

A New Memorandum

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10 years ago, I wrote to NPA an article about Michelson-Morley's tests (MMX) called *Conserved Wave Front: A Memorandum*. No reactions from NPA or from CNPS means that I see a reason to repeat it.

Conserved wave front in MMX

In the law of reflection of light in a mirror we must use the wave vector \mathbf{c} , (ray direction), and **not** the vector sum $\mathbf{c}+\mathbf{v}$, (beam direction). This follows from the fact that boundary conditions, implied by mirrors, have relevance in relation to the dynamic process described by the wave vector, \mathbf{c} but **not in relation to the constant and local ether property, \mathbf{v}** . Therefore, we must remember that, in a coherent system, it is \mathbf{c} (and not $\mathbf{c}+\mathbf{v}$) that falls along the optical axis. Since MMX only can detect ether wind in the horizontal plane, we find that the difference between the two mentioned concepts is as small as an angle of about one part in a million, due to planetary rotation. This small effect can normally be disregarded. However, the effect is important when we analyze the interpretation of MMX. By the use of coherent and advanced technology \mathbf{c} can be detected with extreme precision, but we cannot detect $\mathbf{c}+\mathbf{v}$ with high precision.

The light source in MMX is designed to produce light with a very small beam width. When light is returned after reflection in a **distant** mirror the coherence in the light is further improved. Therefore, aligning the distant mirror means that returning light is coherent and wave front orientation is fixed in relation to the test equipment, and therefore independent of \mathbf{v} . **Without this fixation it would not be possible to maintain the fringe pattern when the equipment is rotated.** This is the reason to the fact that I stated **conserved wave fronts in MMX** 10 years ago. This means that there is **no effect** of the ether wind in the transverse arm of MMX.

The mistake

A very serious mistake was introduced in physics in 1882, by the use of $\mathbf{c}+\mathbf{v}$ (instead of just \mathbf{c}) in the law of reflection in a mirror. Therefore, it was wrong to assume light to take a longer way, due to the ether wind, in the transverse arm of MMX. Instead light behavior is unchanged in the transverse arm, and light just hits the detector at a different point at an **unchanged** point in time, independent of the transverse ether wind. A pure translational ether wind cannot tilt a wave front. In 1887 this mistake was accepted by most scientists. So, Michelson was forced, by majority, to give up his correct view.

The effect caused by **one distant** mirror can also be produced by **two parallel** mirrors, where light can be reflected many times. This idea is used in a more modern version of MMX, by the use of two optical resonators. In a competition between wave fronts the wave fronts consuming least amount of time will win according to Huyghen's principle. Therefore, \mathbf{c} (not $\mathbf{c}+\mathbf{v}$) is defined by two mirrors in the same way as due to one distant mirror. So, we find that wave front orientation is **conserved in MMX** and therefore no effect of ether wind in the transverse arm of MMX. A serious error was done in 1887.

A cover up

In 1889 a cover up for this error was invented by the introduction of the FitzGerald contraction. This was an ad hoc solution, not founded on reality, and therefore assumed to be brilliant. This contraction

could now, together with dilation of time, motivate the Lorentz transform. By this transform the problem appeared to be solved, although the mistake remained. Correction means **conserved wave front**, and therefore the assumption $c \pm v$ in longitudinal arm implies $\sqrt{c^2 + v^2}$ in the transverse arm in order to conserve c in relation to the ether, with **unchanged** direction of c .

The correction

Instead of the ad hoc FitzGerald contraction we can have a contraction based on physical reality that is 2 times the FitzGerald contraction. To see this, we only have to assume that the longitudinal forces between atoms that are controlling atomic separations also are moving with speeds $c \pm v$ between atoms. This is analogous to the behavior of transverse forces in light. Therefore, we get a contraction in the longitudinal arm equal to the reduction in 2-way speed of light. This means that the effect in the longitudinal arm is compensated and therefore **not observable**.

We have found no effect in the transverse arm of MMX and not observable effect in the longitudinal arm. So, MMX is **useless** in relation to the ether wind. Since pure translational ether wind cannot alter a wave front, we can see that the horizontal ether wind v (about one part in a million of c) cannot produce stellar aberration. Instead observer motion u (about one part in ten thousand of c) can produce an **illusion** of bending. So, stellar aberration is also **useless** in relation to the ether wind.

It was wrong to base SRT on MMX and stellar aberration. Better guidance, regarding the ether wind, can be found in satellite navigation systems and in space technology. Spherical symmetry in the global positioning system allows an ether wind in negative radial direction with capacity to explain gravity. (An explanation to gravity by a falling ether was suggested by this author in July/august issue of *Galilean Electrodynamics* of 1999.) Assuming this ether wind to be equal to the escape velocity means a radial ether wind of 9.4 km/s at 20 AU. Therefore, between 20 and 70 AU a change in 2-way light speed can produce an illusion of a change in carrier frequency of about 10^{-9} . This can explain the Pioneer anomaly.

Summary

Between 1882 and 1887 an error in the interpretation of MMX was introduced. The transverse ether wind was assumed to change **direction** of light, in conflict with the wave model for light. This was probably based on a particle-based thinking. The speed of light was hold constant in agreement to the wave model. This contamination of 2 models caused the wave/particle paradox and the absurd idea of time dilation. So, the present confusion in physics started as early as in 1882.

The main reason to this mistake was that the vector sum $c + v$ was used in the law of reflection in a mirror. Instead, just c should be used. So, the common statement that light moves transverse to the wave front can be in error by one part in a million.

We do not need time dilation, but we need a contraction of matter that is 2 times the FitzGerald contraction. We can explain gravity and the Pioneer anomaly.

Discussion

Is it possible that a small error of one part in a million could survive for about 137 years? Most people's first reaction to this idea is negative, by intuition. However, after deeper and more rational discussions, this idea seems very realistic. Scientists have a tendency to look only in one direction regarding time, and intuition can often fool our common sense. So, we are better at inventions than we are at doing discoveries.