

# Forgotten Approximation-->Twin Paradox

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## Stellar aberration

If light is moving with velocity  $\mathbf{c}$  in a specific frame, and we search the velocity in another frame, moving with the velocity  $\mathbf{u}$  in relation to the first frame, we get  $\mathbf{c}-\mathbf{u}$  in the new frame. We can use simple vector addition and state that light *always* moves perpendicular to the wave front. In this way we can explain stellar aberration, by planetary *translation* with speed  $u$ , about  $10^{-4}$  times  $c$ .

However, this is not really true, since an ether wind can be blowing *inside* the plane of the wave front. Therefore, the statement above demands that the ether wind  $\mathbf{v}$  is very small and can be ignored. Experiences from the GPS system indicates the possibility of an ether wind  $v$  in the order of  $10^{-6}$  times  $c$ , caused by planetary *rotation*. We can see this in the Sagnac correction in GPS. Apparently, the ether wind is around 100 times smaller than Michelson's assumption. The difference between beam and ray directions is only about  $1 \mu\text{rad}$ . Normally disregarded, but relevant in MMX.

## Detection of the ether wind

When we want to detect the ether wind we must, of course, withdraw the earlier assumption, and regard ether wind inside the wave fronts. Such an ether wind cannot alter the wave front orientation. Therefore, the total wave motion  $\mathbf{c}+\mathbf{v}$  (beam direction) is changed by  $\mathbf{v}$ . However, the normal to the wave fronts (ray direction), equal to  $\mathbf{c}(1+v*\cos A/c)$  is *not* changed. Beam direction is relevant when we detect by *amplitude*, and find direction of max intensity. Ray direction is relevant when we detect by *phase* in coherent systems (with reflectors and refractors), and find the normal to the wave fronts. So, in most optical experiments (like in relation mirrors in MMX) we must use the ray direction,  $\mathbf{c}$  – not the beam direction,  $\mathbf{c}+\mathbf{v}$ . This means that the use of a distant mirror in MMX creates a virtual light source that defines a wave front that has *fixed* orientation in relation to the test equipment. So,  $\mathbf{c}$  – not  $\mathbf{c}+\mathbf{v}$  – is fixed in MMX. This fixation is necessary for interferences over large areas. This implies *no effect* of the ether wind in the transverse arm in MMX. This is in agreement to Michelson's first prediction.

In 1882 a different interpretation was suggested by Potier. He assumed – in error – that just scalar  $c$  (not vector  $\mathbf{c}$ ) was fixed by the equipment. By this assumption he arrived at an effect (of ether wind) in the transverse arm of MMX, equal to half the effect in the longitudinal arm. Potier made a very important mistake, since ether wind  $\mathbf{v}$  can *only* translate – and *not* rotate – a wave front. (This is different from observer motion  $\mathbf{u}$  that can translate *and* rotate a wave front.) Potier's mistake gave a too low prediction for MMX. Time dilation was then invented to cover up for this error, and fill the gap. The twin paradox followed.

## A peculiar assumption

Potier's mistake seems to be caused by an unfounded assumption that returning light must hit *exactly* the same point on the wave front where light started in the *equipment* frame. Instead light hits the same point on the wave front where light started in the *ether* frame. This follows from the fact that wave fronts are fixed by equipment. Small deviations caused by ether wind  $\mathbf{v}$  falling *inside* the wave fronts are irrelevant, since they are hidden by the quite large fringes that normally are used. The important property of interferometers is a very high sensitivity (much smaller than wavelength) in only *one* dimension. In the other 2 dimensions the interferometer is almost blind.

The correct interpretation of MMX is described in Fig 1. The shift inside the wave front is marked in the diagram. This distance is many times smaller than the size of the fringes, and irrelevant.

