The Shapiro Delay Experiments in Light of Apparent Source Theory and the Venus Planet Radar Range Data Anomaly

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Abstract

This paper reports on the large round trip time variations observed in the Shapiro delay experiments, as reported by Bryan G Wallace , whose claim will be confirmed according to Apparent Source Theory. The 'anomalous' variations in the measured round trip time could be larger than the reported gravitational time dilation effect, typically by a factor of about five to ten. Such large anomalous variations in the round trip time that could be attributed to either the ether theory or the emission theory may have been discarded from the raw data to arrive at the relativistic prediction. The argument in this paper is that Apparent Source Theory predicts that there must have been large variations in the round trip time in the Shapiro delay experiments. And this claim is supported by the reports of Bryan G Wallace. All this casts doubts on the integrity of the experimenters. Therefore, not only did they discard data showing large variations in round trip time, they must also have manipulated the remaining data in order to 'prove' gravitational time dilation.

Introduction

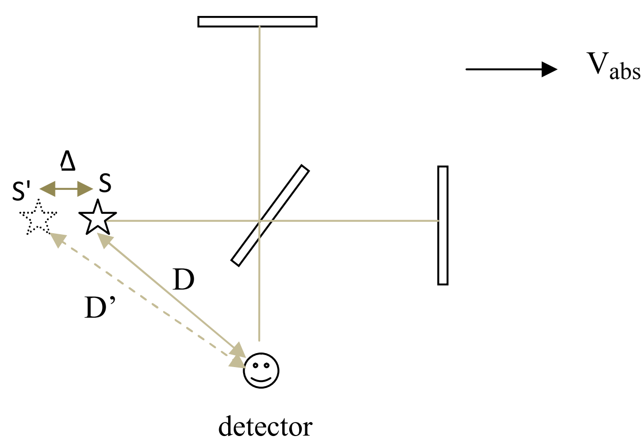
Einstein's General Relativity Theory (GRT) predicts that time is dilated in a gravitational field. This means that a clock runs slowly in a region of stronger gravitational field as compared to a clock in a region of weaker gravitational field. In 1962 Irwin Shapiro proposed an experiment to test this. A radio signal traversing Sun's gravitational field would be subjected to slight additional delay, compared to the delay if there was no gravitational field in the path of the radio wave. This was tested in 1964 by Irwin Shapiro, by sending radar signals to Venus when the Earth, the Sun and Venus were nearly aligned. The radio waves were reflected from Venus surface and detected on Earth and the round trip time measured. Since the radio waves traverse the Sun's gravitational field, there will be a slight additional time delay of the signals according to General Relativity Theory. It was reported that gravitational time dilation was confirmed to an accuracy of 5%. The active radar version of this experiment was repeated with the Viking Mars probe. The radio waves transmitted from Earth were received by the Viking probes that landed on Mars, which immediately retransmit it back to Earth. The claimed accuracy was 0.1%.

What is less known to many mainstream physicists, however, is that the data of the round trip time of the radar signals showed 'anomalous' variations, as large as time variations corresponding to 500 Km, as disclosed by Bryan G Wallace[4][5][6]. The data seemed to confirm the emission theory of light (Galilean relativity).It is surprising how Shapiro and his co-workers were able to confirm gravitational time dilation with accuracies of 5% and 0.1% in the presence of such wild variations of the round trip time.

In this paper, we will explain the origin of these 'anomalous' variations, confirming the Bryan G Wallace claims, and bringing to light the prevailing biases among mainstream physicists towards Einstein's relativity theories. This paper will falsify one of the classical experiments cited as confirmation of GRT: the Shapiro delay, based on Apparent Source Theory (AST) developed by this author. AST readily explains the Michelson-Morley experiment, the Sagnac effect, moving source experiment and other light speed experiments. We will start by introducing AST.

