The Important Sagnac Effect

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The almost hundred years old conflict between the special relativity theory (SRT) and the Sagnac effect is analyzed. The common interpretation of Sagnac effect as an effect of rotation is refuted. The relation between Sagnac effect and ether model is discussed.

Background

Since Sagnac in 1913 discovered the effect named after him scientists have failed to provide a unification of the effect and SRT that all could agree upon. Many different ideas have been presented. These problems have been explained away by stating that Sagnac effect is an effect of rotation. However, the notion of Sagnac effect as an effect of translation has been advocated by H Ives.

The Sagnac Effect

Sagnac effect has been described as a time delay $2A\Omega/c^2$ (one-way effect), where A is a plane area rotating around its normal with angular velocity Ω. A circular path in an optical fibre is used in laser gyros, and time delay is detected as a phase angle in light representing a measure of angular velocity, i e act as a rate gyro. According to Stokes' rule: integrating a vector's rotation over an area equals integrating the vector's component on the limit of the area along that limit. This gives a Sagnac effect equal to vL/c^2, where L is the length around a circle and v its tangential velocity. Although these two expressions are mathematically identical, the first expression can be physically misleading. We can see that by realizing that the effect is distributed along a line and not over a surface. Therefore, Sagnac detected an effect of *translation* although he was forced to use a rotating equipment. Today we can detect Sagnac effect with translating equipment. R Wang [1] and C S Unnikrishnan [2] have done that in different ways. They have measured velocity without external reference and thereby demonstrated *translational* Sagnac effect and *existent* ether. The expression vL/c^2 can be used for translational equipment if L is the length of a straight line and v is its velocity

component in in its own direction. A translating curved line has the same Sagnac effect as a straight line between its endpoints. See also [3].

Indicating translational motion based on Sagnac effect has given certain verdict about the ether's existence by measuring *relative* velocities. See [1] and [2]. But we want to know the state of motion of the ether per se also. This means measuring an *absolute* velocity in the ether i e an ether-wind. We must detect first order effect, and that *is* the ether-wind. If we can keep the distance between light source and detector constant we can get an *unambiguous* method. However, all this is possible only if we can find a way to circumvent the clock synchronization problem.

Conclusions

Sagnac effect is an effect of *translation* that refutes SRT and proves the ether's existence.

Sagnac effect is the best way to find the ether's state of motion.

References

[1] Rayong Wang, Ti Zheng, and AipingYao, "Generalized Sagnac Effect", Physical *Review Letters,* **Vol 93 Number 14,** (2004)

[2] C S Unnikrishnan, 'Light and the observer: New experiments and a critique of our common beliefs about light', *SPIE* **6664-23**

[3] J.-E. Persson, "The Special Theory of Relativity and the Sagnac Effect", **14:th** *Annual Conference of the Natural Philosophy Alliance* (May 2007), In Absentia Available at: www.geocities.com/mail0110261847 Also in *Infinite Energy*, **Nr 77**, Vol 13, 35-40