ROTATIONAL LIGHT

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Abstract: A small test of relativity.

Examination

Most likely the light has inertia[1] and so the Sagnac effect is a consequence of the effects of Bradley and Doppler, i.e. the variable direction of the rays is transformed into a variable lightspeed by the mirrors. This can be verified with a rotating interferometer of Mach-Zehnder (Fig.1;2). If we replace one of the mirrors with a dispersion prism or a corner reflector (Fig.3;4), then the rays will displace laterally (A) on the screen, whereas the dephasing (D) will decrease by half. The respective basal formulas[2;3;4] are:

$$A = \frac{l.v}{c} \tag{1}$$

A - lateral aberration
l - length of radial ray
v - peripheral velocity
c - speed of light

$$D = \frac{4.\pi.v.F}{\lambda.c} \tag{2}$$

F - figure area
λ - wavelength

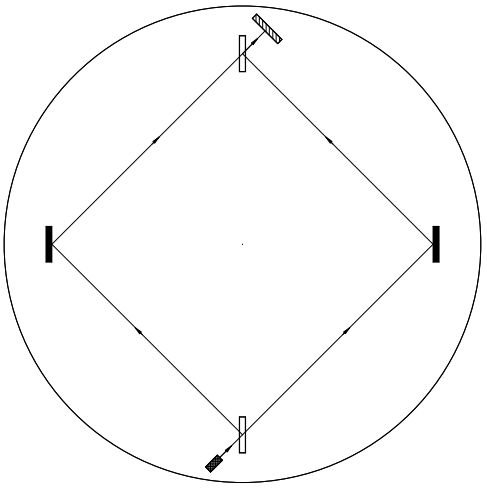

Fig. 1

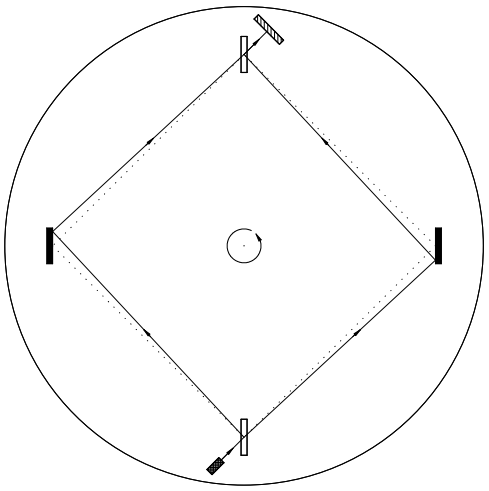

Fig. 2

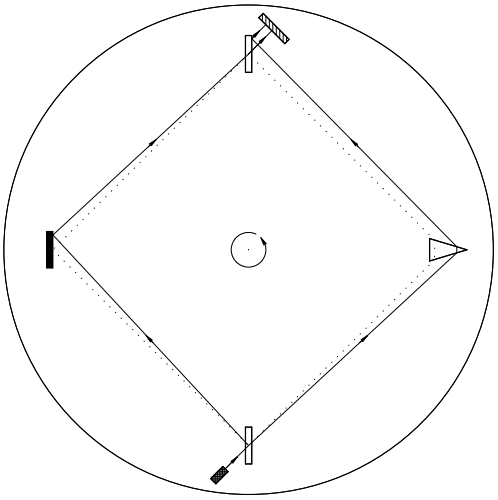

Fig. 3

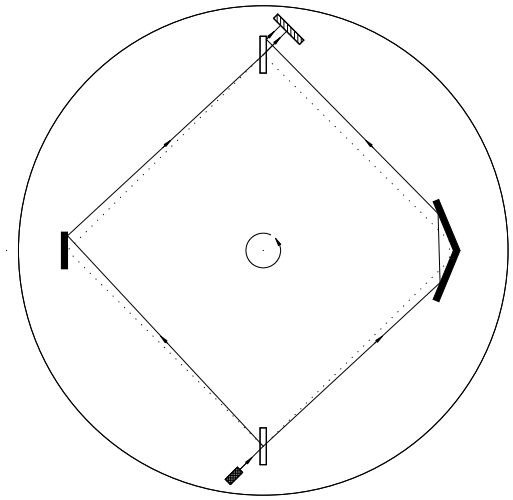

Fig. 4

A similar result will be obtained from a Sagnac interferometer with dispersion prisms (Fig.5). The beams will move sideways (parallax) on the screen, instead of dephasing longitudinally.

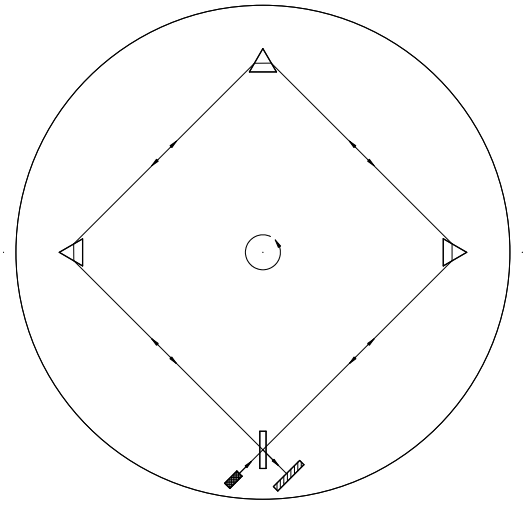

Fig. 5

According to the relativists, light has no inertia, whereas the Sagnac effect is a result of the Lorentz transformations[5;6] (3) (Fig.6). However light inertia follows from the law of conservation of energy, besides the relativistic effect of Sagnac doesn't depend on the figure area but on the circumference, which is not true practically.

$$\Delta t = t_+ - t_- \approx \frac{l}{c-v} - \frac{l}{c+v} \qquad (3)$$

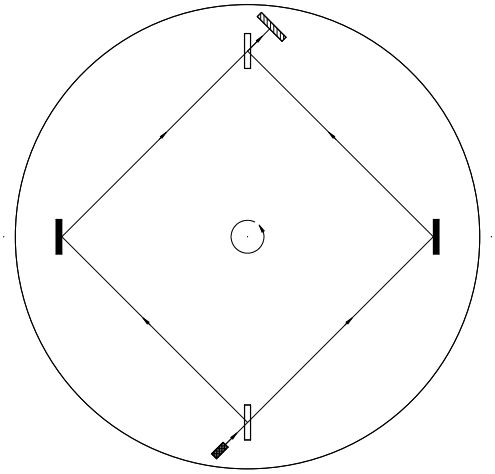

Fig. 6

References

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