

Re: one way light speed

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2006-11/msg00660.html>

- *From:* karandash2000@xxxxxxxxxx
 - *Date:* 7 Nov 2006 08:25:26 -0800
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mluttgens@xxxxxxxxxx wrote:

Tom Roberts wrote:

nobody1357@xxxxxxxxxxxxxxxx wrote:

I have been told a few times that all measurements of light speed are two way and I can't think of an experiment setup which can show a different result if one way speed differed in two directions.

Take two clocks separated by some distance, with a light source and detector at each such that the clocks can record the time of emission and arrival of light pulses. Watch the variation in the time difference for successive pulses sent between them as the apparatus rotates. If the one-way speed of light varies for different orientations, the time difference for propagating light pulses will likewise vary.

This has been done: see the FAQ for references to Cialdea, to Krisher et al, and to Torr and Kolen, plus the other experiments listed under "one-way tests of light-speed isotropy".

Exercise: there is a hidden assumption in claiming this experiment measures one-way light speed anisotropy. Explain what it is. Discuss implications.

So, if one way speed can never be measured, doesn't this mean it has no effect on laws of nature and in a sense it doesn't exist like aether?

It can be measured. But interpreting the measurement is complicated by the fact that the two clocks must be synchronized; any method can be

Re: one way light speed

use to synchronize them, and the results depend directly on the method used.

This is merely one more instance of why in modern science we don't do experiments to "measure things", we use them to TEST THEORIES. In testing a theory applied to a one-way measurement, the method of clock synchronization must be included in the analysis, and for all viable physical theories it will cancel out (an arbitrary human choice like clock synchronization cannot affect any physical phenomena).

Suppose

I'm saying that speed of light is infinite in this direction and $c/2$ in the opposite direction, what can disprove this claim?

The above experiment could do so. Note that what you claim is not enough, and you must describe how the one-way speed of light varies with orientation. The fact that rotations come back to the same orientation after an angle of 2π puts rather strong constraints on how it can vary with orientation. Indeed, for the outrageously large variation you suppose even a second-order experiment like the MMX could refute it (because you cannot make the anisotropy vary with orientation in such a way that the MMX would not detect it in some orientations).

You will probably claim that the authors of the following paper are crackpots!

Search for anisotropic light propagation as a function of laser beam alignment relative to the Earth's velocity vector
astro-ph/0608223

"The results obtained with both methods show that the course of the light rays are affected by the motion of the Earth, and a predominant quantity of first order with a $\Delta c/c = -\beta(1+2a)\cos\theta$ signature with $a = -0.4106 \pm 0.0225$ describes well the experimental results. This result differs in a amount of 18% from the Special Relativity Theory prediction and that supplies the value of $a = -1/2$ (isotropy)."

Marcel Luttgens

Ah, the wonderful Navia et Co papers!

I love the appendix where they rehash the nonsense about being able to detect one way light speed anisotropy in gaseous medium with n slightly greater than 1 (same erroneous claim as Cahill). So, Navia's theory is

Re: one way light speed

Re: one way light speed

pure bunk.

Most probably their experimental data is bunk as well. Tom will let us know.

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