A Very Special Case

a brief comment about the Michelson / Morley experiment

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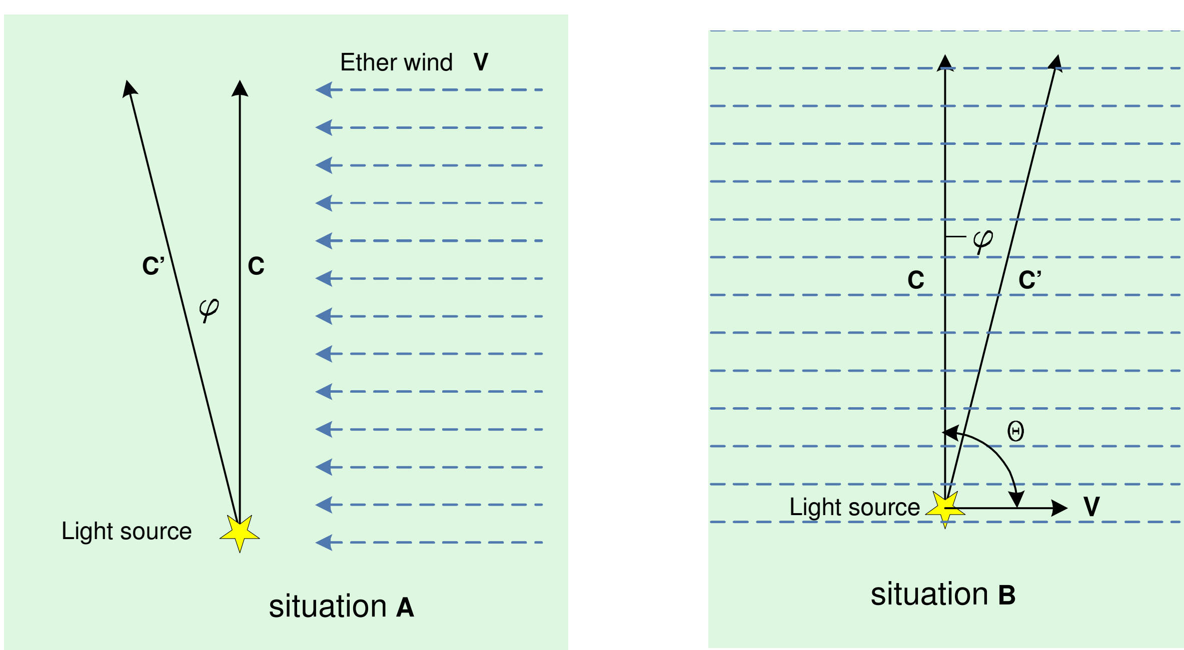
Abstract - *Very often, in the history of science, amazingly simple phenomena, when initially misunderstood, may become laden with prejudice and somewhat mystical connotations and, since then, are passed on from generation to generation for no better reason then* ***magister dixit.*** *One example already 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 well demonstrated by the Compton effect or by experiments involving torsion balances en 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, say, in the **Y** direction and a hypothetic ether wind is blowing with velocity **v** in a perpendicular, say, **-X** direction 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 light source is moving with velocity **v**, say, in the **X** direction and due to to the fact that light possesses momentum, an observer at rest will see the light beam tilted by an angle **-φ** in the **X** direction.



Now, the M/M and all following experiments of that kind have been based on the premise **A** and their calculations in this respect apply and are absolutely correct except for the fact that situation **A** is an

unrealizable fancy and **is by no means equivalent to B**, otherwise the 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 happens, the real situation during the experiments have been, by force, situation **B** and it can be shown that, in this case, for any velocity **v** and relative moving direction angle **θ**

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

which translates into a frequency increase

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

and a consequent increased momentum

$$p' = \frac{h \cdot \nu'}{c} \qquad \textbf{(3)}$$

with a tilt angle

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

such that when we introduce a co-moving observer in direct view of the light ray, with the same speed and direction 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)

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

for any **v** and θ, and for all such experiments the outcome **must be an absolute null result.**

For velocities approaching the velocity of light, which isn't the case here, the speed **v** should be taken as

$$v = v_{source} \cdot \sqrt{1 - \frac{v_{source}^2}{c^2}}$$

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