About the alleged reality of the Lorentz contraction and the determination of the absolute motion of the earth. By *M. La Rosa*.

In recent years, Prof. *Courvoisier* from Babelsberger Observatory some interesting astronomical investigations published by the physical proven reality of the famous Fitz-Gerald-Lorentz contraction and the absolute motion of the earth in space should be measured. From the results of certain measurements supposed in fact a periodic deformation of the earth's crust have come to light which one can be traced back to famous contraction by one of all bodies in the Milky Way common and at a speed of approx. 600 km/sec to a point very close to the "Capella" would have to keep translational movement.

There is no need to say a word about the importance of this investigation to be lost, be it in terms of the value that have these results in and of themselves, be it in relation to the theoretical assumptions that support them; requirements, which would lead us back to the universe than in one that is in absolute stillness, a universal one (physical) means forming a point of reference floating grasp.

Without going now to the credibility of the results of questionable observations and even less on the possibility a return to theoretical assumptions to want to take that were considered definitively obsolete, I want the attention of physicists and astronomers to an argument direct that to me - on the concrete territory of facts - the acceptability of the famous hypothesis of the contraction seems to contradict; an argument that I touched on many years ago in a of my work had the opportunity to go into more detail I didn't think it was appropriate at the time because of the theory of relativity in their first version of the contraction in question had taken any concrete reality value.

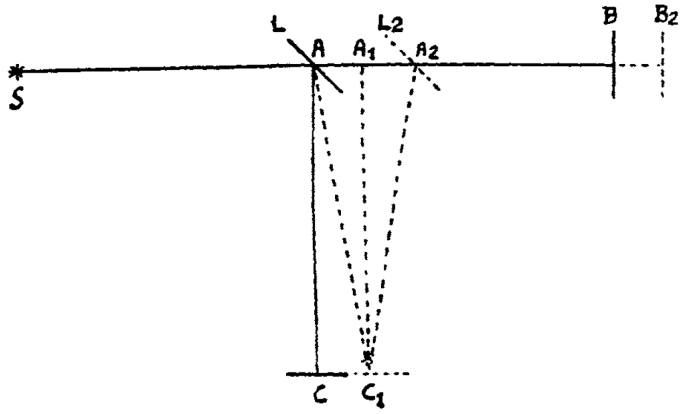
Occasionally an investigation on the experimental foundations of the 2nd principle of "closer relativity" (by which I recommend the advisability of a repetition of *Michelson*'s experiment with extraterrestrial light was led, which later by *Tomaschek* and was done by *Daytan G. Miller*), I calculated the delay τ with which the two light beams in *Michelson*'s apparatus would propagate if along the two arms of the same, instead of air (or better the free ether) would suitably be two material ones means of different nature would have been introduced[1]).

For the convenience of the reader, I briefly list the small calculation to:

Let d_1 and d_2 be the lengths of the two arms of the instrument, n_1 and n_2 are the absolute indices of the means (at rest) and let v be the translational velocity of

[1]) By *M. La Rosa*: On the experimental foundations of the 2nd principle etc. N.C. (6) **3** [1912].

the instruments in the direction of the arm d_1, after the *Lorentz*ian theory (absolute point of reference) would have to those of one dormant with the agent source coming waves to move away from point *A* (see Fig.) of *Michelson*'s apparatus to mirror *B* lengthwise of the arm d_1, which is determined by the ratio:



$$t_1 = \frac{d_1 + vt_1}{c_1 + \frac{n_1^2 - 1}{n_1^2}\, v} = \frac{d_1}{c_1}\left(1 + \frac{v}{n_1^2 c_1} + \frac{v^2}{n_1^4\, c_1^2} + \cdots\right)$$

given time where $c_1 = c/n_1$ the speed of light in the mean of index n_1 (at rest) while $c_1 + (n_1^2\text{-}1)/n_1^2 \cdot v$, as is known, that of the light in in means located in motion.

In an analogous way, the time of the way back from *B* given to *A* by

$$t_2 = \frac{d_1 - vt_2}{c_1 - \frac{n_1^2 - 1}{n_1^2}\, v} = \frac{d_1}{c_1}\left(1 - \frac{v}{n_1^2 c_1} + \frac{v^2}{n_1^4\, c_1^2} + \cdots\right)$$

Restricted to the terms of the second order the time t' for the outward and return journey is given by the relationship

$$t' = 2\frac{d_1}{c_1}\left(1 + \frac{v^2}{n_1^4 c_1^2}\right).$$

For reproduction along the line perpendicular to the translation we get that from point *A* of the plate *L* waves emitted sideways from the material average speed $(n_2^2\text{- }1)/n_2^2 \cdot v$ led to it be. Thus, they remain more and more in relation to the whole apparatus, which moves with the speed of v is moving away and from which we are moving with the speed of v/n_2^2 appear to be removed.

Thus, the waves emanating from A after reflection on C_1 go back to point A, so they have to go up path AC_1 on the way there and the same on the way back traverse path C_1A_2 where $CC_1 = AA_1 = A_1A_2 = v/n_2^2 \cdot t_1'$, since t_1' is the time of the way from A to C_1. Well, this time will appear to be related to the rate of propagation of waves along AC_1 and C_1A_2 (viz to $c_2 = c/n_2$ and to the length d_2 of the arm must by the ratio:

$$c_2^2 t_1'^2 = \frac{v^2}{n_2^4}\, t_1'^2 + d_2^2$$

which is immediately justified by a look at the figure and from which (within the second order in v/c) derives:

$$t_1' = \frac{d_2}{c_2}\left(1 + \tfrac{1}{2}\frac{v^2}{c_2^2\, n_2^4}\right).$$

For the way there and back, obviously one becomes double so great a time as this, t'', may be required.

Assuming that the two optical paths have been chosen to be the same in the idle state, that is if $n_1 d_1 = n_2 d_2 = \delta$

then we are given the delay $\tau = t' - t''$ be through

$$\tau = \frac{\delta\, v^2}{c^3} \cdot \frac{2n_2^2 - n_1^2}{n_1^2 n_2^2}$$

It becomes $\tau = \delta v^2/c^3$ in the case where $n_1 = n_2 = 1$, which precisely that delay caused by the famous contraction of the arm parallel to the translation according to the ratio $(1 + \frac{1}{2} v^2/c^2)$: 1 would be compensated. In general it should one assumes, so that the compensation can take place, that the contraction in the ratio

$$\left(1 + \frac{1}{2}\frac{v^2}{c^2} \cdot \frac{2n_2^2 - n_1^2}{n_1^2 n_2^2}\right) : 1$$

succeeds, which embarrasses the famous hypothesis.

Because in fact the delay is a function of the refractive indices, we would if we compensated for them in the contraction of in the direction of translation oriented arm, led to this conclusion: that if you keep the whole *Michelson*ian apparatus unchanged leaves (shape, structure, nature of all its parts, etc.), also the means arranged along that arm, and only the mean changes, which the waves along the encounter normal arms (which can easily be could be accomplished by mixing different liquids inserted into a suitably arranged tube), automatically the contraction of the first arm would have to change, to such an extent that they in accordance with the ratio listed above adapted to the new agent introduced.

Palermo, April 1932. *M. LaRosa*.

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