Apparent Source Theory

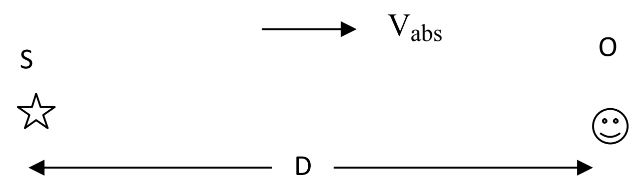
In my previous papers[1][2], I was able to explain many light speed experiments by applying Apparent Source Theory (AST). According to AST, the position of a light source changes apparently relative to a co-moving observer, due to absolute motion. For example, in the Michelson-Morley experiment, the effect of absolute velocity is just to create an apparent change in the position of the light source relative to the observer/detector. An apparent change in the position of the light source will not cause any (significant) fringe shift for the same reason that an actual /physical change of light source position will not result in any (significant) fringe shift because, intuitively, both the longitudinal and transverse light beams will be delayed or advanced by the same amount.



This theory (AST) enabled explanation of many light experiments: the Michelson-Morley experiment, the Kennedy-Thorndike experiment, the Sagnac effect, the Silvertooth experiment, the Marinov experiment, the Roland De Witte experiment, the Venus planet radar range data anomaly (reported by Bryan G Wallace), the A Michelson rotating mirror light speed measuring experiment, terrestrial moving source and moving mirror experiments, and other experiments.

The procedure to analyze light speed experiments is:
1. Replace the real/physical source by an apparent source
2. Analyze the experiment by assuming that the speed of light is constant relative to the apparent source.

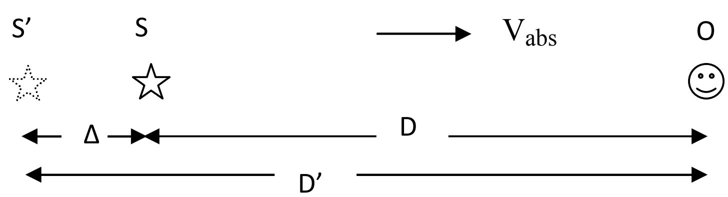
Consider absolutely co-moving light source S and observer O, as shown in the figure below. Assume that the light source S and the observer O, are initially both at (absolute) rest, i.e. $V_{abs} = 0$.



A light pulse emitted by S will be detected after a time delay of

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

Now suppose that the light source and the observer are absolutely co-moving to the right.



The new interpretation proposed here is that the position of the source S changes apparently to S', *as seen by the observer*.

The analysis is as follows. During the time interval (t_d) that the source 'moves' from point S' to point S, the light pulse moves from point S' to point O, i.e. the time taken for the source to move from point S' to point S is equal to the time taken for the light pulse to move from point S' to point O.

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

But

$$D + \Delta = D'$$

From the above two equations:

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

and

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

The effect of absolute motion is thus to create an apparent change of position of the light source relative to the observer, in this case, by amount Δ .

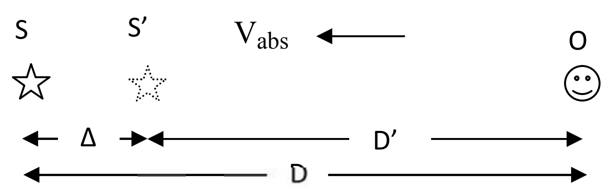
Once we have determined the apparent position of the source as seen by the co-moving observer, we can analyze the experiment by assuming the speed of light to be equal to *c* relative to the apparent source.

Next we determine the time delay between emission and observation of light. A light pulse emitted by the source is detected at the observer after a time delay of:

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

To the observer, the source S appears farther away than it physically is. For the observer, the center of the spherical wave fronts is always at S' and moves with it. We can see this as a modified emission theory, as a fusion of emission theory and ether (absolute) theory.

