

DOES THE MICHELSON-MORELEY EXPERIMENT *REALLY* INDICATE THAT THE SPEED OF LIGHT IS A CONSTANT?

by

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THE MICHELSON-MORELEY experiment was undertaken to measure the speed of the earth through a hypothetical “aether”. A beam of light was split in two, and each of the beams was sent in separate directions: one in the direction of the revolution of the earth around the sun, and the other in a direction perpendicular to the first. A mirror reflected each beam back to the source, where they were re-combined. It was reasoned that if the speed of light were affected in its movement by the presence of the “aether”, the time taken for the light to go with-and-against the earth’s movement through the “aether” would be greater than for the light to go at right angles to that direction. The difference in times should show up as interference fringes when the two beams were re-combined.

But the results showed virtually no interference fringes, indicating that speed of light was virtually the same in any direction. (And yes, many directions were in fact tried.)

The conclusion was drawn, therefore, that there could not have been any “aether” through which the earth moved in its orbit around the Sun. This paved the way for Einstein to suggest that the speed of light must be a constant for all observers, and that all rectilinear movement was relative. In other words, this paved the way for the Theory of Relativity.

But was the Michelson-Moreley experiment — and others like it conducted subsequently — interpreted correctly? Was there another, perhaps different, explanation for the observed results?

Dr. Héctor Múnica of the University of Bogota, Colombia, has published a paper in *Apeiron* (Vol. 5, Nos. 1-2) in which he says that there is. He says that the results actually showed that there *was* movement of the earth through the ether, but that the results were *interpreted* otherwise (for who knows what reason?) The paper's Abstract and Conclusions can be found at:

<<http://www.newtonphysics.on.ca/faq/Michelson-Morley.html>>.

I haven’t yet read the full paper — just the Abstract and Conclusions — but it seems very clear to *me* that there could be no result of a Michelson-Morley-type experiment conducted on earth other than an almost null result. And the *real* reason for that is that during *every* such experiment, the light always travelled through the earth’s atmosphere!

Consider what would have happened if the experiment had been performed at the bottom of a crystal-clear ocean. The speed of light would definitely have been measured to be virtually constant, but

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the actual speed of light would have been reduced considerably compared to what it would have been had it been measured in a total vacuum, right?

The ocean currents would perhaps have made a bit of difference here and there, as must the wind have in the real Michelson-Morley experiment — and this would explain the slight divergences from the null result. But since all Michelson-Morley-type experiments have been performed in atmospheric air, all they show is that the speed of light in atmospheric air is the same no matter in which direction one shines the light (or *virtually* the same, given the fact that the speed of the wind, even at its very fastest — as in a hurricane or tornado — is less than a billionth of the speed of light).

Big deal!

No one — and I mean *no one* — has *ever* performed an experiment in a *total* vacuum to see whether the speed of light is *really* independent of the velocity of its source or observer, or both. Even the best vacuum on earth has thousands of molecules of air in it per cubic centimetre. There is no way a Michelson-Morley-type experiment can be performed in a man-made vacuum on earth, making sure the light avoids *all* contact with air.

And even in outer space there is no such thing as a *perfect* vacuum — at least not in volumes of space large enough to perform such an experiment conclusively.

It is well-known that once light enters a medium, its speed changes from whatever it was earlier, to the speed of light which is specific to that medium. That, in fact, is how refraction works! Even the tiniest particle of such a medium affects light this way: witness the rainbow, created by refraction of light from tiny droplets of water.

As a result, even if light enters the air at a gazillion miles per hour, if its speed is measured *after* it enters the air, its speed will be measured as the speed of light that is specific to air.

And if the air is not moving relative to the observer, this will be the speed of light regardless of the direction the light is shining. Of course if the air *is* moving relative to the observer, the speed of the air will have to be added to or subtracted from the measured speed of the light, depending on direction — since the Fizeau experiment shows that when a medium moves, the speed of the medium affects the speed of light in it correspondingly.

And this simple and straightforward explanation would account for the *almost* null result of *all* Michelson-Morley-type experiments.

Note that with this explanation, all evidence for assuming that the speed of light is a constant disappears — and with it, all need for the Theory of Relativity.

Einstein once said words to the following effect: “Explanations should be as simple as possible, but not simpler”. He should have followed his own advice — the above explanation is as simple as possible, and there could hardly be any simpler!

Comments? *E-mail me.*