V.I.Sekerin

ROLE OF ASTRONOMIC OBSERVATIONS FOR FORMING CATEGORIES OF SPACE AND TIME

(Work from the collection "Problems of space and time in modern natural science", series "Problems of the study of the Universe", issue 15, St. Petersburg, 1991, pp.253-257)

The concepts of space and time, developed in the process of scientific cognition, belong to the fundamental categories of science. They cannot be deduced with the help of logical evidence from simpler positions, but are only described in connection with other concepts in the practice of all human activity and in the course of conducting targeted measurements, of which astronomical observations can also be a part. Space and Time as categories of materialistic philosophy took shape in their time on the basis of the achievements of classical mechanics.

In the late 19th - early 20th centuries, the concept of space and time of classical physics was sharply criticized by E. Mach [1] and H. Poincaré, as a result, relativistic ideas about space and time became dominant in the so-called “scientific theory”. They are based on the postulate that the speed of the light signal does not obey the classical law of addition of speeds.

The concept of "movement" refers to a change in the spatial relationship of bodies. The nature of the movement, its speed can be said only if it is indicated with respect to what the movement is taking place. For light, relativists make an exception and believe, according to A. Einstein ([2], p. 387), that “... one and the same light ray propagates in a void with a speed “ c ” not only in the frame of reference K, but also in every other frame K', moving uniformly and rectilinearly relative to K”.

This postulate is accepted as a starting point, without proof. In abbreviated notation, it is sometimes written as c = const. However, a number of astronomical phenomena come into conflict with the named postulate.

In 1676, at the Paris Observatory, the Danish astronomer Olaf Römer, using a telescope recently invented by Galileo, discovered an interesting phenomenon that is either still not completely understood, or its understanding has been diligently forgotten [3]. Observing the planet Jupiter and its satellites, Römer noticed that the time of the full revolution of the Io satellite around Jupiter, determined by the moment the satellite exits (or enters) from the shadow of Jupiter, changes periodically. The periodicity is associated with the movement of the Earth in its orbit around the Sun.

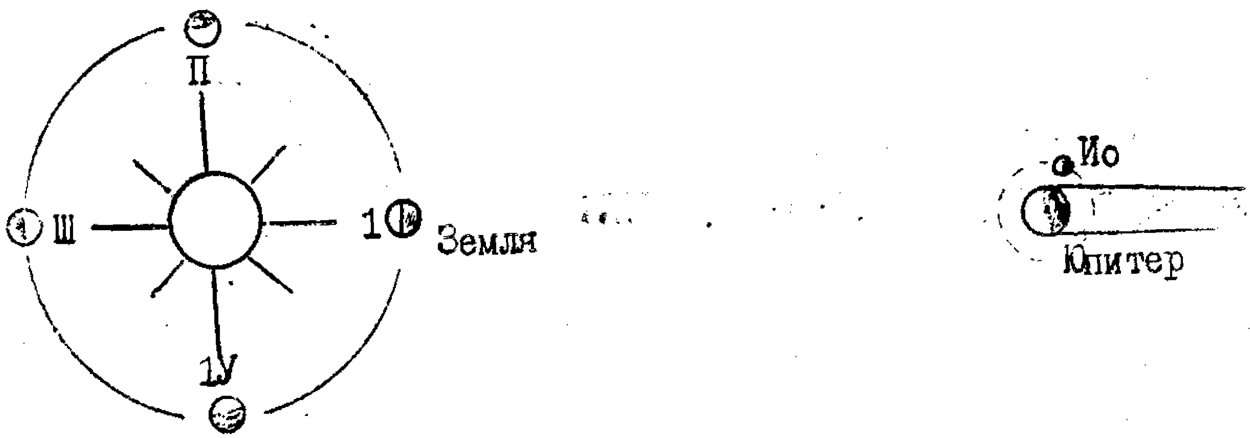

Рис. 1

Fig.1. At the moment of the closest approach of the Earth to Jupiter (in position I), the period of Io is T_1 *= 1.77 days =* $1.5 \cdot 10^5$ *sec.*

When the Earth moves to position II, the period begins to increase and reaches its maximum T_2 in position II, after which it decreases and becomes again equal to T_1 in position III. But the decrease does not end here, but continues to position IV, where the period T_4 acquires a minimum value, then an increase occurs to the initial value in position I. The maximum increment in Io's period ΔT_2 is 15 seconds, and the decrease in ΔT_4 = 15 seconds is approximately the same. In all other intermediate positions of the Earth in orbit, the change in Io's period is proportional to the component of the Earth's velocity relative to Jupiter along the Earth – Jupiter straight line. The period increases as the Earth moves away from Jupiter, and decreases as it approaches it. Since the angular velocity of Jupiter's revolution around the Sun is much less than the angular velocity of the Earth (the year of Jupiter is almost 12 terrestrial years), then during the year the relative position of the Earth and Jupiter does not change significantly and does not have a noticeable effect on the described effect.