In the same way, for absolute velocity directed to the left:



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

From which

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

and

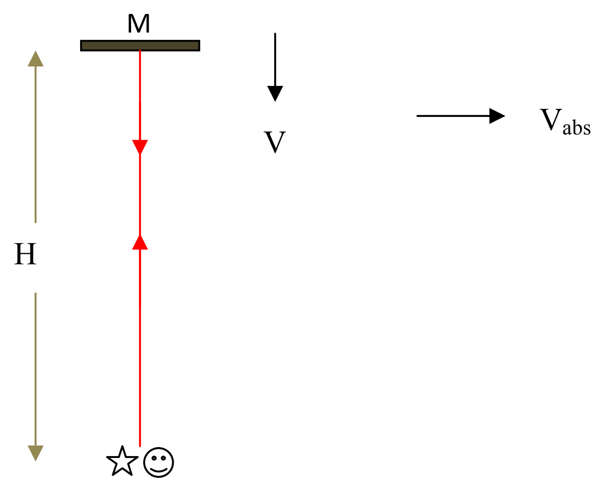
$$\Delta = D\frac{V_{abs}}{c + V_{abs}}$$

In this case, it appears to the observer that the source is nearer than it actually is by amount Δ.

A light pulse emitted by the source is detected at the observer after a time delay of:

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

Next let us see the case of absolutely co-moving light source and observer, with a mirror moving relative to the source and observer, as shown below. The source and the observer are so close to each other that the distance between them can be considered to be zero. In this case, the apparent source will be at the same position as the real source.



Assume that the mirror is moving towards or away from the source and the observer with velocity V, with the source and observer at rest relative to each other, but with a common absolute velocity as shown in the next figure. The absolute velocity vector can have any magnitude and direction. How are such experiments analyzed?

The procedure of analysis is restated below:

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

Let us consider a simple case in which the distance D between the source and the observer is much less than the distance H to the mirror, so that we can assume that the source and observer are essentially at the same point in space. The lesser the distance between co-moving source and observer, the lesser will be the apparent change of source position due to absolute motion, hence the lesser observable absolute motion will be. *For experiments in which co-moving source and observer are so close enough to each other that they can be assumed to be at the same point in space, absolute motion will have no effect on the experiment.* The experiment can be analyzed using emission theory.

If the mirror is not moving, the round trip time of a light pulse emitted by the source will be:

$$t = \frac{2H}{c}$$

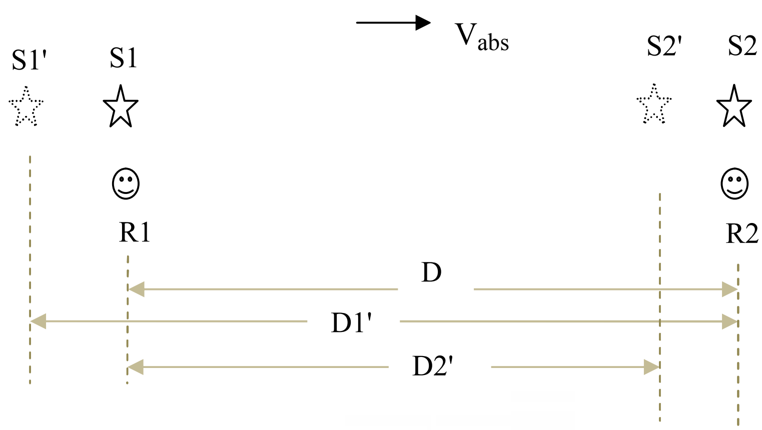
If the mirror is moving with velocity V, we apply emission (ballistic) theory after replacing the real source by the apparent source (which in this case is almost at the same position as the real source), the *group* velocity of the reflected light will be c + 2V, relative to the observer.

$$t = \frac{2H}{c + 2V}$$

We apply this analysis to the Shapiro delay experiment in which radar signals are reflected from the surface of planet Venus.

Next we develop the analysis of the second version of the Shapiro delay experiment: the Viking Mars probe experiment.

Consider the following experiment. A short light pulse is emitted by source S1 and detected by detector R2 which triggers source S2 to emit a short light pulse back. Detector R1 detects the light pulse, from which the round trip time is calculated. This is a system of two transponders.



