An Experiment to Test Absolute Motion

Henok Tadesse

entkidmt@yahoo.com

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Abstract

We propose a new experiment to test absolute motion based on time of flight technique. A novel method is proposed to overcome the difficulty in time of flight experiments, namely the difficulty in measuring extremely small time intervals. Two light transponders are each fixed to the ends of a rigid rod. Each transponder consists of a light detector unit and a light emitting unit. The light detector unit, upon detecting a light pulse, triggers the light emitting unit. Let the transponder on one end of the rod be Transponder 1 and the transponder on the other end be Transponder 2. Transponder 1 is initially started and emits a short light pulse towards transponder 2. Up on detecting the light pulse, the detector of Transponder 2 immediately triggers the emitter of Transponder 2, which emits a short light pulse towards Transponder 1. Up on detecting the light pulse, the detector of Transponder 1 immediately triggers the emitter of Transponder 1, which emits a short light pulse towards Transponder 2 , and so on. The new technique involves a free running, continuous exchange of a short light pulse. The frequency of the pulses is determined by the round trip time of light. Absolute motion of the rod would change the round trip time, and hence the frequency of the pulses. Two such rods (four transponders in total, two transponders on each rod) are used in the proposed experiment, with output pulse frequencies f_1 and f_2. The pulse trains from the two transponder pairs are applied to an electronic unit (consisting of mixers, filters, etc.) which detects the difference of the two frequencies: $f_1 - f_2$. If absolute motion exists, then a difference frequency is detected when the orientation in space of one rod is changed with respect to the other rod. This experiment would provide practically unlimited accuracy in measuring absolute velocity.

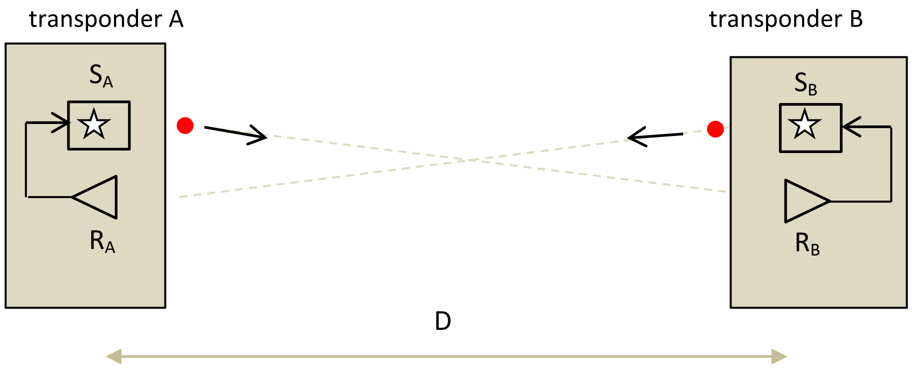
Introduction

Many experiments done to detect absolute motion have so far failed to detect any such effect. The most famous of these is the Michelson-Morley experiment, which has failed to detect any fringe shift. Many of these experiments are based on light interference technique. On the other hand, relatively recent experiments, such as the Silvertooth, the Marinov and the Roland De Witte experiments have detected large, first order effects. However, the scientific community has so far rejected these experiments. In this paper, we propose yet another novel experiment to detect absolute motion.

Proposed experiment

Consider two co-moving light transceivers (transponders) A and B, each fixed to the two ends of a rigid rod, with the distance between them being D. The detector of each transceiver detects light, upon which it triggers the emitter (source) of the transceiver to emit a light pulse[3].

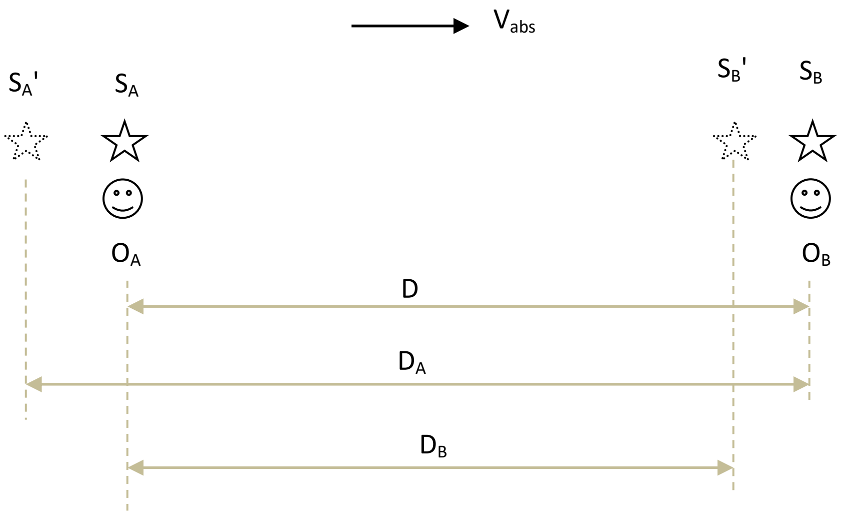
Electrical engineer, BSc, Debrezeit, Ethiopia   Mobile: +251 910 751339
or +251 912 228639   Alternate email: *wchmar@gmail.com*



Initially S_A emits a short light pulse, which is detected by R_B, which triggers S_B , which immediately emits a short light pulse, which is detected by R_A, which triggers S_A , which immediately emits a short light pulse, which is detected by R_B, and so on.

