PHYSICS. - *On the Sagnac effect*. Note by Messrs. **Alexandre Dufour & Fernand Prunier**.

We have shown ([1]) that the experiment provides the same result for the Sagnac effect, whether the observer is entrained or not by the disc. The interpretation of this result appeared to us to present difficulties in relativistic theory.

Mr. Langevin ([2]) estimates, on the contrary, that the forecasts made in accordance with the theory of relativity, by the fixed observers or others related to the platform, agree between them as well as with the experiment. He recalls that the observer bound to the platform can choose between two simple solutions, the first in which he adopts a uniform time on the disc, and the second when he makes use of a non-uniform local time.

In the first solution, speed of light is, for the observer related to the disc,

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([1]) *Comptes Rendus,* **204**, 1937, p. 1925.
([2]) *Comptes Rendus,* **204**, 1937, p. 304.

understood to be between $c + \omega r$ and $c - \omega r$ according to the direction of propagation, r denoting the distance of a point considered on the path of the light and a center arbitrarily selected for all on the disc. In the second solution, speed of light is c.

But it is quite obvious that if the observer bound to the disc compares them with its instruments (ruler and clock) in a given region at a distance r from the arbitrary center, for values of the speed of light in the different directions, he will find two things will happen, either a variable speed according to the direction or an isotropic speed.

If the experiment gives him a variable speed with the direction, one can explain without difficulties the experiment of Sagnac, both in its original form and as we gave here.

If the experiment provides to the contrary, the same value c for speed of light in all the directions, as the routes are for the entrained observer, the same ones as when the disc is at rest, this observer should not note Sagnac effect when the disc is put in rotation, while the observer remained fixed in the laboratory, there is a Sagnac effect. One explains neither the initial Sagnac effect then, nor our experimental result.

This is why, in our opinion, only the solution with variable speed per direction must be retained, provided however indetermination to which the arbitrary choice of the center leads. It is thus, except for this reserve, because of a kinematics identical to traditional kinematics, and not because of a special kinematics and a local time, that relativity explains the Sagnac effect. Traditional kinematics, behavior for inaccurate with the first order for systems of axes in translation, would thus become again exact with the first order for systems related to a disc in rotation, when the arbitrary center is selected on the axis of rotation. However far this center is and as small as ω is, we should always admit as speeds of light on the portion of trajectory remained remotely finished, are respectively given, for the observer related to the disc, by $c + \omega r$ and $c - \omega r$ for the two directions of propagation. Is it not thus led to suppose that it should be the same in the limiting case of a translational movement of speed v, as provided for only the classical theory?