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COMMENTARY

Commentary on "Does a Cosmic Ether Exist? Evidence from Dayton Miller and Others"

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As a former researcher in relativistic rotation (see, for examples, Klauber 2002 and Klauber 2007), I was greatly intrigued by James DeMeo's (2014) well-written and highly informative *JSE* Historical Perspective article on the Miller and other experiments that effectively repeated, and refined, the Michelson–Morley experiment. I had been aware of Miller's controversial findings, as well as those of Múnera, Deckers, Arenas, and Alfonso (2006), which seemed to show non-isotropic light speed, but I had not studied them extensively and had essentially been seduced by the arguments of Shankland and others. I was not aware of the other similar research mentioned in the article, nor of the interactions between Miller, Einstein, Shankland, and others on the subject, and I thank Dr. DeMeo for recounting them.

Having read a large number of articles by those purporting to have found holes in Einstein's relativity theory, I, frankly, have found the vast majority to be cases of simple misunderstanding of fundamental concepts within that theory. My own position has long been that relativity theory is correct, but that it has been misinterpreted and misapplied for the particular case of relativistic rotation (see my above-cited articles for details).

But this case is decidedly different. Here, we are not talking about interpretations of theory, but about experiments carried out by highly competent, well-credentialed, meticulous researchers. As Einstein himself said, ". . . a single experiment can prove me wrong . . . " Well, here we have several such experiments.

As much as I appreciated DeMeo's article, I was, however, disappointed that it did not mention any of a substantial number (approaching twenty) of other experiments, performed from the early 20th century up to the past decade, which effectively repeated the Michelson–Morley experiment to far greater accuracy and found no cosmic light speed anisotropy. Up to 2004, these are listed in Klauber (2004); from then through 2007, in Klauber (2007). I mention a select few below.

Brillet and Hall (1979) (the latter a Nobel laureate), found no cosmic

anisotropy up to the order of 3×10^{-8} of the speed of light, i.e. about .01 km/sec, a far cry from the 20 km/sec Miller and others found. Granted, the Brillet and Hall experiment was enclosed in materials and a building, plus was near ground level, which via Miller's reasoning would reduce the signal significantly. However, Miller's results suggested a reduction from such causes to yield an anisotropy on the order of 1 km/sec, not one hundredth of that.

In this regard, the Wolf and Petit (1997) results are particularly noteworthy as the light signals tested in their experiment traveled from the global positioning system satellites and so passed primarily through empty space, with virtually no possible "ether drag." Such a signal, under the ether hypothesis, would be on the order of at least 200 km/sec, but they found no anisotropy to an accuracy of .002 km/sec.

More recent ground-based tests with accuracy comparable to, or greater than, that of Brillet and Hall include Braxmaier, Müller, Pradl, Mlynek, and Peters (2002), Antonini, Okhapkin, Göklü, and Schiller (2005), Herrmann, Senger, Kovalchuk, Müller, and Peters (2005), and Stanwix, Tobar, Wolf, Susli, Locke, Ivanov, Winterflood, and van Kann (2005). No anisotropy found there either.

So what are we to believe? I must admit to being as perplexed as anyone. I have no answer.

On one hand, we have top researchers, carrying out experiments diligently and carefully, who find results that conflict with extant theory, and for which, try as some might, no reasonable, non-paradigm–rupturing explanation seems sufficient. On the other hand, we have other top researchers, no less diligent and careful, with quite opposite, theory-consonant, results.

One hint Miller's experiment may give us is the very close alignment of the anisotropy he found with the perpendicular direction to the plane of the ecliptic of Earth's orbit (see figure 13 in DeMeo 2014). Could there be some new physics hidden somewhere therein that could alter the detected signal in some types of experiments, but not that in other types? For example, as one "shot in the dark" (pun intended), could dark matter orbiting the sun near the Earth somehow subtly affect certain measurements, but not others? If so, one might not be too surprised by an anisotropy alignment like that Miller found, i.e. either roughly perpendicular to, or roughly parallel with, the plane of the orbits of the planets.

This is an anomaly begging for exploration.

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