If transceivers A and B are at absolute rest, then the round trip time of light will be $2D/c$, hence the frequency of the pulses will be $f = 1/ (2D/c) = c / 2D$.

If A and B are in absolute motion, say to the right, the apparent positions of each light source as seen by the other detector will be as shown below [1][2][3].



S_A' is the apparent position of S_A as seen by O_B , and S_B' is the apparent position of S_B as seen by O_A , where O_A and O_B are the detectors at A and B, respectively.

In this case, the round trip time of a light pulse emitted by A, re-emitted by B, and detected by A will be:

$$T_d = \frac{D_A}{c} + \frac{D_B}{c}$$

where

$$D_A = D\,\frac{c}{c - V_{abs}} \quad \text{and} \quad D_B = D\,\frac{c}{c + V_{abs}}$$

Therefore,

$$T_d = \frac{D_A}{c} + \frac{D_B}{c} = D\,\frac{c}{c - V_{abs}} + D\,\frac{c}{c + V_{abs}} = \frac{2Dc}{c^2 - {V_{abs}}^2}$$

The frequency of the pulses will be:

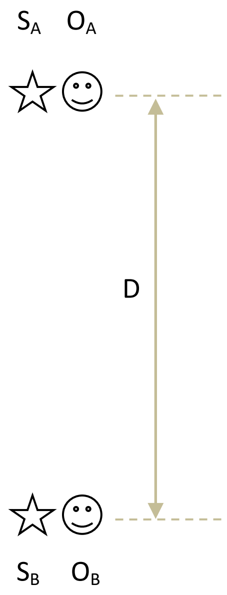
$$\boxed{f = \frac{1}{T_d} = \frac{c^2 - {V_{abs}}^2}{2Dc}}$$

This is the frequency of the pulses when the rod is oriented towards the direction of absolute velocity, which is towards Leo constellation.

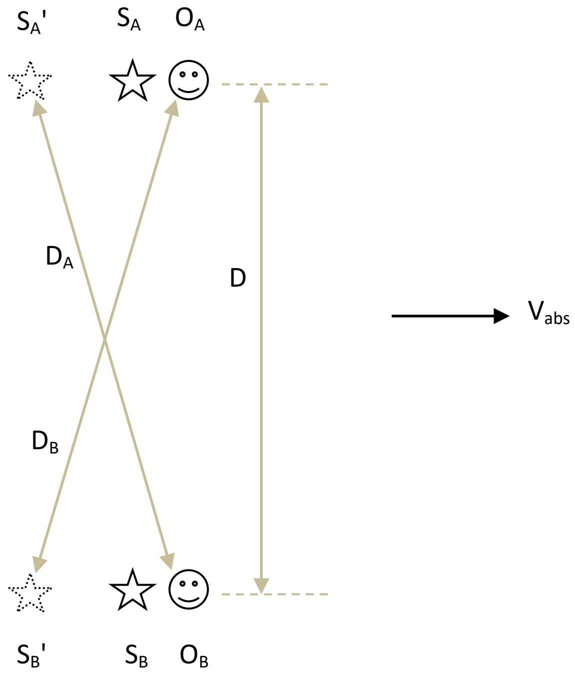
Note that the distance between S_A and O_A(and between S_B and O_B) is assumed to be very small, and much less than D, so that both can be assumed to be at the same point in space.

Now let the rod be oriented perpendicular to Earth's absolute velocity.

As before, if A and B are at absolute rest, the round trip time of light will be *2D/c* , hence the frequency of the pulses will *be f = 1/ (2D/c) = c / 2D.*



If A and B are in absolute motion, say to the right, the apparent positions of each light source as seen by the other detector will be as shown below.



The round trip time of a light pulse emitted by S_A , detected by O_B, which in turn will be emitted by S_B and detected by O_A will be:

$$T_d = \frac{D_A}{c} + \frac{D_B}{c}$$

where

$$D_A = D_B = D\frac{c}{\sqrt{c^2 - {V_{abs}}^2}}$$

Therefore,

$$T_d = \frac{D_A}{c} + \frac{D_B}{c} = \frac{2D}{\sqrt{c^2 - {V_{abs}}^2}}$$

The frequency of the pulses in this case will be:

$$\boxed{f = \frac{1}{T_d} = \frac{1}{\left(\frac{2D}{\sqrt{c^2 - {V_{abs}}^2}}\right)} = \frac{\sqrt{c^2 - {V_{abs}}^2}}{2D}}$$

This is the frequency of the pulses when the rod is oriented perpendicular to the direction of absolute velocity.

For example, let V_{abs} = 390 km/s and D = 3m.

