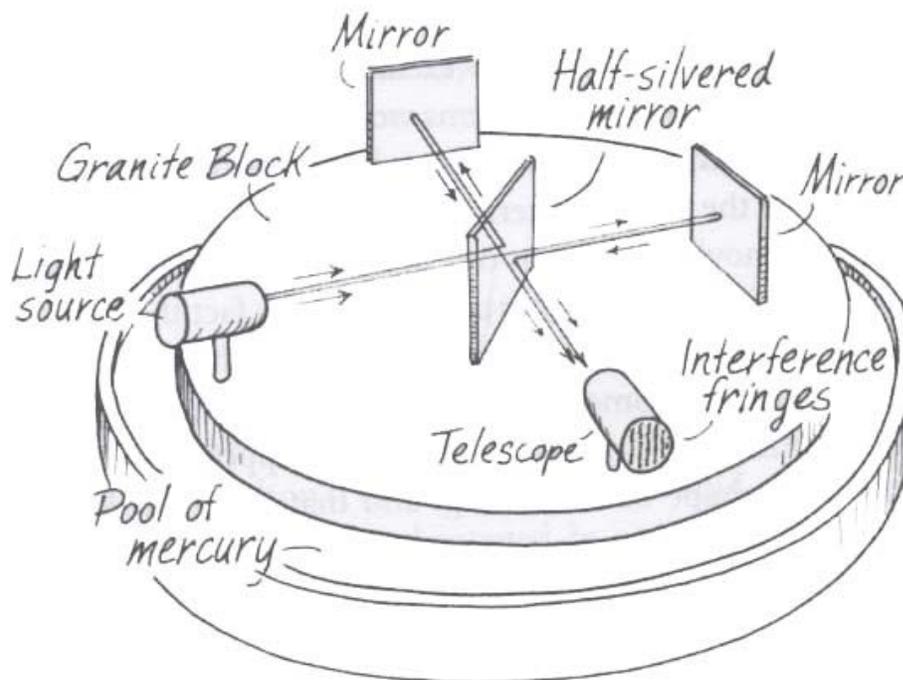# Questioning the conclusion of Michelson-Morley's experiment
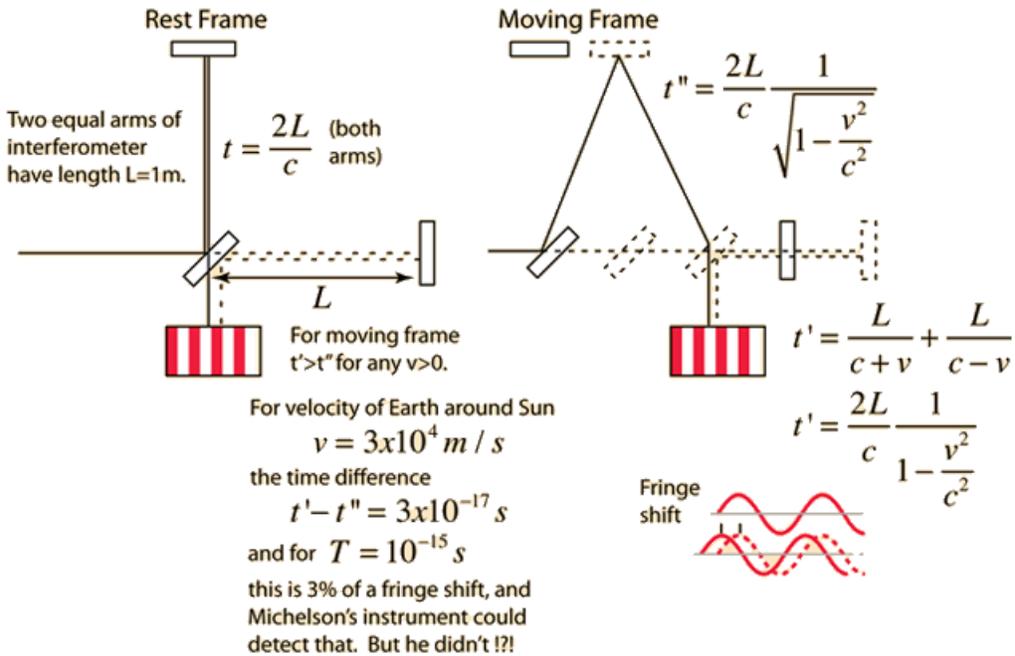
Simon Zhou

The original intention of the Michelson-Morley experiment was to calculate the speed of the ether. The design is as follows:

The procedure of this experiment is: light is emitted from the light source, and the light is split into two beams after passing through the beam splitter, and then reflected back and then concentrated into a bundle by the beam splitter to form light interference. The device is then rotated to change the direction of motion of the ether, causing a phase shift of the two beams. The phase change affects the variation of the interference image, and then the speed of the ether is calculated.

The calculation is as follows:

Rest Frame

Moving Frame

Two equal arms of interferometer have length L=1m.

$$t = \frac{2L}{c} \quad \text{(both arms)}$$

$$t'' = \frac{2L}{c} \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

For moving frame t'>t" for any v>0.

For velocity of Earth around Sun

$$v = 3x10^4 \, m/s$$

the time difference

$$t' - t'' = 3x10^{-17} \, s$$

and for $T = 10^{-15} s$

this is 3% of a fringe shift, and Michelson's instrument could detect that. But he didn't !?!

$$t' = \frac{L}{c+v} + \frac{L}{c-v}$$

$$t' = \frac{2L}{c} \frac{1}{1 - \frac{v^2}{c^2}}$$

Fringe shift

The result of this experiment is that the interference image does not change. The result eventually overturned the existence of the ether.

The conclusion of the Michelson-Morley experiment has two premise assumptions:
1. it is assumed that light is not affected by inertia, that is, the speed of light is independent of the speed of the light source. When it is proved that the ether does not exist, V represents the speed of the surface movement of the earth. Therefore, in the equation above, the speed of light C is independent of the Earth's motion V, which means that the relationship between C and V is negated.
2. the V is smaller than C, under the premise that the speed of light is not affected by inertia. Obviously, if V is greater than C, then the light is not likely to be reflected back to form an interference. Then this experiment cannot be completed.
Under these two assumptions, it is expected that the experimental results will produce changes in the interferogram, but in fact there is no change. People created the Lorentz factor in order to accommodate the results of the experiment. This experiment results in a far-fetched explanation.
Under the Fruit of the poisonous tree, all inferences based on these two assumptions (such as Lorentz transformation) and all the theories resulting from it will naturally point to these two conclusions: the speed of light is not affected by inertia, and nothing can faster than light.

Another hypothesis:

If we do not make these two assumptions, we make the opposite assumption: light is affected by inertia like other substances, and the speed of light is related to the speed of the light source. Then the V in the above figure should be omitted, or it can be understood as V is 0. Then $T_1 = 2L/C$, $T_2 = 2L/C$, T_1 and T_2 will not change regardless of the direction of the experimental equipment. Therefore, the interferogram will not change. This is consistent with the experimental results.

Summary:
The Michelson-Morley experiment is a test of light, a representation of reality, there is no right and wrong in it. And people will get different conclusions under different assumptions: under the assumption that the speed of light is affected by inertia, the experimental results are completely consistent with the expectation; on the contrary, under the assumption that the speed of light is not affected by inertia, the assumptions and experimental results Inconsistent, for this reason people have made Lorentz-style accommodation, making this assumption seem more satisfactory.