The apparent distance D1' will be:

$$D1' = D\frac{c}{c - V_{abs}}$$

The apparent distance D2' will be:

$$D2' = D\frac{c}{c + V_{abs}}$$

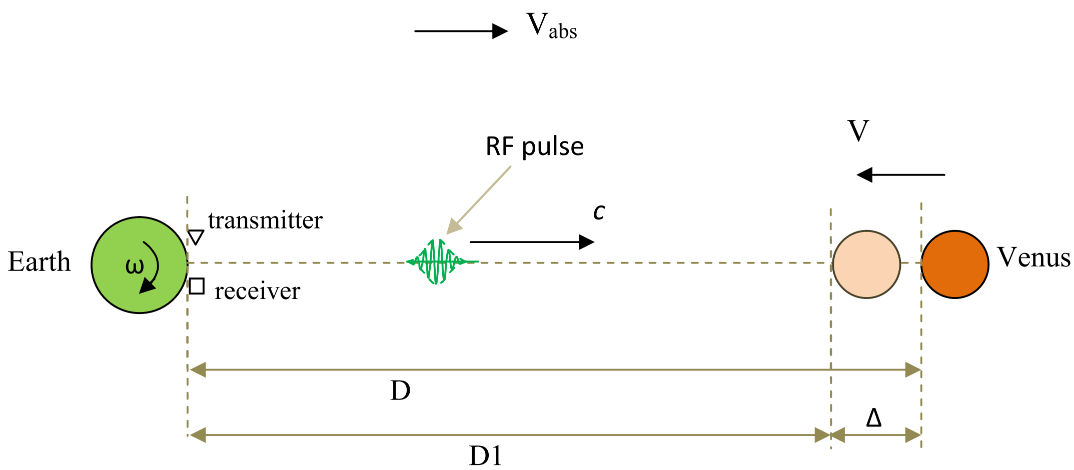
The round trip time will be:

$$t_d = \frac{D1' + D2'}{c} = \frac{D}{c - V_{abs}} + \frac{D}{c + V_{abs}} = \frac{2D}{c}\ \frac{1}{1 - \frac{{V_{abs}}^2}{c^2}}$$

Next we apply the above analyses to the Shapiro delay experiments.

The Venus radar reflection experiment

D is the distance between Earth and Venus at the instant of radar reflection from Venus surface.
D1 is the distance between Earth and Venus at the instant of light detection on Earth.
V is the Earth-Venus relative velocity. V_{abs} is the absolute velocity of the Solar System
ω is Earth's angular velocity.
t is the round trip time.



Remember the procedure of analysis:

1. Replace the real source with the apparent source (in this case almost the same as the real source because the transmitter and receiver can be considered to be at the same point)
2. Then analyze the problem by assuming that the speed of light is constant relative to the apparent source. This simply means that we apply emission theory in this case.

In the this case, the velocity of the RF pulse reflected from Venus relative to an observer on Earth is c+2V, according to emission theory, where V is the Earth-Venus relative velocity.

The round trip time can be determined if we know the velocity of the RF pulse in the earth's reference frame (which can be considered to be at rest, according to emission theory and Galilean relativity). The velocity of the transmitted RF pulse is obviously equal to *c* relative to the transmitter, according to AST. The velocity of the reflected pulse will be $c + 2V$, relative to the Earth (reflection from a moving mirror).

Therefore, the total round trip time is determined as:

$$t_1 = \frac{D}{c} \quad , \quad t_2 = \frac{D}{c+2V} \quad \text{and} \quad t_1 + t_2 = t$$

$$t = t_1 + t_2 = \frac{D}{c} + \frac{D}{c+2V} = \frac{2D(c+V)}{c(c+2V)}$$

$$\Rightarrow \quad D = \frac{tc}{2}\ \frac{c+2V}{c+V}$$

where t_1 is the forward flight time, t_2 is the backward flight time and t is the round trip time of the RF pulse.

The distance D1 at the instant of detection of the pulse on earth will be:

$$D1 = D - \Delta = D - t_2 V$$

$$= D - \frac{D}{c+2V} V$$

$$= D\frac{c+V}{c+2V}$$

$$= \frac{tc}{2}$$

Note that the absolute velocity of the Solar System did not appear in the above analysis. This is because absolute velocity is undetectable if the source and observer are located closely enough.

