MICHELSON - MORLEY EXPERIMENT

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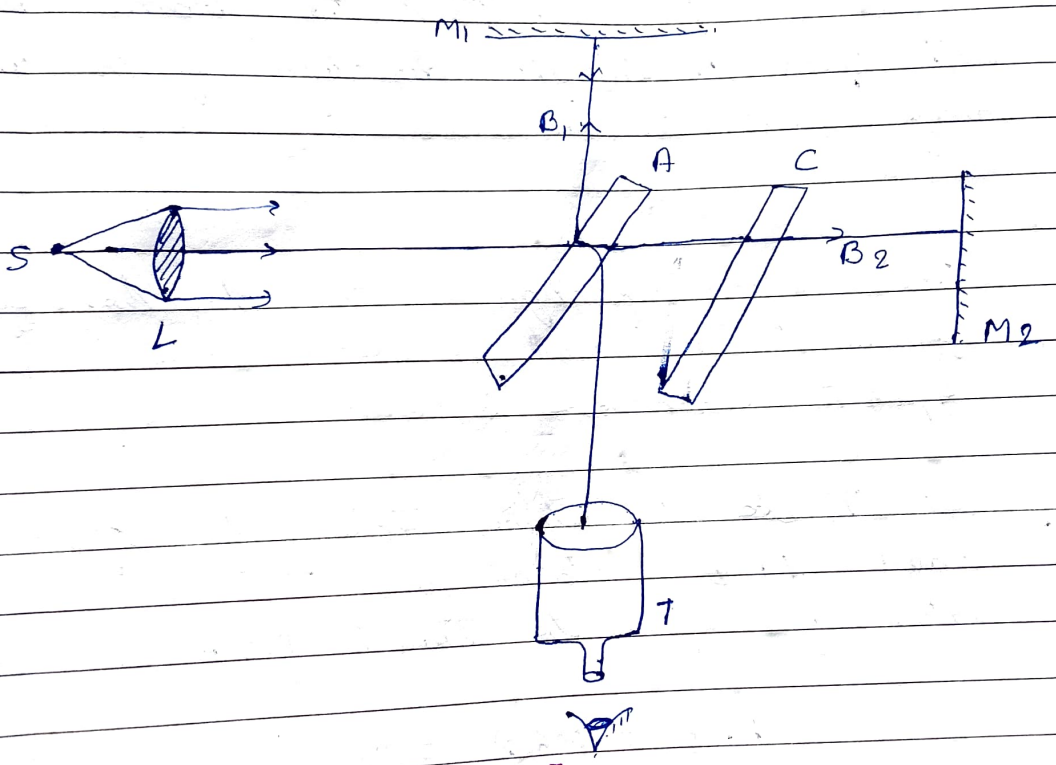
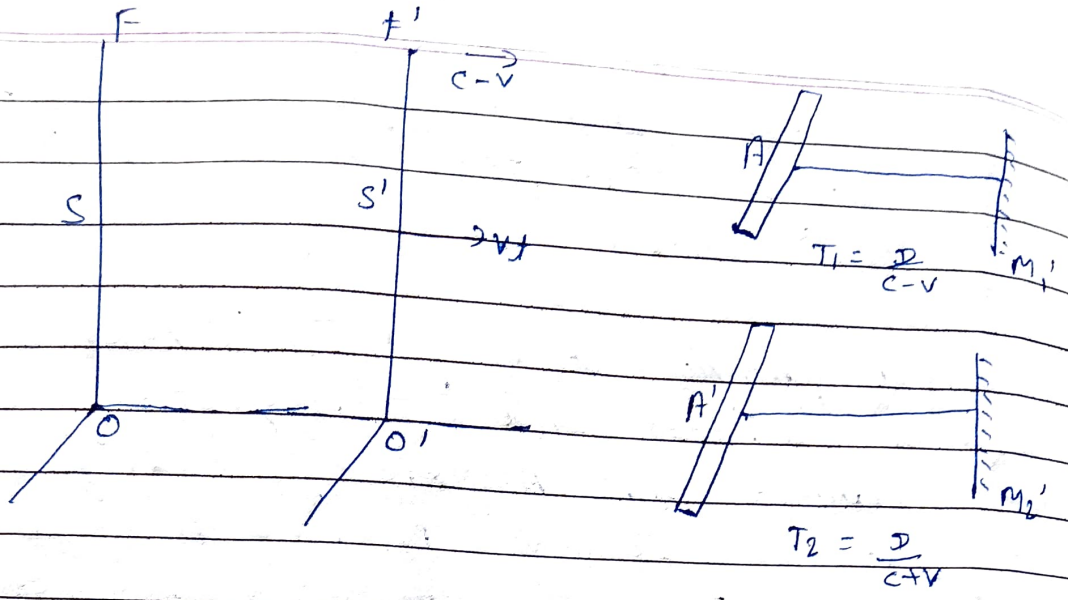
Michelson and morley performed experiment during 1881 - 1887 to detect the luminiferous ether.

A parallel beam of monochromatic light is divided into two parts by half silvered plate A. one portion of light beam travels towards M_1 and is reflected back to A. The other refracted portion of light travels to towards M_2 and is also reflected back to A.



Both beams B_1 and B_2 interfere with each other and the interference fringes formed can be viewed by the telescope. It is arranged to move along the direction of the earth's orbit round the sun. The speed of apparatus is equal to the speed of earth v in its orbit.



According to Galilean frame of reference, F is a fixed frame of reference, corresponding to the ether medium. The speed of light relative to F is C. F' is the frame moving with speed V in the direction of the earth along with the interferometer around the Sun.

* The velocity of light in the direction of frame F' is equal to (C-V) and in the opposite direction is equal to (C+V)

* Let T_1 be the time taken by light to travel AM_2 distance and T_2 be the time taken by light to travel $M_2'A'$ distance

$$AM_2 = M_2'A = D$$

Total time taken by light for its to and fro journey is

$$T = T_1 + T_2$$

$$= \frac{D}{C-V} + \frac{D}{C+V}$$