


The apparent position of the light source is determined from:

$$\theta' = \theta \frac{c}{c + \omega R}$$

The apparent position of the mirrors can also be determined with similar formula way, as proposed already.

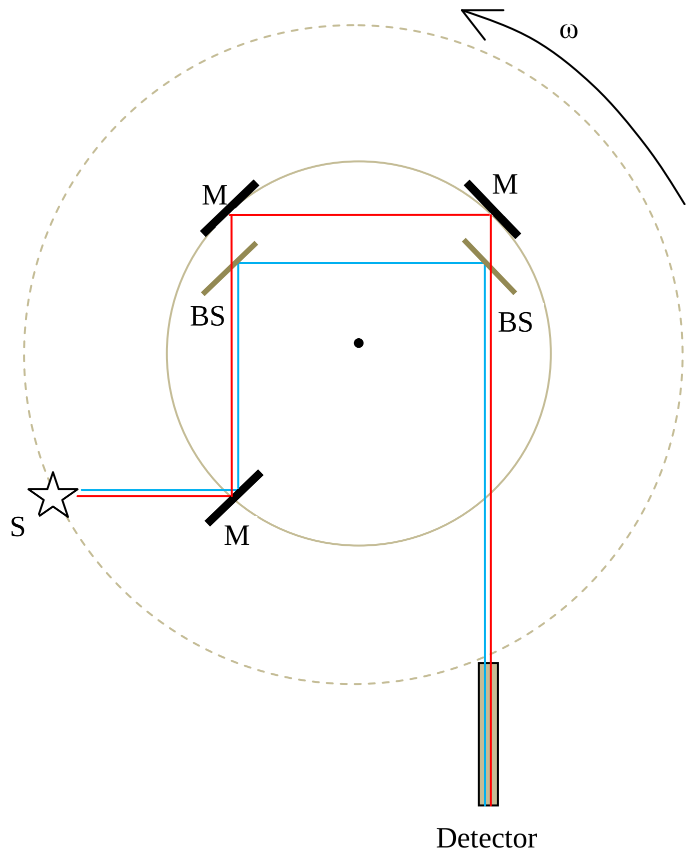




$$\theta' = \theta \frac{c}{c + \omega R}$$

Modified Sagnac experiment - a proposal

The conventional Sagnac apparatus involves two light beams propagating in opposite directions. It will not distinguish between (rotational) AST and ether theory.



Here we propose a modified Sagnac experiment in which two light beams propagate in the same direction (CW or CCW) , instead of in opposite directions, as shown above. M represents mirror and BS represents beam splitter.

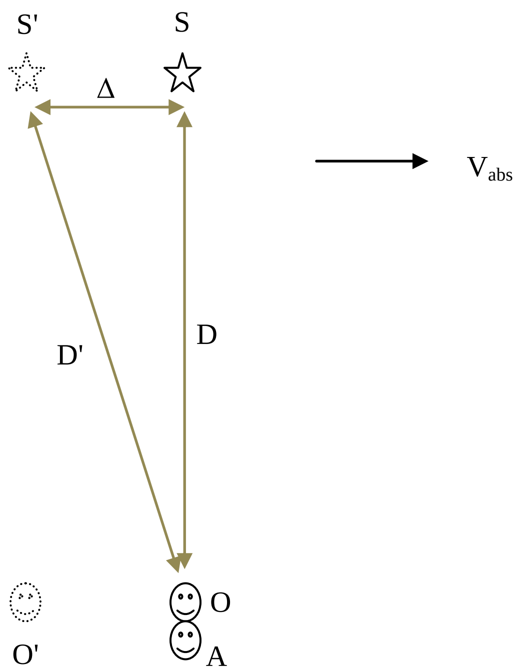
It is proposed here that the result of this experiment will be 'null', just as that of the Michelson-Morley experiment. This means that there will be a small fringe shift which is much less than the value predicted by ether theory. If this is confirmed, it will be another disproof of ether theory and Einstein's relativity and proof of rotational AST.

Contradiction between Apparent Source Theory and the phenomenon of stellar aberration

I have recently discovered a contradiction between Apparent Source Theory and the phenomenon of stellar aberration, which I overlooked for years. Since AST has a firm logical and experimental foundation, this contradiction is seen here as the incompleteness of AST, rather than as a disproof of AST.

