Proposal for Wavelength Meter in Motion to Test the Invariance of *c*

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Abstract

A wavelength meter in motion is proposed to test directly the invariance of *c* as postulated by the Special Relativity, which is the first time this experiment is attempted [3]. Until now it was assumed aether, if it was found, was a static substance having a unique reference frame from which entities were traveling through and therefore must not be present if tests proved otherwise.

If we replace aether with graviton fields overlapping each other then we will have a reference frame that follows the rotation of the Earth. Thus to detect its presence, we will have to physically move against that rotating frame in order to detect a change in speed of light.

This is done by sending a laser beam in the same direction of the velocity vector of the moving experiment, capturing the difference in wavelength as we will later see.

1. Introduction

In Einstein's 1905 paper on Special Relativity, two postulates form the basis of the theory [1]:

1. First postulate (principle of relativity)

   The laws of physics are the same in all inertial frames of reference.

2. Second postulate (invariance of c)

   The speed of light in free space has the same value *c* in all inertial frames of reference.

It was assumed that the latter was already tested because of the Michelson-Morley experiment [2] and other replications favored the null hypothesis.

The aim of this experiment is to search for evidence of a variable speed of light. According to a recent study, it might be possible to predict all phenomena of the universe based on the fact that gravity is a particle. In contrast with the previously assumed static aether from which the bodies are moving through the graviton field will have the same spin of the emitting source. Therefore the failure to detect any movement by the Michelson-Morley experiment can be explained by the fact the reference frame simply had the same spin of the Earth. The reference frame simply follows the source of the strongest gravitational acceleration. This reference frame is the Earth for all low orbit experiments that tested Special Relativity, the Sun for solar system wide probes, and so on.

By sending the laser emitter and wavelength meter at a sufficiently large velocity compared to the inertial frame of Earth we hypothesize that a detectible variance in the speed of light will be seen, only now possible with recent advancements in high-precision metrology [5].

2. Variance of *c* and Wavelength in a Graviton Field

Although gravitons haven't been directly detected and might not even be possible [4], we hypothesize to detect its presence indirectly by observing a variance in both *c* and the wavelength of a photon from the graviton field it is traveling through. We reevaluate the absoluteness of the reference frames, henceforth to be referenced to as Finite Theory.

Since gravity obeys the principle of superposition, we will have to isolate which reference frame defines the absoluteness of the kinetic time dilation amplitude via the gravitational acceleration strength:

$$a_E = \frac{-Gm}{(x-i)^2} \quad (1)$$

$$a_S = \frac{-Gn}{(x-j)^2} \quad (2)$$

Where:

- $m = 5.9736 \times 10^{24}$ *kg* (mass of the Earth)
- $n = 1.98892 \times 10^{30}$ *kg* (mass of the Sun)
- $i = -6371000$ *m* (position of center of the Earth)
- $j = 1.49597870691 \times 10^{11}$ *m* (position of the Sun)

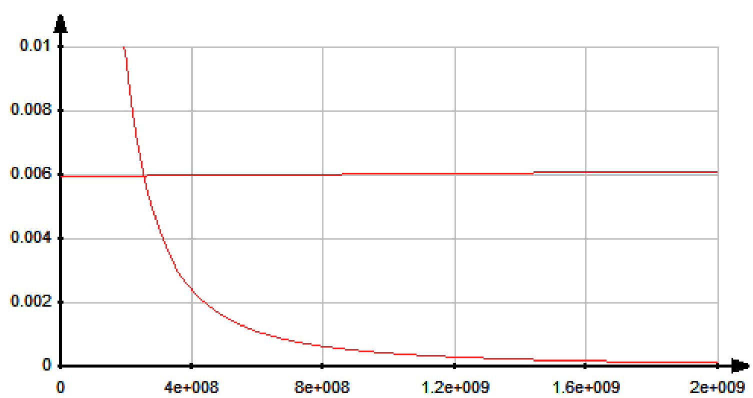

Fig. 1. FT Gravitational Acceleration of the Earth and the Sun *(-m/s²)* vs. Altitude *(m)*

Thus the reference frame for altitudes lower than the following is defined by the Earth:

$$x = \frac{(j-i)\sqrt{mn} + in - jm}{n-m} \quad (3)$$

$$x = 2.5245 \times 10^{8}\, m \tag{4}$$

By sending the experiment at a speed in the vicinity of the speed of sound, it should be sufficient to detect a change wavelength directly proportionally while energy is conserved:

$$E = \frac{h(c - v_1)}{\lambda_1} \tag{5}$$

$$E = \frac{h(c - v_2)}{\lambda_2} \tag{6}$$

$$\lambda_2 = \frac{(c - v_2) \times \lambda_1}{(c - v_1)} \tag{7}$$

$$\lambda_2 = 6.49987 \times 10^{-7}\, m \tag{8}$$

Where:

- $c = 3 \times 10^{8}$ *m/s*
- $v_1 = 0$ *m/s*
- $\lambda_1 = 6.5 \times 10^{-7}$ *m*
- $v_2 = 6125.22$ *m/s*

For a wavelength meter having an accuracy of ±1.5 *pm* we should be able to confirm whether the change in wavelength occurs for the experiment in motion. The predicted difference of 1.3×10^{-11} *m* (λ1 - λ2) is large enough to be detected.

3. Experiment

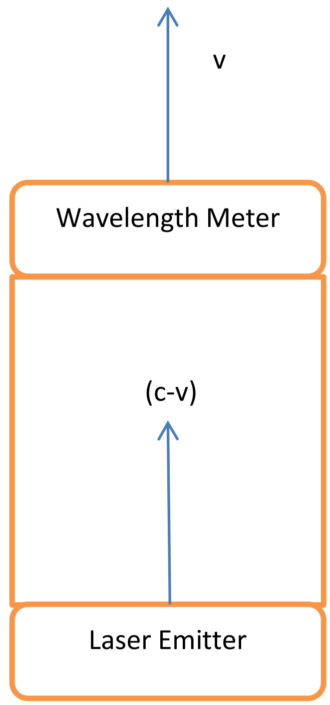

Fig. 2. Experiment in motion to measure the difference in wavelength

Where:

- v is the speed of the experiment

We should see a difference in wavelength to the order mentioned in the previous section.

Acknowledgment

Thanks to Evan Adams for helping editing it and for reviewing related experiments.

References

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[5] Luna, PHOENIX 1200 Tunable Laser Module & Wavemeter. Retrieved October 4, 2013, from http://ir.lunainnovations.com/phoenix.zhtml?c=196907&p=irol-newsArticle&id=1267885