

# Ambiguous Direction of Light

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## Abstract

The concept speed of light is a most debated subject in physics. However, the concept direction of light is also important. This article presents an ambiguity in the concept direction of light. This ambiguity is very important regarding the interpretation of an empirical result concerning light and ether. It is demonstrated, in this article, that it is interpretational errors that are the real cause of the great confusion in modern physics regarding the use of waves or particles to describe light.

## Background

We do not know much about light because light in itself is invisible. Light helps us to see reflecting and emitting objects but does not reveal itself. We are confused regarding wave model or particle model for light and also about the existence of an ether. It is assumed, in this article, that light can be explained by the wave model only, and that the ether is an existing, physical concept explained by particles only. These particles are assumed to move very fast in all directions. This idea is in agreement to a 300 years old model presented by Fatio.

## Light

Light propagates as wave fronts of spherical form. Every point on such a wave front produces new wave fronts. This means that light always will find the path between two points that takes the smallest amount of time. Therefore, light not always takes the shortest way between two points. Wave fronts from very distant objects, like fix stars, can be regarded as plane wave fronts. We can describe light as a wave vector  $\mathbf{c}$  representing velocity in relation to the ether with  $\mathbf{c}$  in a right angle to the wave fronts in the ether's frame. If the ether is moving with velocity  $\mathbf{v}$  in relation to an observer, the vector sum  $\mathbf{c}+\mathbf{v}$  describes motion of light in relation to that observer. This sum represents the *real* motion of light.

The vector sum  $\mathbf{c}+\mathbf{v}$  has relevance in the case when we do non-coherent detection of a focused beam, since beam direction depends on ether wind transverse to light motion. Orientations of the wave fronts inside the beam do *not* depend on transverse ether wind. These wave fronts are defined by mirrors in interferometers and in laser cavities and are therefore always parallel to these mirrors. This means that in these kinds of instruments where wave fronts *orientations* are relevant the component of the ether wind falling inside the wave fronts becomes irrelevant. These instruments are therefore *blind* to transverse ether wind. These instruments can only see  $c(1+v_e/c)$ .  $v_c$  is component in  $\mathbf{v}$  parallel to  $\mathbf{c}$ . It is important to remember that  $\mathbf{c}$  is about one million times  $\mathbf{v}$  with the same speed as a fast aircraft or the speed of sound.

We have an ambiguity in the concept direction of light. We have real motion defined by  $\mathbf{c}$  and  $\mathbf{v}$ , and we have also observable (by coherent detection) direction defined by  $\mathbf{c}$  only, since coherent detection is blind to transverse ether wind. If transverse ether wind cannot change wave front orientation we must ask ourselves, what really can change wave front orientation. The answer to this important question is that such a change demands ether wind longitudinal to light,  $v_e$ , to be different in different points on the wave front. In the wave front plane the gradient in  $v_e$  must be different from zero.  $\mathbf{v}$  can change orientation of light only in this way. We can see a parallel to refraction where  $\mathbf{c}$  can change orientation of light only if  $c$  is changing over the wave front.

In a telescope light is focused against a point on the detector. If the telescope is moving in transverse direction (in relation to light) with velocity  $\mathbf{u}$  the light will hit a different point on the detector. The difference becomes  $\arctg(u/c)$ . Therefore, in a telescope we have a different meaning in the concept direction of light due to the aberration produced by this effect. Aberration is produced by detector motion when light is propagating in the telescope. This effect means a change in *apparent* wave front orientation. The *real* orientation of wave fronts from a fix star is independent of ether wind. We can therefore conclude that the concept direction of light has three different meanings:

1. **Real** motion of a beam defined by  $\mathbf{c}$  and  $\mathbf{v}$  and valid for a focused light beam.
2. **Observable** direction of light dependent only on  $\mathbf{c}$ , in interferometers and cavities.
3. **Aberrated observable** direction dependent on  $\mathbf{c}$  and  $\mathbf{u}$ , in telescopes.