The frequency of the pulses when the rod is parallel with the absolute velocity vector will be:

$$f_{parallel} = \frac{c^2 - {V_{abs}}^2}{2Dc} = \frac{300000^2 - 390^2}{2 * 0.003 * 300000} = 49999915.5000000Hz$$

The frequency of the pulses when the rod is perpendicular to the absolute velocity vector will be:

$$f_{perpendicular} = \frac{\sqrt{c^2 - {V_{abs}}^2}}{2D} = \frac{\sqrt{300000^2 - 390^2}}{2 * 0.003} = 49999957.7499821Hz$$

The difference in frequency will be:

$$f_{perpendicular} - f_{parallel} = 49999957.7499821 - 49999915.5000000 = 42.24998\ Hz$$

The actual experimental setup consists of two identical such systems (each system consisting of two light transceivers connected to each end of a rigid rod) , one oriented parallel to the Earth's absolute velocity and the other perpendicular to it.

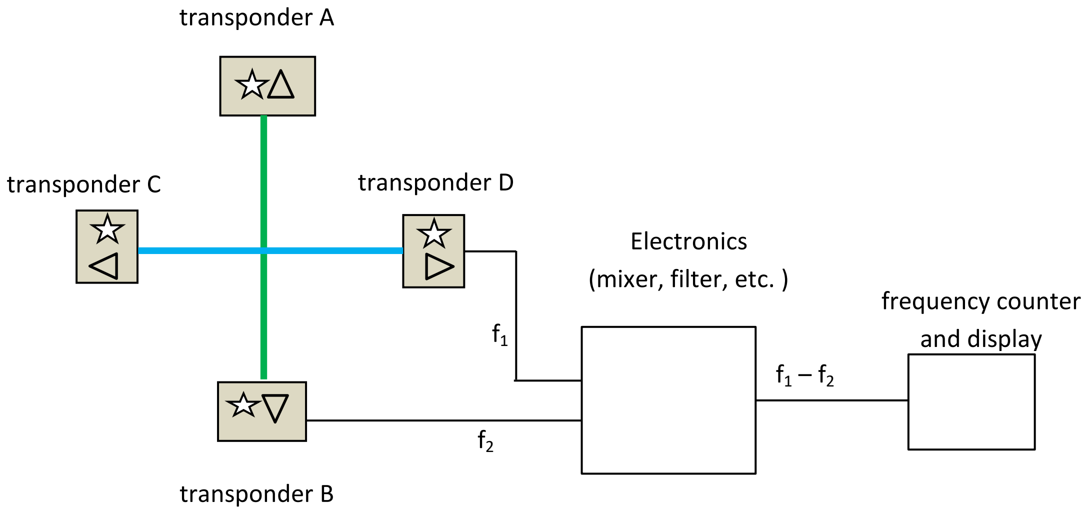
The two signals are applied to an electronic unit (consisting of mixers, filters,) that detects the difference frequency:

$$mixer\ output = f_{perpendicular} - f_{parallel}$$

The output of the electronic unit (mixer), which is several tens or hundreds of Hertzs, can be applied to a low frequency digital counter.

Note that we have assumed, for simplicity, instantaneous emission of a light pulse by the transceivers upon triggering by a detected pulse. In an actual experiment, the finite delay between detection and re-emission of a light pulse should be taken into account. Additionally, in a practical experiment, a fixed time delay may be added between detection of a pulse and triggering of the transmitter. This will reduce the RF frequency to a lower frequency which is easier to process.

The actual experimental setup may look as follows. Two pairs of transponders each fixed to the ends of two rods.



The rod of transponders A and B (rod AB) could be pointed towards Leo, whereas the rod CD is rotated to be parallel or perpendicular to rod AB and the frequency change noted. It is important that the pulse counting be made over relatively long time interval for better accuracy and to average out spurious signals.

Use mirror in place of one of the transponders?

Some readers might be tempted to think that the proposed experiment could be ‘simplified’ by replacing one of the transponders with a mirror. Such conventional view is rooted in ‘ether thinking’. According to Apparent Source Theory (AST), such experiment will not be sensitive to absolute motion at all. As its name implies, AST proposes that absolute motion causes an apparent change in position of the *source*, not of the mirrors. There is a distinction between AST and *ether* theory. Apart from this, however, the calculations made above are the same for AST and ether theory. So ether advocates might use this experiment to test ether theory. However, replacing one of the transponders with a mirror will give null result, disproving ether theory.

Conclusion

The new experiment proposed in this paper is basically based on integrating (accumulating) the extremely small differences between the time of flight of light in two directions, which would be difficult to measure by using conventional time of flight methods in which the time elapsed between spatially separated emitter and detector is measured. The new method uses two spatially separated light ‘transceivers’ (or ‘transponders’) , instead of spatially separated emitter and detector , with the emission, detection and re-emission cycle continuing for as long as desired. A short light pulse is continuously exchanged between two light transponders. This technique can enable determination of the magnitude and direction of Earth’s absolute velocity with high accuracy.

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

References

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