

The Enigmatic Ether-Wind

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The three main types of methods for detecting the ether-wind are analyzed. Alternative interpretations are found to all three phenomena. These interpretations indicate an entrained ether-wind.

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1. Background

The theory of relativity has been debated for about hundred years. Much critique has been focused on mathematical aspects. Philosophical aspects have also got critique. Harald Nordenson has been very critical in books from 1922 and 1969 [1]. Nordenson states that the production of multiple time concepts refutes the theory of relativity. Apparently more discussions regarding *physical* aspects are needed. This article is therefore focused on the interpretations of phenomena that are basic for the theory of relativity.

2. Effect of ether-wind transverse to light

The stellar aberration was easily explained in relation to Newton's particle model for light. The effect was explained as a raindrop effect. A transformation of coordinates into the frame of the moving observer is needed to describe the observer's conception of the phenomena in question. Thereby is the motion of the observer subtracted from the motion of light. When the observer is moving with the speed u transverse to light with speed c we find apparent direction of light is changed an angle $\arctg(u/c)$ and speed is changed to $(c^2+u^2)^{1/2}$. See Fig 1.

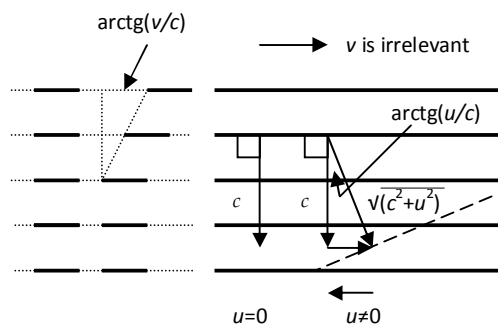


Fig 1 a Transverse ether-wind v does not change wave front normal

Fig 1b Observer's motion u creates the illusion of a changed direction to a fixed star (Bradley's idea)

When Maxwell's wave model for light became popular the ether became needed. Therefore aberration was supposed to be explained by the ether-wind v instead of by the observer's motion u . This became problematic and an explanation based on Fresnel's ether drag coefficient [2] was invented. Unfortunately it was not discovered that the effect of observer's motion u is the same in relation to a moving wave as to a moving particle. This means that the simple explanation by Bradley, due to observer's speed u , is valid for the wave model for light also. We will later see that there is no effect of transverse ether-wind v .

Airy wanted to demonstrate increased aberration due to decreased light speed with water in a telescope. The test failed. This can easily be explained by Bradley's simple model. When light's behavior is transformed into the frame of the observer we find the normal to the wave front to be in line with the optical axis of the telescope. This explains why the water had no effect, since the telescope detects the normal to the wave front. We can also see this by realizing that refraction in the surface between air and water reduces small angles and thereby compensates the searched effect.

The explanation based on Fresnel drag gave an acceptable explanation for the autonomous ether although not theoretically very convincing. However the problem was increased when the entrained ether was discussed. Scientists came to the conclusion that stellar aberration could not be united with the entrained ether. The assumed *real* bending due to v could not be explained for the entrained ether. If instead Bradley's *apparent* bending due to u had been accepted for light waves it would have been valid for both ether models.

Understanding stellar aberration demands knowledge about the behavior of advanced optical instruments like resonators, lasers, interferometers and telescopes. Since wave velocity c is a constant and an ether-wind v , inside the wave, front has the same effect all over the wave front we can conclude that wave front normal is conserved in relation to changes in transverse ether-wind. This is true as long as we use instruments detecting the normal to the wave front. In instruments of this type the relevant description of light is $c(1+v_c/c)$. v_c is the component in \mathbf{v} that is parallel to \mathbf{c} . In instruments of this kind the wave fronts are always parallel to the mirrors and resonators independent of ether-wind blowing in the plane of the mirrors and wave fronts. When \mathbf{v} and \mathbf{c} are orthogonal to each other they are independent of each other. This means also that in Michelson and Morley's test light speed and wave length along the optical axis are independent of ether-wind inside the wave fronts. Stokes' reduction of Michelson's prediction by 50%, due to a supposed transverse effect, is not correct.

