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Experiment with Two Interplanetary Space Ships

Gennadiy Sokolov, Vitali Sokolov
sokolovg@yahoo.com

There is proposed a new experiment with two atomic clocks, whose analysis disproves Einstein's postulate of light speed invariance. Two spaceships moving at the same speed V in the same interplanetary orbit send each other optical or radio signals, similar to GPS, measuring the time and the speed of the signals. The signals move in opposite directions through the distance between giving a shift of time intervals that can be explained only by the fact that the signals travel at different speeds, $C+V$ and $C-V$. The result of this experiment can not be refuted by any relativistic arguments.

Introduction

The basis of Special Relativity is its second postulate regarding the invariance of the speed of light, stating that it moves in a vacuum with a constant speed C=299 792 458 m/s and therefore, no observer will ever calculate its speed as greater than C .

In the proposed experiment, the measured time intervals in which the signals cover the distance between ships are shown to be different. It is then concluded that the signals travel with the speeds $C+V$ and $C+V$. The speed of the signal from the first ship to the second is greater than C proving the falsity of the postulate of the invariance of the light speed. The falsity is confirmed also by direct measurement of the speeds with which the signals reach the ships and by the measurement of the distance between the ships, as well as the frequency of the signals.

Description of the experiment

In interplanetary space, two identical space ships S1 and S2 move along the same path at the same speed V at a constant distance from each other equal to L. Each ship has an atomic clock, a radar and a devices for measuring the frequency and speed of the light signal. The atomic clocks were synchronized before launching ships and no relativistic corrections were introduced into them. Since ships and clocks experienced the same acceleration and move along the same path at the same speed, we can say that atomic clocks on the ships are synchronous and show identical time. Method of the measuring of the speeds of the light signals is described below under "Measurement of the signal speeds"

Measurement of the time intervals

Let the ships travel at the speed V = 24 km/s and the distance L between them, for clarity, is equal to 29 979 245.8 m. At moment t_0 each ship sends an optical signal towards the other. Relative to the rarefied interplanetary medium, the signals travel at a speed almost equal to C.

If we imagine that space ships are at rest relative to the medium, the light pulses must cover distance L in the same time $T_0 = \frac{L}{C} = 0.1$. But because the ships move relative to the medium, the speeds of the light pulses are different with respect to the ships. Therefore they reach the ships at different times.

At moment t_0 ship S2 sends a signal in the direction of S1 and S1 sends a signal in the direction of S2. Every signal, like the signals in GPS, contain information about the time of emission, determined by the clock of the ship. The signals reach the ships at different times:

S2 receives the signal when its clock shows time t_1 which is less than $T_0 = 0.1$,
S1 receives the signal when its clock shows time t_2 which is greater than $T_0 = 0.1$.

Relativity theory concludes in such a situation that the clock of ship S2 is running faster than the clock of ship S1. But in this case, it is absolutely obvious that the time difference can not be explained by some relativistic effects, because the clocks of both ships experienced the same acceleration and move along the same path with the same speed. The explanation here can be only one: the signals cover the same distance L in different times because they travel with different speeds relative to the ships.

The light pulse sent by ship S2 moves in the first moment at speed C relative S2. But as soon as photons are re-emitted by atoms of the interplanetary medium, they move with speed $\frac{C}{n} \approx C$ relative to the medium and with speed $(C-V)$ relative to ships S2 and S1. The signal of the S2 covers practically the total distance to S1 with speed $(C-V)$ in the time $t_2 = \frac{L}{C-V} > T_0$.

Similarly, the signal from S1 to S2 covers practically the total distance to S2 with speed $(C+V)$ for the time $t_1 = \frac{L}{C+V} < T_0$.

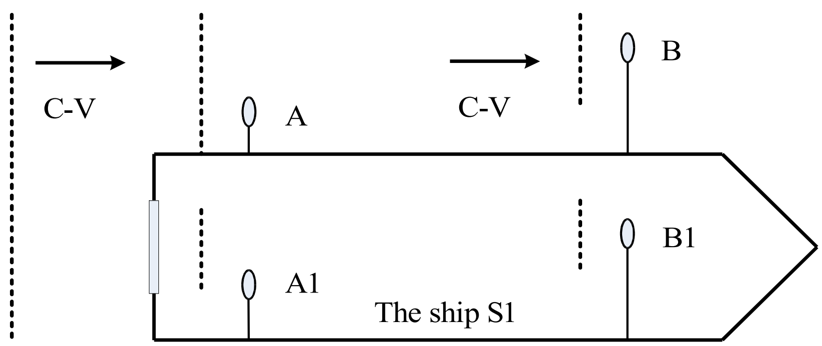
When the speed of the ships, V is equal to 24 km/s and the distance L is 29 979 245.8 m,

the signal of ship S2 travels relative to ship S1 with speed $(C-V)$ = 299 768 458 m/s, lower than C , and reaches S1 in time t_2 = 0.100 008 006 s which is 0.000 008 s greater than T_0 .

the signal of ship S1 travels relative to ship S2 with the speed $(C+V)$ = 299816458 m/s, greater than C and reaches S2 in time t_1 = 0.099 991 995 s which is 0.000 008 s lower than T_0 .

