The Scandalous Sagnac effect

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Abstract

Ron Hatch presented an alternative, [1], to the theory of relativity (SRT) for explaining VLBI results by a behavior of atomic clocks. Another alternative, based on the Sagnac effect, is presented here.

Background

In the reference, [1], Ron Hatch provides an alternative (in relation to SRT) explanation to the aberration observed in the VLBI (very long base interferometry) measurements. Ron's alternative is based on the LET (Lorentz ether theory). Instead of on mathematical magic, by Einstein, a diurnal mechanism, based on gravity from the Sun, is presented by Ron. However, the disadvantage is that the principle of equivalence must be given up in Ron's alternative. Ron also wrote an abstract stating that the equivalence principle was disproved. However, he did never write a full paper on this issue.

Ron's theory assumes a diurnal change in clock speed dependent on positional changes, caused by the gravity potential from the Sun, and from the rotation of our planet. His motivation is an observed phenomenon in VLBI observations, stating that VLBI data must be handled in the frame of our Sun. If data are treated in the frame of the Earth, data from the leading VLBI station arrive 2.1 μs too early, and data from the rear VLBI station arrive 2.1 μs too late. This fact creates an *illusion* of a wave front tilting of 10^{-4} radians, in agreement to the *illusion* of tilting that Bradley observed in stellar aberration, also caused by ether-related motion. In Bradley's telescope the illusion was caused by moving the detector a length $10^{-4}f$ (in relation to the ether, or Sun), when light moves the length *f*.

Sagnac effect

The 2 VLBI stations are assumed to be situated on opposite sides of our planet, and observations are done in a direction transverse to a line connecting the 2 stations. The equipment is moving with speed, *u*, in relation to the Sun, in a direction transverse to observation. Therefore, the time for the signals to move to an assumed point in the center of Earth are dependent on the Sagnac effect. So, we get: $t_{lead} = \frac{t}{1+u/c}$ and $t_{rear} = \frac{t}{1-u/c}$. Here $t = \frac{r_{Eart}}{c} = 2.1 \times 10^{-2}\ s$, and $u/c = 10^{-4}$. Therefore, we get: $\Delta t = \pm 2.1\ \mu s$. Analogous to the case in stellar aberration, the point where the signals have been united is moved a length $\pm r_{eart} \times 10^{-4}$, in relation to the Sun (or ether), when the signals have moved the length r_{earth}.

Here *u* represents changes in motion in relation to the ether. This demands an existing ether, but *u* is different from real ether wind, *v*. Since the 2 stations are situated on opposite sides of the Earth the real ether winds do not contribute to the Sagnac effect. The reason is that the real ether wind is blowing in direction towards the center of Earth, so these 2 effects, ±*v* , compensate each other, and do not cause Sagnac effect.

By ignoring the Sagnac effect, the clock in the leading VLBI station therefore is indicating a too early arriving time. The opposite is valid for the rear VLBI station. These facts create an *illusion* of wave front tilting in the VLBI observations, caused by observer motion. The mistake is ignoring the Sagnac effect. Instead of Ron's diurnally changing clock bias, we get an effect in VLBI equal to the effect in stellar aberration. Einstein's equivalence principle can be saved, but not SRT.

So, we have found that **ignorance of the Sagnac effect** is the cause of the effect observed in VLBI experiments. Therefore, it is possible to compensate for Sagnac effect, either in the synchronization process, or in the evaluation process, to avoid the observed phenomenon.

An alternative explanation

Since the need for Sagnac correction was not discovered another solution was found by using a frame with the *transverse* (to signal motion) *component* in v=0. We can also, in an alternative way, explain stellar aberration and aberration in VLBI by transforming light, or VLBI signals, moving with speed c and direction 0 in the frame of our Sun into a frame with speed v in *transverse* direction. We thereby get speed sqrt(c^2+u^2) and direction arctg(-u/c)=-10^{-4}. So, we find that the wave front is tilted in the observer's frame, although unchanged in reality.

Conclusions

The VLBI instrumentation has detected a **first order** effect of the Sagnac effect. This has not been observed due to an indoctrination with the erratic idea that first order detection of *changes* in light speed was not possible. Since first order detection cannot give a *value* on light speed, this conclusion was caused in error, and the most perfect method for detecting Sagnac effect was missed.

We can also conclude that *first* order Sagnac effect can be used to detect ether wind as a function of elevation angle, and thereby confirm a vertical ether wind of v=11.2 km/s on Earth. However, *second* order Sagnac effect (in the method used by Michelson and Morley) cannot be used due to compensation by means of contraction of length. See [2].

Remarks

- The Pioneer anomaly has detected a **second order** effect of the ether wind in 2-way signal speed, in **radial** direction only, by a radial ether wind (a vector). This is in contrast to the official explanation by an effect of gravity potential (a scalar) assumed to affect signals moving in **all** directions. This is demonstrated in reference [3].
- Since the correction is constant in VLBI tests, the frame of the Earth can also be used in these tests, together with a correction of 10^{-4} radians.
- Someone has said: if Sagnac's experiments had been done before the tests made by Michelson, together with Morley, we today would have a quite different physics. This is an interesting point of view, worth some kind of thinking.
- Sagnac experiments are described sometimes by a rotating surface, and sometimes by a translating line based on a *mathematical* identity causing a *physical* confusion. However, in physics the translating line is the only correct interpretation, which is demonstrated when the light is locked in by an optical fiber. Due to his testing method, Sagnac was forced to use a closed light path, but this is not a general demand for causing Sagnac effect.

References

[1] Ron Hatch, *Those scandalous clocks*, GPS Solutions (2004) **8.67-73**

[2] John-Erik Persson, *Physics and Math*, available at: https://www.gsjournal.net/Science-Journals/Essays/View/8704

[3] John-Erik Persson, *The Pioneer anomaly according to Fatio*, available at: https://www.gsjournal.net/Science-Journals/Essays-Cosmology/Download/8663