Comparing two observations of Io's periods at points I and III, O. Römer saw that their periods are equal, but the beginning of the period at position III is 22 minutes late according to his measurements in comparison with if the duration of the periods did not change during the time between observations ... The astronomer determined that the delay in the beginning of Io's period at point III is caused by the fact that the light from the satellite must travel to the observer an additional distance equal to the diameter of the earth's orbit. By dividing this distance by the time of delay, Römer was the first in the world to calculate the speed of light.

Consider now the periods in position II and IV. The first one is 15 seconds longer than the initial one, the second one is the same amount less. The change in the duration of the periods shows that the light has different values of its speed relative to the observer, depending on the registration conditions.

Indeed, Io's satellite reflects light during time T and forms a stream of light in space with a length λ (λ = cT), where c is the speed of light in the Jupiter system, T is the time of revolution of Io's satellite around Jupiter; λ is a link that consists of two parts, a - Io is in an illuminated place, b - a gap in the stream of light, Io in the shadow of Jupiter.

In position I, the Earth is motionless relative to Jupiter along the Earth-Jupiter straight line, and the λ link, after the light has covered the distance from Jupiter to Earth, is recorded by an observer on Earth for:

$$T_1 = \lambda / c, \tag{10}$$

Thus, during the same period of time as T, $T_1 = T$. The same happens in position III, only the beginning of the period registration time, as observed, occurs with a delay, because the λ link needs time to overcome the additional distance in diameter Earth's orbit, $T_3 = T$.

In position II, the Earth moves away from Jupiter, the link λ catches up with the Earth and, according to the law of addition of velocities, the speed of light relative to the Earth is equal to $c_2 = c - V_3$, and the registration time of the link λ:

$$T_2 = \lambda / c_2 = \lambda / (c - V_3), \tag{11}$$

V_3 = 29.8 km / sec - the speed of the Earth in orbit.

Six months later, the Earth moves towards the flow of light, the speed of which for the observer is now $c_4 = c + V_3$, and the registration time

$$T_4 = \lambda / c_4 = \lambda / (c + V_3). \tag{12}$$

Since in (11) and (12) the length of the link is the same, then, moving λ to the left side of the equations, we equate the right ones with each other:

$$T_2 (c - V_3) = T_4 (c + V_3). \tag{13}$$

Transforming equality (13) with respect to c, we find:

$$c = V_3 (T_2 + T_4) / (T_2 - T_4).$$

Substituting in the last formula the numerical values of the observed periods and the speed of the Earth's orbit, we again calculate the speed of light relative to the source.

The last method of calculating the speed of light is possible only because the motion of light obeys the classical law of addition of speeds.

In modern textbooks, Römer 's article [3] is not presented in full, hiding that part of Römer 's reasoning that contradicts Einstein's postulate cited above.

Oddly enough, but astronomers do not notice that this postulate (according to W. Macmillan, "the most meaningless of all that we could only come up with" ([4], p. 112) is illegally imposed on nature. Apparently, this is because that in practice the speeds are sometimes very small in comparison with and can be discarded.

The situation is changing in the era of active space exploration. The analysis of radar observations of Venus, carried out by B. Wallace [5], showed that the speed of rotation of the observer together with the Earth and its orbital motion must be added with the speed of light to obtain the correct values of the distances.

In addition to American observatories, the Crimean Observatory, which later refused to participate in the work, took part in the experiments on the radar of Venus. The need for repetition and open discussion of the results of space radar is beyond doubt. The difficulties that Wallace faced when publishing his articles, as well as the controversy on the "I. Shapiro case" that unfolded in the American journal Scientific Ethics [6], are understandable to Soviet readers.

B. Wallace's articles became widespread in the USSR thanks to the existence of Samizdat. The manuscript also distributed articles by prof. SA Bazilevsky with a serious criticism of the theory of relativity. All attempts to publish Bazilevsky's articles, undertaken for a quarter of a century, were unsuccessful. I, too, was able to publish my essay [7] only thanks to the appeared opportunity to publish books at the expense of the author.

Coming out of the era of stagnation, we removed the halo of infallibility from many authorities, however, the ban on criticizing the theories of Einstein and modern relativists has not yet been lifted.

The censorship allows only the humorous "criticism" of the relativists in its own address. So, Yu. B. Rumer in the afterword to his book "What is the theory of relativity", jointly with LD Landau, writes: "I recall a joking review that Landau himself gave to this book: “Two crooks persuade the third that he can understand what the theory of relativity is”([8], p. 75).

Physicists joke, but schoolchildren and students are not allowed to joke. Teaching the theory of relativity at school and universities leads to education or an inferiority complex, when, having made every effort, a person does not understand anything and considers his abilities to be the reason for this, or double-dealing, when even without understanding anything, he asserts out loud that everything is clear. The latter are rated higher - thus, omnivorousness, eclecticism and lack of convictions are brought up.

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Installation date: 07/15/2007

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