Stokes' mistake was reused by Einstein as a motivation for what he called time dilation. Metaphysical time dilation does not exist. The observed effect in atomic clocks is instead caused by a physical effect of the ether-wind on electron's orbits inside the clocks.

Since most advanced optical systems detect the normal to the wave fronts the correct representation of light is $c(1+v_c/c)$. The vector sum $\mathbf{c}+\mathbf{v}$ is relevant only in systems that can detect the direction of a focused beam. It is very important to separate between these two kinds of systems where the transverse component of ether-wind is valid only in systems detecting the direction of the beam and most systems detect only wave front normal. When we observe fix stars in a telescope we detect the normal to the wave front and transverse ether-wind v is irrelevant. This means that stellar aberration is produced by observer's velocity u and therefore Bradley's aberration model is valid for both light models and both ether models. *Stellar aberration can therefore not tell us anything about the state of motion of the ether.*

3. Second order effect of longitudinal ether-wind

Michelson and Morley sent information forth and back between mirrors to see a second order effect on the two-way speed of light from the ether-wind. Although this effect is opposite in the two directions a very small effect remains after two-way propagation. Since

this effect is very small it is important to analyze what effect the ether-wind can have on the crystals in the test equipment. The mechanical structure is the reference for the two-way propagation of Michelson's signals.

The separation between atoms in a crystal is controlled by the ether. It is very difficult to see an alternative. The atoms produce static fields in the ether and these fields become dynamic due to the ether-wind. This means that information is transmitted in both directions between the atoms with the speed c in relation to the ether. The information flowing between atoms is simultaneous in the two directions, but the flow between Michelson's mirrors is sequential. The total effect is nevertheless the same in the two cases. This is plausible since the effects are very small. The separation between atoms is therefore reduced to the same amount as the reduction in two-way speed of light. The time for two-way propagation is therefore unchanged. This contraction is 2 times the Lorentz-Fitzgerald contraction, but is not combined with any time dilation. *Michelson and Morley's tests cannot tell us anything about the state of motion of the ether.*

4. First order effect of longitudinal ether-wind.

Methods based on the first order longitudinal effect have been abolished due to the problem of synchronizing separated clocks. However, this problem is circumvented in the kind of experiments first introduced by Sagnac. Instead of synchronizing two clocks light from one clock is reaching a detector from two different ways. Light with speed c follows a circular path in two opposite directions inside an optical fiber with length L . When this path is moving with tangential speed v the length L is changed to $L(1 \pm v/c)$. The difference in propagation time is therefore $\Delta t = L[(1+v/c) - (1-v/c)]/c = 2vL/c^2$. Since length and not speed is changing we do the calculations in a not rotating frame. This means that we do not get the quadratic term that is common in other interpretations. From simple geometrical relations we get $\Delta t = 2vL/c^2 = 4\Omega A/c^2$. Here Ω is angular velocity of circular area A .

We have got two expressions for Δt that are identical in a mathematical sense, but not in the physical interpretations. We have a physical ambiguity. Is Sagnac effect caused by a translating line or by a rotating area? The answer to this question is found in the distribution of light and thereby also the distribution of Sagnac effect. Light is distributed along a line and not over an enclosed area. Sagnac effect is therefore an effect of *translation*. This follows also from the fact that the interferometer compares phase between two parallel wave fronts and reacts thereby in one dimension only. Detection in one dimension can only detect translation and rotation of the equipment was needed due to the synchronization problem. However, due to a confusion regarding behavior of light and behavior of equipment the Sagnac effect got a wrong classification as an effect of rotation. This error is very important and this explains also why Sagnac effect has not got a clear and simple explanation after almost 100 years. The confusion regarding Sagnac effect is demonstrated in an analysis done by G B Malykin in [3]. In this article about 20 different attempts to explain Sagnac effect are described.