The third alternative is relevant in relation to the interpretation of stellar aberration. This means, that stellar aberration is an apparent phenomenon caused by  $\mathbf{u}$  (independent of  $\mathbf{v}$ ). Therefore, the telescope behaves in relation to light waves in the same way as Bradley explained in relation to light particles. This means a rain drop effect. Effect of observer motion is the same in both cases, which is logical.

We can now see that stellar aberration is an indication of our own state of motion. Stellar aberration cannot tell us anything about the ether wind,  $\mathbf{v}$ . The irrelevance of transverse ether wind makes stellar aberration useless in this respect. However, this irrelevance is important in relation to Michelson and Morley's tests (MMX) also, since we can conclude no effect in the transverse arm in MMX. Therefore, we find that Stokes' reduction of Michelson's prediction, due to transverse effect, is without motivation.

MMX is based on the ether and information is sent forwards and back between mirrors. Separation between atoms in a crystal cannot be based on anything else except the ether, since the ether is all there is. Two nearby atoms produce changes in the ether, and these effects are in some kind of balance for a specific separation. However, these effects move forth and back between the two atoms. This means that the atomic separation is based on a two-way communication between the atoms. Information is sent forth and back between the atoms. In MMX information is sent forth and back between mirrors. A two-way communication, based on the ether, is present in both cases. We can therefore conclude that the searched effect in MMX is compensated by a contraction of physical objects. MMX is therefore a useless method in relation to the ether wind.

It is demonstrated in [1] that blackbody radiation, photoelectric effect and Compton effect can all be explained by the wave model for light. It is also demonstrated, in the same article, that the photoelectric effect cannot be explained by the particle model for light.

Information about light is searched by the use of discrete electrons as detectors. We observe light by looking at matter and this means that quanta of light can be an illusion produced by material quanta. Another problem (due to this indirect detection) is that it is not possible to decide if changes in electron's kinetic energy should be considered to emanate from light or from ether. Assuming interchange with the ether, instead of with light, means that light not necessarily must transport energy. Instead, light can be considered as a tool that is helpful in the interchange of energy between ether and matter. This idea is in line with the fact that the two force fields in light are only *potential*. This means that the forces do not exist until a particle is present in the fields. It is therefore reasonable to regard light to be without energy as stated in [1]. This idea opens a possibility to explain destructive superposition in light. Perhaps it is also of help when we try to understand why light can move over enormous distances.

## Ether

Traditionally ether models are grouped into three classes. We have autonomous ether, entrained ether and not existent ether. A fourth model is introduced in [2] and in [3]. This ether is not entrained in itself, but is considered to have entrained properties. Gravity is an example of such a property. The state of motion of the ether (the ether wind) is another property that can be the cause of gravity as suggested in [2].

It is demonstrated in [2] that the wave model for light and an assumed ether wind in the direction of gravity can explain the observed bending of light near our sun. The bending can be described by two curves and is explained by a gradient in the component in the ether wind  $v_c$  that is longitudinal to light. The same ether wind model can explain the small change in Doppler effect that is observed in Pioneer space stations outside our planetary system. Instead of a decreased speed in the space station the observed effect is explained by an increased two-way speed of light. See [4]. We can also use our ether model to describe the behavior of atomic clocks in the GPS system as a clock dilation (not time dilation). This depends on the fact that electrons in atomic clocks move towards and along the ether wind. See [2]. We can see in that article that clock speed is proportional to two-way speed of light like the effect in MMX.

The ideas about light without energy imply energy to exist in the ether. Energy and mass in the ether are also demanded by the fact that the ether can transfer gravity.

## Gravity

Fatio explained gravity by a flow of fast particles moving in all directions. This 300 years old idea was later developed further by Le Sage. The idea is today called pushing gravity. It has been assumed that pushing gravity should demonstrate a very, very small reduction of the combined gravity from our sun and our moon during a solar eclipse. A small non-linearity due to an exponential relation should produce this deviation in relation to Newton's linear gravity model. Newton's principle of superposition demands linearity. Observations supporting this idea have been reported from China in 1997. See [5]. Vertical effect was observed in a gravimeter. In horizontal direction results have been reported by Rohan Janos in [6]. These observations were regarding motions in a radio tower.

