

**On an attempt to compare the
relativity theory with the mechanical
views for the emission of light.**

By Michele La Rosa.

Now with the theory of relativity, a crisis is approaching, it would be of utmost interest to find an

attempt to reason to come to a clear decision between the second principle of relativity theory and the mechanical options, which mediate between the teaching of light and electromagnetism and the actual principle of relativity shall stand in place, without thereby entering revolutionary repercussions.

In such studies have not been lacking. In a recent paper ¹⁾, I have dealt in detail with them and their employment. Permit me here to point out this work, it happens less because of the negative result, which I am there into what affects the value of the results obtained so far, as to attract the attention of researchers who are great exercise and rich agents have to draw on a remarkable proposal that I had this opportunity to make, because I think it has been overlooked by most.

What led me to this view, is primarily a recent report by Mr. Tolman ²⁾, one of the researchers who has dealt with this most important subject. My work is not a word mentioned, although I have developed essentially the same thoughts.

I pointed out in this paper that the theory of relativity and the mechanical theories give different results for the propagation of waves in a medium with respect to the source in motion, and then proposed to repeat the famous experiment of Michelson and Morley with a light source which is outside the earth (preferably with sunlight), as this may result in the desired proof.

I further showed that such an attempt by the theory of relativity would again provide a negative result, according to the basic conception of the mechanical hypothesis, a positive one.

I put my account based only the following hypotheses:

1. When the light source, and the means in which the waves propagate, have a (constant) reciprocal velocity. then for an observer O, which is in relation to the light source is at rest, the velocity of propagation of

the waves affecting only insofar as this is in the Fizeau experiments.

$$\left(\text{Entrainment coefficient } \frac{n^2 - 1}{n^2} \right).$$

2. For an observer O_1 , which is regarding the medium at rest, the propagation rate of the waves results from composition of the speed with the relative speed between the two observers (thus also between the first observer and the source of light), seen by the first observer, according to the usual parallelogram rule under the same circumstances.

In this way, which is in my opinion the easiest and most direct, since it follows the observed facts, next I came to the conclusion that in the use of a light source, which does not participate in the movement of the earth, the wave trains the two arms of the Michelson's apparatus must show exactly the phase shift, which requires of the old theory of Lorentz. Now can be derived from our hypotheses easily as follows:

1. When the waves in a single medium of index 1 spread, the speed of O remains seen unchanged, as viewed from O_1 is obtained by composition of the former with the relative speed between the light source itself and O_1 .

2. When the waves hit one mirror with respect to O_1 at rest, the reflected waves, whose centers continue to move for the two observers the same speed, see the source of light moving to themselves: i.e., O sees the center of the reflected wave motionless there in the space, where it is emitted from the mirror. O_1 sees it moving at the velocity v from itself, provided that he is located between the light source and mirrors, and that v is the velocity with which he sees the source approach.

These consequences include the obvious assumptions about the propagation of the time being, that Ritz has introduced in his brilliant attempt of an electromagnetic radiation theory ¹⁾.

Mr. Tolman had set up a different hypothesis about the speed of the reflected waves in the circumstances described, but this was refuted by an interference

1) M. La Rosa, N. Cimento (6) 3, 345, May 1912.

2) The .Phys. Rev. 35, 136, August 1912. I'm very sorry that my work has escaped Mr. Tolman, but I have not failed to send him an excerpt from when I sent in May a number of copies to foreign researchers.

1) Ann. de Chim. et de Phys (8) 18, 145, 1908.

experiment executed by himself ¹⁾). That's why I did not think it necessary to mention it in my work.

However, I did not fail to examine where the outcome of the hypothesis suggested by Stewart ²⁾ leads and found that the above result is obtained only sign-reversed, assumed by the author that the light reflected from a moving mirror proceeds from the moving image of the light source.

The new treatise of Mr. Tolman teaches us as new only that the known facts about the Doppler effect in canal rays (according to the hypothesis of Stewart this effect would have a change of sign, which contradicts the facts) entitle us to reject these hypothesis' and that, if we want to remain in the areas of mechanical laws, we have to abide by the hypotheses of Ritz or to the more general and more direct, which emerged from a fundamental experiment on the light in a moving medium and the old laws of classical mechanics.

1) The Phys. Rev. 31, 26, 1911

2) The Phys. Rev. 32, 418, 1911

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