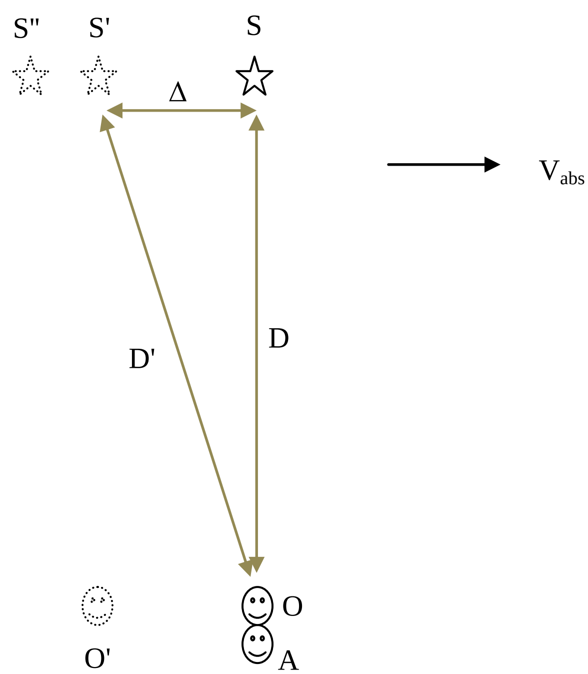
Contradiction of AST with stellar aberration

Imagine absolutely co-moving light source S and observer O. Assume also another observer A who is at absolute rest.



Assume that the source emits light at the instant when it is at position S' and the co-moving observer is at position O'. The observer A is always at absolute rest at position A. Assume that moving observer O detects the light just at the instant that he/she is passing through the location of stationary observer A. According to Apparent Source Theory (AST), the co-moving observer O has to point his telescope towards point S' to see the light, due to apparent change in position of the light source for absolutely co-moving source and observer[1]. Since moving observer O and stationary observer A are at the same point at the instant of light detection, observer A will also detect the light at that instant. However, we know that the stationary observer A should also point his telescope in the direction of S', the point in space where light was emitted. We see that both the stationary observer and the moving observer would point their telescopes in the same direction to see the light. This is in contradiction with the phenomenon of stellar aberration and is a real challenge to Apparent Source Theory, because, according to the theory of stellar aberration, co-moving observer should point his telescope towards current position (S) of the source, which contradicts AST.

As another related contradiction, suppose that at the instant of light detection, the co-moving observer O instantaneously starts moving to the left with velocity V_{abs} relative to the source. This would make observer O to be stationary at the point where observer A is located because the forward absolute velocity V_{abs} of observer O to the right will be cancelled by the backward velocity V_{abs} of O relative to the source. Since observer A and observer O are now both stationary at almost the same point in space, both should observe the light in exactly the same way. We know that stationary observer A has to point his telescope towards point S', the point where the source was at the instant of emission. But, according to the theory of light aberration, if observer O had to point his/her telescope towards S' when co-moving with the source, he should point to the direction of S'' when moving relative to S (relative to S'), as shown below. Although observers A and O are at the same point in space and also both at absolute rest (therefore, at rest relative to each other), observer A has to point his telescope in the direction of S' , while observer O has to point his telescope towards direction S'', which is a contradiction.



Since both observers are at the same point in space and are at rest relative to each other, the light should come from the same direction for both observers. Which direction is correct ?

Astronomical observations of binary stars shows that stellar aberration depends only on the absolute velocity of the observer and is independent of absolute velocity of the light source[2]. This disproves the theory that observer O will see light coming from direction of S''.

This is another related contradiction of AST with the phenomenon of stellar aberration.

Apparent Source Theory - a theory implying intrinsic nature of absolute motion

The above contradiction between AST and the stellar aberration phenomenon was a challenge to AST. The proposed solution to this enigmatic problem required not only a new theory, but a new paradigm: intrinsic nature of absolute motion.

Intrinsic Absolute Motion (IAM) theory

The contradiction of Apparent Source Theory with stellar aberration led to the theory of intrinsic absolute motion paradigm. Intrinsic Absolute Motion theory introduces a new scientific paradigm. It introduces a new distinction between *equal motions* and *same motion* and between *translational* and *rotational* motions.

Two physical objects may have *equal* motions (equal velocities, equal accelerations, equal rates of change of acceleration, ...) . This paper introduces a new paradigm into physics: *equal* motion vs *same* motion. Two physical objects may have *equal* motions, but not *same* motion. Therefore, co-moving light source and detector will be at rest relative to each other, and will have *equal velocities*, but may or may not have *same velocity*. A light source and a detector with *equal* absolute velocities do not necessarily have *same absolute* velocity. Only they are at rest relative to each other, i.e. only their relative velocity is zero. In applying Apparent Source Theory, we use the common (*same*) absolute velocity, but not the individual, separate absolute velocities, of the light source and the observer.

Many questions may arise. What makes the distinction between a light detector that has only *equal* velocity as the source and a detector that has the *same* velocity as the light source ? Should the light source and detector have rigid mechanical connection ? Is there a continuum of coupling (unification) of the separate absolute velocities ? i.e. is there a degree to the *unification* of the separate absolute velocities ?

If the theory of intrinsic absolute motion is correct, then these questions are to be answered.

Conclusion

Absolute motion is defined only for physical entities, a system of physical objects and subsystems existing as a unit. Hence, absolute motion is intrinsic. The existing 'mechanistic' , 'extrinsic' scientific paradigm makes no such distinction. The successes of Apparent Source Theory, in combination with its apparent contradictions with experiments, led to the new theory proposed in this paper: intrinsic nature of absolute motion.

Thanks to God and the Mother of God, Our Lady Saint Virgin Mary

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