With correct classification of Sagnac effect we can easily see that this effect is very important in relation to the state of motion of the ether. Since the effect is translational the same effect must exist in a straight line of length L moving with the speed v in its own direction in relation to the ether. This means $\Delta t = vL/c^2$ (one way). The ignorance of this important fact has resulted in explaining away Δt as production of 'local' time. Such a

production of multiple time concepts refutes the theory of relativity according to Nordenson in [1]. We conclude that Sagnac effect is a first order effect of an ether-wind. *The linear Sagnac effect provides very important information regarding the state of motion of the ether.*

5. The ether-wind

The enigma regarding the state of motion of the ether (the ether-wind) has been approached from 3 different aspects. According to the interpretations presented here 2 of them have been accepted in error and 1 has been abolished in error. The first and most important error was done by many scientists before Einstein and was the abolishing of the entrained ether by reference to stellar aberration. The basic reason to this error was ignorance of the fact that the direction of light can mean 2 different things. One concept is the beam direction defined by the vector sum $\mathbf{c}+\mathbf{v}$. Another concept is the normal to the wave fronts inside that beam defined by $\mathbf{c}(1+v_c/c)$ where v_c is the component in \mathbf{v} that is parallel to \mathbf{c} . In the last definition ether-wind blowing inside the wave fronts is *irrelevant*. When we observe stellar aberration in a telescope we use an instrument detecting the normal to the wave front. The transverse component in the ether-wind \mathbf{v} is irrelevant with this kind of instrument. This means that we must explain stellar aberration by means of the transverse component in observer's motion \mathbf{u} instead. The effect of observing a moving phenomenon from a moving platform *must* be the same independent of if the phenomenon is a particle or a wave. Stellar aberration is therefore *useless*. The second error regarding Michelson and Morley's tests is not very important, but has caused much confusion. The third, very important error was ignorance of the relevance of Sagnac effect in relation to the ether-wind.

Important information regarding the ether-wind can be found from the global positioning system (GPS). In GPS positioning is done based on the one-way speed of radio signals. This demands universal GPS time and a circumvention of the synchronization problem. Compensation for Sagnac effect is done and calculations are done in a not rotating frame translating with the speed of the center of our planet. A further confirmation of this fact can be made by measuring first order effect of the ether-wind by a method described by Dr C C Su in [4].

Data from very distant objects like fix stars and pulsars must be compensated for the motion of our planet and transformed into the frame of our sun. Signals from nearby satellites are handled in the frame of our planet. This indicates that each celestial body needs a frame of its own. From this we can conclude that these frames are not real frames but only approximations to one preferred *field*. This field is dependent on the distribution of matter. From this we can conclude that the entrained ether is the correct ether model. A very important support for the entrained ether is also found in the fact that planets can move in orbits without being retarded by friction. The ether provides no resistance to velocity, only to changes in velocity (acceleration) by inertia.

However, it can perhaps be misleading to say entrained ether. Instead we should say entrained ether-wind (a property of the ether). A gravitating body absorbs a small amount of gravity particles passing through the body. This is in agreement to Fatio and Le Sage's gravity model. This means that it is the *missing* part of the particle flow that follows the active mass. Therefore, we can say that it is a shadow like effect that is entrained by matter, not the

ether per se. A small difference in the number of ether particles moving with the speed c causes an average vertical velocity of -7.91 km/s. This is the cause of gravity.

A real and observable wave front bending can be produced as an effect of a difference in the longitudinal component v_c of the ether-wind \mathbf{v} . This is described in an article in *Physics Essays* for December 2010. See [5]. The bending of light near our sun can be calculated as $\int \nabla v_c(\mathbf{r}) d\mathbf{r}$. v_c is component in \mathbf{v} parallel to \mathbf{c} . A very rough estimate, based on an assumed vertical ether-wind of -437 km/s, gave a value in the order of 10^{-5} radians, in agreement to observation.

6. The enigma

The concept 'ether' has been the most difficult concept in modern physics. The ether is not observable and we try to observe light. However, light is not observable either. We must therefore observe matter exposed to light. This is possible on charged particle as electrons, atomic kernels and ions. These facts are the reason to the difficulty in finding knowledge about the ether.

The confusion regarding the ether-wind is an important part in the confusion regarding wave or particle model. It is described in [5] that light can be described by the wave model only and that the ether can be described by the particle model only. This is also described in more detail [6], where it also is stated that the electron is a particle and the generated wave function only describes the electron's effect on the surrounding ether.

7. Conclusion

The results in [5] and [6] suggests that the prevailing ether less theory should be substituted by an ether constituted by a multidirectional flow of fast moving particles with very small masses. This ether can transmit light waves as well as the force of gravity.

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