Measurement of the speeds of the signals

The light pulse travels relative to the interplanetary medium with speed C . Because the ship S1 moves relative to medium with speed V=24 km/s, photons move relative to S1 with speed $(C-V)$= 299 768 458 m/s. The speed with which photons move relative to the space ship can only be measured with the help of the device placed outside the ship as Fig. shows.



Measurement of the speeds of the light pulses

A pulse of light travels at speed C relative to the interplanetary medium and at the speed $(C-V)$ relative to the space ship S1. Two photocells, A and B are equipped on the outer surface of the ship. At moment t_A a light pulse reaches the photocell A and sends the pulse into the measuring circuit. Part of the light pulse without any change in the speed of the motion, passes photocell A and at moment t_B reaches photocell B. The difference $t_B - t_A$ allows calculation of the speed of the light pulse.

Any measuring device placed inside the spacecraft (A1- B1 in Fig.), in principle can not measure the speed with which the light signal moves relative to the ship, because entering through the window into the ship, the photons change their speed: after re-emission by atoms of the glass, they move inside the ship with the same speed as the photons emitted by any other light source, located inside the vehicle. Measurement the speed has to be carried out without any disturbance of the actual speed with which the photons move relative to the ship.

Measurement frequency and distance

The fallacy of the second postulate can be additionally confirmed in the experiment by measurement of the frequency of the signals and radar measurements of the distance between the ships. According to SRT, if the receiver does not move relative to the source, radio and optical signals come to receiver with the same frequency ν_0 , and any change of the frequency are explained only by relative motion of the source and the receiver.

Because the ships move with the same velocity V, the distance between source and receiver obviously does not change in this experiment. However, due to re-emission by the medium, the speeds of the signals change which leads to a change in frequency.

Photons of frequency ν_0 move with initial speed C relative to ship S2 and with $(C+V)$ relative to the interplanetary medium. Re-radiating by the medium, photons change frequency to $\nu' = \nu_0(1+\frac{V}{C})$ and with such frequency cover all the distance to ship S1. When photons enter S1, they decrease frequency to $\nu = \nu_0(1+\frac{V}{C})(1-\frac{V}{C}) = \nu_0(1-\frac{V^2}{C^2})$.

Photons emitted by ship S1 cover the distance between the ships with frequency $\nu'' = \nu_0(1-\frac{V}{C})$ and increase it to $\nu = \nu_0(1-\frac{V}{C})(1+\frac{V}{C}) = \nu_0(1-\frac{V^2}{C^2})$ when entering ship S2. That is, both ships receive identical frequencies $\nu = \nu_0(1-\frac{V^2}{C^2})$ less than ν_0. For the speed V=24 km/s, because of medium motion, the frequency is reduced by 0.00000000641 ν_0 .

In your opinion, because of such frequency change, radio contact with several interplanetary stations has been lost in the first flights to Venus: the frequency rapidly decreased and the connection was lost when the station entered the atmosphere of Venus which was moving at 35 km/s. Later, there were even attempts to explain this phenomenon by some mysterious increase in speed of the space station. We explain it with the expression $\nu = \nu_0(1-\frac{V^2}{C^2})$ and a cosmological red shift: the frequency of the light, coming from the stars to Earth, decrease in multiple re-emissions when photons pass through the moving gas accumulations and the atmospheres of other stars.

In radar measurements, the distance is determined with the expression $L = 0.5\Delta t C$ as it is assumed that light travels with the same speed in both directions. Because the speeds of light in opposite directions are different, the distance defined in this way is less than the actual distance between the ships: $0.5(t_1+t_2) = 0.5\left(\frac{L}{C+V}+\frac{L}{C-V}\right)C = L\frac{1}{1-\frac{V^2}{C^2}}$.

Because the medium moves relative to ships with the speed V=24 km/s , the defined distance is more by 0.00000000641 L.

Conclusion

The experiment proves that the optical and radio signals travel relative to the moving space ships, not with the same speed as the basic postulate of special relativity asserts, but with different speeds $(C+V)$ and $(C-V)$, and signals from the first ship travel with a speed greater than C and reach the second ship faster than a signal from the second to the first. The result of the experiment is confirmed by additional measurements of the distance between the ships and the frequency of the signal.