Above an experience of comparison between the theory of relativity and the mechanical conceptions on the emission of light[1])

NOTE FROM DR. M. LA ROSA.

At this time where the theory of relativity goes meeting a crisis, the research arouses the greatest interest of a fact, which can serve as the basis for a clear-cut decision between the second, disputed principle of this theory and the conceptions mechanical; which they promise to reconcile, without ruinous repercussions, optics and electromagnetism with the principle of relativity proper, now imposed at these branches of science.

Attempts have not been missed.

Of them, and of the observations that have been addressed to you, I am largely occupied in a recent job[2]), which I allow me to recall not so much for the pessimistic conclusions I had to reach about the value of the results achieved so far, how much to attract the attention of those who own long preparation and abundance of means, above a notable proposal, that I had occasion to advance, since I believe that it escaped many.

He especially induced me in this persuasion one recent publication of Mr. Tolman [3]) - - which is one of those the most have dealt with the important topic - - in which I have not found a hint of my work, although there basically contain the

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[1]) *Journal of Natural and Economic Sciences*, Vol. XXIX, Palermo, 1912.

[2]) M. La Rosa. *N. Cimento*, vol. s. VI, vol. III, file 4th, p. 345, May 1912.

[3]) *Phys. Rev*., vol. XXXV, p. 136, August 1912, very sorry that my work has escaped Mr. Tolman, although I have had the care to send you a copy, since last May.

same ideas that I had then occasionc to exhibit.

After having pointed out that the theory of relativity, and mechanical theories predict different results for propagation of the waves in a system of media in motion with respect at the source, I proposed, in that work, to repeat the famous experience of Michelson and Morley with source light not terrestrial (best of all the Sun), since it can spring from it the proof sought.

I demonstrated in fact, that while according to the theory of relativity this experience should again give negative results, according to the fundamental concept of the mechanical hypothesis it should give positive results.

On the basis of my calculation, I introduced only the following hypotheses:

1.°) When a light source and a system of means, in which the waves propagate, have a relative speed (constant), the only influence that this has on the speed of propagation of the waves, according to an observer 0 at rest with respect to the source, and that which results from the experiences by Fizeau $\left(\text{dragging with the coefficient}\frac{n^2-1}{n^2}\right)$.

2.°) Under the same conditions, the speeds appreciated by an observer 0_1 at rest with respect to means, are those that are obtained by composing, with the ordinary rule of the parallelogram, the velocities seen by the first observer with the velocity that these - - and therefore the source - - has with respect to the second.

In this way - in my opinion simple and direct, since closer to the facts of experience - - I was able to conclude than between the waves traveling along the two arms of the apparatus by Michelson, when the source does not participate in the motion of the earth, the phase difference must appear exactly predicted in the primitive theory of Lorentz.

Now from these hypotheses it is easy to deduce:

1) That in the event that the waves propagate in a only means with index 1, the speeds seen from O are maintained unchanged, those seen from O_1 are obtained by composing the primes with the speed of the source with respect to O_1 itself.

2) That when waves meet a mirror, in quiet with respect to 0_1, reflected waves are generated whose centers they continue to move with the same speed with which the two observers see the source move - and therefore 0 sees the center of the motionless wave at the point of space where was emitted by mirror; 0_1 sees him speed away V; supposing that he is between the source and the mirror and that he sees it approaching with the speed V.

These consequences evidently contain the postulates on the propagation of waves, introduced by Ritz in his brilliant test of an electromagnetic theory of emission[1]).

On the speed of the reflected waves, in the said conditions, Mr. Tolman[2]) had made a different hypothesis, which results clearly contradicted by an interference experience from made himself. That's why I thought I didn't owe it occupy in my work.

I didn't forget, however, to examine to what result it could lead the hypothesis proposed by Stewart[3]), and I found that there is only a change of sign in the predicted result in the first mode, when, with this Author, it is admitted that the waves reflected on a moving mirror behave as waves coming from the moving image of the source.

Mr. Tolman's recently posted discussion apprehends us so this just again: that the known facts about the effect Doppler (which effect with Stewart's hypothesis should present a change of sign contradicted by facts) authorize us to reject this other hypothesis as well, and that wanting to remain in the field of mechanical doctrines we must stick to those of the Ritz, i.e., the wider and more directions that are suggested to us by a fundamental experience of optics in moving vehicles, and from an old principle of classical mechanics.

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[1]) *Ann. de Chem. et de Phys*., s. 8th, vol. XIII, p. 145, 1908.

[2]) *Phys. Rev*., v. XXXI, p. 26, 1911.

[3]) *Phys. Rev*., v. XXXII, p. 418, 1911.

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