In the interpretations of these effects it is important to regard the fact that the registrations do not represent an effect in the test equipment only. Instead the observations represent the difference between the effect on the test equipment in a point and the effect distributed over a part of our planet. The effect on our planet has the size of our moon and is therefore a value built by taking an average value over a great region. A point value can be different from an average. This possible difference explains why the observed effects can be of bipolar nature.

## Conclusions

We can conclude that the old results, from stellar aberration and MMX, should be disregarded due to interpretational errors. Instead we should regard results from modern advanced technology in atomic clocks, Pioneer anomaly and eclipse effects. They can all be explained by the wave model for light. The bending of light near our sun can also be explained by the wave model for light.

## Alternative ideas

Ron Hatch has demonstrated in [7] how an autonomous ether model can be mathematically justified. However, the possibility of an autonomous ether does not prove other ether models to be impossible. Therefore, the article is not against an entrained ether.

Carel van der Togt has declared that stellar aberration is in agreement to an entrained ether in [8]. This idea is supported in this article, but with a very different motivation. Carel stated light to move completely independent of the ether wind. Instead in this article the behavior of the telescope creates the illusion that light moves autonomously in direction, but not in speed.

Duncan Shaw has presented ideas in agreement to this article, [9]. Duncan states that our planet creates a cocooning effect, which hides for us the motion in relation to our sun. This is in agreement to statements in this article, that matter creates a wave function in the ether that has the same effect. However, Duncan seems not to agree to the idea in this article that no aberration in gravity from our sun is explained by no speed in *constant* gravity. Speed is relevant only for *changes* in gravity, which is something very difficult to detect.

## Results

We do not need the concept dilation of time or any other effect on space or time due to an ether wind in the direction transverse to light. We do not need the concept spacetime either.

Instead we need two-way speed of light proportional to  $1-\beta^2$  and speed of atomic clocks proportional to  $1-\beta^2$  and a length of physical objects proportional to  $1-\beta^2$ .

By assuming the cause of gravity to be a vertical ether wind equal to the speed of a satellite in a circular orbit at the same altitude as the ether wind we can predict the behavior of atomic clocks observed in the GPS system. The effect of the satellite speed is reduced by the average value of a squared cosine function (equal to  $\frac{1}{2}$ ). This effect is caused by the fact that the satellite's orientation is not stabilized in the direction of motion. See [2].

The Pioneer anomaly is explained. See [4].

The bending of light near or sun is explained and very roughly estimated in [2]. A more accurate calculation should be done regarding this effect.

Destructive superposition in light is explained.

Bipolar response from gravitational shielding caused by a solar eclipse is explained. This explanation is in agreement to Fatio's 300 years old model. Observation of a vertical effect is reported from China in 1997. See [5]. A horizontal effect is reported by Rohan Janos. See [6].

## Summery

The situation in theoretical physics has been uncertain and slowly developing for about 100 years. The problem seems to be related to the theory of relativity and the extension of quantization from matter only to light as well. However, it has not been observed that the first (and therefore most important) error in physics was done much earlier. This error was related to the transition from light as particles into light as waves. This was a great step forwards, but also a step backwards due to the wrong conclusion that stellar aberration was dependent on the state of motion of the ether. Instead stellar aberration is caused by the state of motion of the observer only. Bradley's original explanation (a rain drop effect) in relation to light particles is valid for light waves as well. The effect of observer motion in relation to a moving phenomenon does not depend on the kind of phenomenon. An ambiguity in the concept direction of light caused a confusion in the interpretation of stellar aberration. This error was the cause of the unjustified abolishing of the ether and the invention (not discovery) of the mysterious concept of spacetime.

We have seen a weaker form of entrained ether. We regard the ether as not entrained in itself. Instead the ether has entrained properties like gravity and ether wind producing gravity. The vertical ether wind is related to the speed of an orbiting satellite. This ether wind and the wave model for light can explain the most important empirical results. A very good test on these ideas can be found by measuring the one-way speed of light in different vertical and horizontal directions. This can be done by using two HeNe lasers with very high frequency stability connected over a few meters by optical fiber and connected to an interferometer. See [10].

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