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Example of wordplay with aether in relativity

Roger J Anderton
R.J.Anderton@btinternet.com

Physics is in a mess with a lot of wordplay going on, I present an example of that. Most relativists (those who believe in Einstein's relativity) say that the aether (also called "ether") doesn't exist; now Frank Close adds a proviso.

Frank Close (professor of physics at the University of Oxford) in 2016 (republished 2018) [1] says this: "Michelson-Morley's set-up proved highly sensitive and, to their surprise, demonstrated that the speed of light is universal, independent of direction. In turn, this led Albert Einstein to insist that the ether does not exist (at least in the form then believed) and to propose his theory of Special Relativity in 1905."

Notice the proviso "at least in the form then believed"- so, it opens the possibility of an ether not in the form then believed; this is a proviso often not given by others.

That's how the wordplay can happen in physics; one person might say there is no ether without such a proviso, while another might have the proviso.

The ether exists and adding the proviso is trying to repair the damage of incomprehension in physics by those who have said there is no ether.

Now Einstein went back to the aether concept in 1920s. He changes his mind a lot on issues and might have changed again – I will need to check at some later time. Ideally Einstein needs to explain his changes of mind, and Einstein does explain his change of mind circa 1920, so going by that. [2]

Einstein says: "in 1905 I held the opinion, that one was forced to abandon the concept of aether in Physics altogether. This judgement, however, was too radical, as we shall see below, when considering General Relativity. In fact, it remains possible to assume the existence of a space-filling medium for which its state can be taken as that of the electromagnetic fields (as well then of matter) …"

So, physics education seems to be teaching Einstein's 1905 view of rejection of aether, instead of when Einstein changed his mind and brought back aether. Einstein's many changes of mind are problematic, and the 1905 rejection of aether has caused a great deal of confusion. Going by Einstein circa 1920 when he accepts aether and hoping he doesn't change his mind later years.

Now, going by some of the interesting things that Frank Close says prior to what has been quoted.

He points out: "As late as the 17th Century, luminaries, such as Kepler and Descartes, insisted that light travels infinitely fast." – what is meant is for light travelling in empty space, because next he points out: "Kepler argued that this must be so, as empty space would offer no resistance to its passage."

What is amazing is that Close seems near to be concluding that Kepler was right in the following sense: light would travel infinitely fast in empty space, but what we think is empty space is not empty, so light doesn't travel infinitely fast in what appears to us to be empty space (but isn't empty space).

But first Close has to talk about Maxwell: "In 1865, the Scottish physicist James Clerk Maxwell published his work on electromagnetic waves, in which light is a wave of electric and magnetic fields. In any electromagnetic wave, an electric field disappears, and a magnetic field emerges, and vice versa, over and over. The resistance or 'stiffness' of free space to the former is called its electric permittivity, while its resistance to the magnetic field is called its magnetic permeability. In Maxwell's theory, the speed of light is related to these quantities. The ease with which the electric and magnetic fields can oscillate back and forth determine the speed at which the electromagnetic wave travels. It turns out that the product of these quantities is proportional to the inverse of the square of the speed of light."

Next Close says: "So, in a sense, Kepler was right, centuries ago. If space offered no resistance – in Maxwell's theory, if the electric or magnetic 'stiffness' were zero – the speed of light would indeed be infinite."

So, what we perceive as empty space (or what Close calls "free space") there is resistance to stop light going at infinite speed. It is like there is a substance in what is appears to us empty space (but which really be non-empty space) that is offering the resistance; what better than to call it aether.

Thus seeing through the wordplay, we see the mistake in rejecting aether.

References

[1] Measuring the speed of light, Frank Close, The Theory of (nearly) everything, BBC Focus magazine, 2018 (first published 2016) p26

[2] A F Kracklauer translation of papers previously not translated from German into English: Einstein in English volume II: 1914-1923, p 755 circa 1920. See also: Boscovich and aether talk presented in 2018, Roger J. Anderton

c.RJAnderton16Oct2018