In the case of Einstein's light postulate :

$$D1 = \frac{tc}{2} - \frac{tV}{2}$$

The difference between the predictions of AST and Special Relativity is:

$$d_{err} = \left(\frac{tc}{2}\right) - \left(\frac{tc}{2} - \frac{tV}{2}\right) = \frac{tV}{2}$$

Now let us estimate this discrepancy. Let us assume the Earth Venus relative velocity V at the time of the experiment to be 1 Km/s .

The round trip time t is determined from the Earth-Venus distance at the time of the experiment.

$$t = \frac{2D}{c}$$

D is roughly 250 million Kilometers. Therefore,

$$t = \frac{2D}{c} = \frac{2 \square 260000000}{300000} = 1667\ s = 27.78\ min$$

Now we can calculate the error in distance predicted by Special Relativity.

$$d_{err} = \frac{tV}{2} = \frac{1667\ s * 1\ Km/s}{2} = 833.5\ Km$$

This means that, according to Apparent Source Theory, Shapiro observed such large discrepancies between the predicted and calculated distances of Venus. His experiment was meant to search for extremely small gravitational time dilation effects, corresponding to a distance of (200µs * 300000Km/s = 60 Km), but encountered distance variations as large as 833.5 Km ! This is comparable with the 500 Km reported by Bryan G Wallace [4].

The question is : How did he manage to extract a gravitational time dilation effect of 200µs from his data, and with a precision of 5% ! Bryan G Wallace was the outsider who knew about this, however his voice was suppressed by the mainstream physicists.

The Viking Mars probe experiment

Unlike ether theory and Special Relativity, according to Apparent Source Theory, the analysis of the Viking Mars probe experiment is different from the Venus experiment. In the Viking Mars probe experiment, the radar signal is transmitted from Earth, received and retransmitted by the space probe on Mars.

We have already obtained the formula for the round trip time as:

$$t_d = \frac{2D}{c} \frac{1}{1 - \frac{V_{abs}{}^2}{c^2}}$$

where D is the Earth- Mars distance and V_{abs} is a component of Solar System's absolute velocity (390 Km/s) along the Solar System plane, for the sake of simplicity . The Solar System's absolute velocity vector makes an angle of only 10^0 with the Solar System's plane. We can obtain the projection of this velocity on the Solar System plane as:

$$390\ Km/s * \cos 10^0 = 384\ Km/s$$

The above analysis assumed that the Earth and Mars are at rest relative to each other. The correct analysis considers the absolute velocities of the Earth and the Earth. Even though Earth and Mars have a common absolute velocity (390 Km/s), their absolute velocities vary and differ because of their revolution around the Sun. We will assume for the sake of simplicity that Earth and Mars are at rest relative to each other and focus only on the effect of absolute motion.

Therefore, V_{abs} in the last equation can attain a maximum value of 384 Km/s . The Earth-Mars distance D at the time of the experiment was about 380 million Kilometers.

The round trip time is:

$$t = \frac{2D}{c} \frac{1}{1 - \frac{{V_{abs}}^2}{c^2}}$$

According to Special Relativity,

$$t = \frac{2D}{c}$$

The difference between the two predictions is:

$$t_{err} = \frac{2D}{c} \frac{1}{1 - \frac{{V_{abs}}^2}{c^2}} - \frac{2D}{c} = 4.15\, ms$$

This corresponds to a distance error of

$$d_{err} = c\, t_{err} = 300000 \frac{Km}{s} \cdot 0.00415 s = 1245\, Km$$

Again discrepancies comparable to this amount must have been observed in the Shapiro experiment. Yet the claimed accuracy in the Viking Mars experiment was 0.5 % !
The gravitational time dilation effect reported was 250 µS, corresponding to 72 Km !

Conclusion

This paper has falsified the Shapiro delay, which is one of the main experiments cited as evidence of General Relativity theory. The falsification of Shapiro delay reveals the extreme biases that prevail in mainstream physics towards Einstein's relativity theories. This casts doubts on the credibility of the other experiments also : the gravitational red shift and gravitational light bending experiments.

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

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