A Very Special Case

A brief comment about the Michelson / Morley experiment

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Abstract - *Very often, in the history of science, amazingly simple phenomena, when initially misunderstood, may become laden with prejudice and somewhat mystical connotations and, since then, are passed on from generation to generation for no better reason then* **magister dixit.** *One example already discussed here* **[1]** *has been stellar aberration. But there is nevertheless a very special case where in trying to explain the null result of the Michelson and Morley experiment scientists, just to keep up to their prejudices, chose the weirdest explanations; instrument length contraction or Ether drag !*

To start with, it is absolutely necessary to emphasize and make clear that, as has been well demonstrated by the Compton effect or by experiments involving torsion balances end others, photons and, consequently, electromagnetic radiation have momentum

$$p = \frac{h \cdot \nu}{c}.$$

But due to the physicists unconditional fixation on the STR they failed to recognize a marked difference between two **non-reciprocal** situations. Let's call them situation **A** and situation **B**. In situation **A** a source at rest emits a light beam in some direction and a hypothetic Ether wind is blowing with velocity **v** at, say, an angle **θ** in relation to the light beam in which case an observer, also at rest, will see the light beam tilted by an angle **φ** in the **-X** direction.

In case **B**, the propagation medium is at rest and the same light source is now moving with velocity **v** in a direction that makes, say, an angle -θ in relation to that of the light beam and, due to the fact that light possesses momentum, an hypothetic observer at rest should (if such an experiment could ever be devised) see the light beam tilted by an angle **-φ** in the **X** direction.

Ether wind   **V**

φ

C'   C

light beam

Θ

Light source

Case A

φ

C   C'

light beam

Θ

V

Light source

Case B
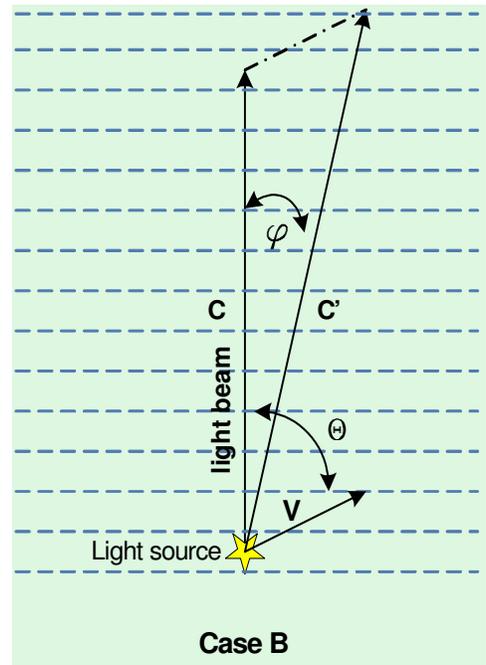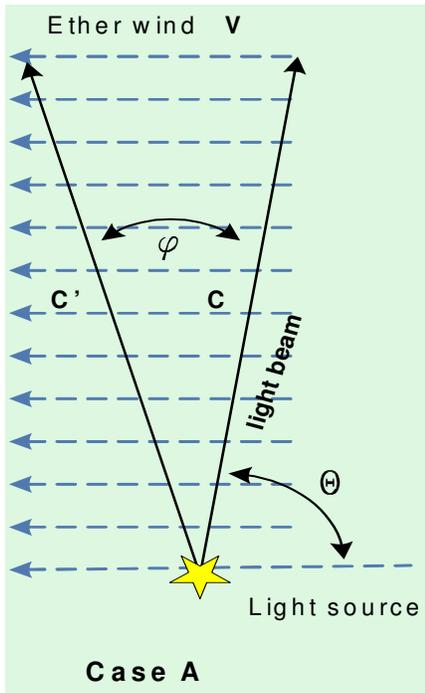
Now, the M/M and all following experiments of that kind have been based on the false premise **A** and their calculations in this respect apply and have been absolutely correct except for the fact that situation **A** is an unrealizable fancy and is by no means equivalent to situation **B** otherwise those experiments should have produced the expected results.

Since those experiments have been already widely publicized it would be tiresome to repeat here all the wording, diagrams and formulations so I will refrain from going that far. But unfortunately, as it happened, the unseen real situation during those experiments have been, per force, situation **B** and it can be shown that, in this case, for any velocity **v** and relative moving direction angle **θ** the vector sum gives

$$c' = \sqrt{c^2 + v^2 + 2 \cdot c \cdot v \cdot \cos(\theta)} \qquad \textbf{(1)}$$

which, for a moving source, translates not into a speed increase but into a Doppler frequency increase

$$\nu' = \nu \cdot \frac{c'}{c' - v} \qquad \textbf{(2)}$$

and a consequent increased energy $h \cdot \nu'$ and momentum

$$p' = \frac{h \cdot \nu'}{c} \tag{3}$$

with a forward tilt angle

$$\varphi = -\mathrm{asin}\left(\frac{v \cdot \sin(\theta)}{c'}\right) \tag{4}$$

If we, now, introduce a co-moving observer in direct view of the light ray, with the same speed **v** and direction θ as is the case in a lab experiment, the relative velocity **v** between source and observer reduces to zero and, from Eq. (1) and (4)

$$c' = c \qquad \nu' = \nu \qquad \text{and} \qquad \varphi = 0$$

for any speed **v** and relative beam pointing angle θ resulting that, for all such experiments, the outcome must be **a strict null result.** It also becomes immediately apparent that these results do not prove nor deny the existence of the Ether which was the very essence of the M/M experiment.

1] **Roald C. Maximo** - Somme Remarks About Starlight Aberration
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