

OPTICS. - On the observation of the phenomenon of Sagnac with an illuminating source not entrained. Note by Messrs. **Alexandre Dufour & Fernand Prunier**.

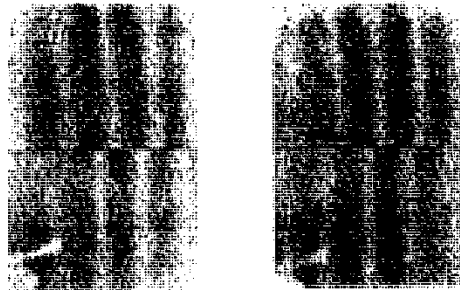
In the usual assembly of the revolving interferometer of Sagnac, the source of light and the observer, who locates the positions of the fringes, are both connected to the disc which actuates the apparatus. We propose to replace the preceding source by a source of light that is not turning with the

system, and to see if this new experimental provision modifies the size of the phenomenon of Sagnac for an observer entrained on the disc in rotation.

The apparatus which we used is of the same type as that of Sagnac, but the separating mirror of the interfering beams occupies the center of the disc. The diameter of the mobile platform was raised to 1m. The area limited by the optical path reaches  $28 \text{ dm}^2$ , which made it possible to count on a phenomenon of Sagnac to be about one tenth of fringe in blue light for an angular velocity of one turn per second.

The illumination of the optical circuit by a source of light not taking part in the rotation of the interferometer, is in the form of flashes occurring once per turn, and whose duration, variable with speed, remained on the order of  $10^{-5}$  seconds. This duration, though small compared to the time for the disc to make a turn, is however much higher than the travel time of light in the interferometer.

To obtain, under these conditions, an acceptable image on the photo-



graphic plate, we used a white source of light and panchromatic filters. The duration of exposure could be reduced to a few minutes for each rotation.

In order to make comparisons, we also carried out photographs of the Sagnac effect with the usual assembly, by taking care to keep the same kind of light source and filters, but by modifying the duration of the experiment to obtain comparable photographic images in the various cases.

The specimens given here as indication, increased four times, represent two of the original pictures obtained when the rotational speed reached approximately four turns a second.

The picture on the left specifies the Sagnac effect, observed when the source is involved. The picture on the right-hand side shows the size of this

effect when the light source is maintained fixed in the laboratory. It is seen that the shift of the fringes is appreciably the same in both photographs.

The measurements showed that, in one case as in the other (source entrained or not), the value found for the Sagnac effect underwent accidental variations reaching, in certain determinations, 15 per 100 of the average value, so that one must consider a sufficient number of observations if one wants to hope for a good approximation. The cause of these accidental variations is probably due to irregular modifications of the optical paths of the rays, modifications resulting from the movements produced in the ambient air by the rotation of the apparatus. When a larger precision is required, it will thus be necessary to place the interferometer turning in an atmosphere at reduced pressure.

In short, for the observer entrained with the interferometer, the Sagnac effect remains practically of the same value, as might be expected, whether the illuminating source takes part or does not take part in the rotational movement of the apparatus. But the particular technique indicated here is of the interest to allow the use of the revolving interferometer under experimental conditions different from those of Sagnac.