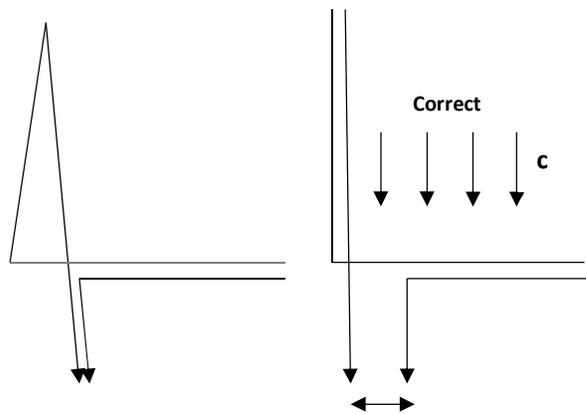


Fig 1 Interpretations of Michelson and Morley's tests

## The beam splitter

It has been suggested that the beam splitter could be helpful in saving the interpretation by Potier. It is true that a beam splitter, moving in relation to the ether wind, could shift light an angle dependent on the ether wind. However, this component behavior does not change significantly the system behavior of MMX. The reason is that the beam splitter is very near the light source, and therefore no distinct wave front is formed. So, light near the source must be regarded as having many wave fronts. The effect of the beam splitter is therefore essentially unchanged on the distant mirror.

## Result

If we correct for Potier's mistake we can avoid time dilation, but we need a doubled contraction of matter – not of space. This means that physical bodies contract in the same way as 2-way speed of light, equal to  $c(1-v^2/c^2)$ . This is probably not a coincidence, but a very reasonable relation, since atoms in a crystal interchange positional information by means of the ether. These ether effects can be assumed to travel with the speed of light, so the relation is plausible.

Since we have abolished dilation of time, we are obliged to explain clock behavior in GPS in a different way. A plausible explanation is a second order effect of the ether wind in the frequency of atomic clocks. This idea seems reasonable since bound electrons move forth and back in relation to the ether wind. So, we can expect an effect of the same type as the effect on 2-way light speed.

## Conclusions

The statement that light always moves transverse to wave fronts is an approximation that seems to be forgotten when the effect in the transverse arm in MMX was introduced in 1882. The fact that an ether wind can just translate – and not rotate – a wave front has also been ignored.

The illusion of an effect in the transverse arm of MMX fooled us to assume an elasticity in the flow of time – just to save the constancy in the flow of light. The resulting twin paradox is connected to another paradox, regarding the wave or particle confusion. A particle thinking about light seems to be behind the mistake in 1882. So, perhaps we do not need the photon particle at all. Instead the wave model needs 2 versions:

1. The vector sum,  $\mathbf{c}+\mathbf{v}$ , to define max intensity when we detect by *amplitude*.
2. The sum of  $\mathbf{c}$  and only the longitudinal component of  $\mathbf{v}$  in detection by *phase*.

We should use  $\mathbf{c}$  – not  $\mathbf{c}+\mathbf{v}$  – in relation to mirrors.

Perhaps we do not need photons at all, since  $hf$  can be regarded as energy interchange between electron and *ether* (and a property of the electron, and not of light). Light can be regarded as an intermediary only, that is needed to convert – but not to transport – energy.

## Remark – gravity

Perhaps the ether wind can be much larger than we have regarded here. It is possible that the ether wind can explain gravity by a radial (in relation to Earth) ether wind. We have no experiences from radial direction. A radial ether wind has spherical symmetry and is therefore not in conflict with the functionality of the GPS system. This idea could easily be tested by the GPS system. Dr C C Su has suggested a scaled down version of de Witte's method, by using 2 HeNe lasers connected over a couple of meters by optical fiber. This method can perhaps answer the gravity question for a very low cost. These 2 methods would allow us to see a first order effect of an ether wind in vertical and horizontal directions.

The predictions by SRT and GRT regarding the so-called time dilation in the GPS system can be substituted by a variation of clock frequency equal to  $f(1-v^2/c^2)$ , caused by a tangential as well as a radial ether wind equal to  $v=3.87\text{km/s}$ . (The tangential effect should be reduced by half, since satellites are not stabilized in relation to motion.) This gravity, and ether, model gives predictions that are in agreement to observations, found in the GPS system. The model is also in agreement to the model described by Fatio and Le Sage (based on particles) and supported by observations during solar eclipses. So, perhaps we need *particles* for the ether and *waves* only for light.

A radial (in relation to Sun) ether wind of  $30\text{km/s}$  at  $1\text{AU}$  gives a 2-way light speed of  $c(1-0.5 \cdot 10^{-9})$  at  $20\text{AU}$  (in radial direction). This fact can produce an *illusion* of a 2-way Doppler effect of  $-10^{-9}$ , and thereby explain the Pioneer anomaly.