Abberation

Bradley discovered the abberation of light from fixed stars. Due to the earth's motion, the apparent position of each fixed star at great distance appears to execute an annual motion about its true position.

Let us consider a star at the zenith of the ecliptic being observed through the telescope.

Fig- 2

Let t be the time that a ray of light takes to travel down the length of the telescope. During this time the lower end of the telescope, where the light is to be received, travels a distance vt, in the direction of motion of the earth. Since it is rigidly attached to the earth.
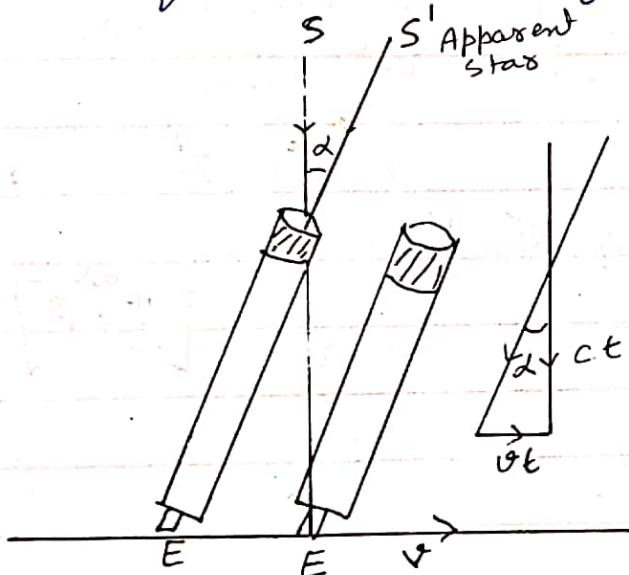
Therefore for the star to be observed the telescope tube must be tilted by an angle α towards the direction of the earths motion where

$$\tan\alpha = \frac{vt}{ct} \qquad or \qquad \alpha \cong \frac{v}{c} \qquad --(1)$$

α is known as the angle of abberation. With $v = $ 31 km/sec, as the earth's velocity in its orbit round the sun

$$\therefore \quad \alpha \cong \frac{3 \times 10^6}{3 \times 10^{10}} = 10^{-4} = 20.5'' \qquad (2)$$

and is in agreement with the observations. If, as assumed by Michelson, the ether frame were dragged with the earth the abberation phenomena should not have occured at all.

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