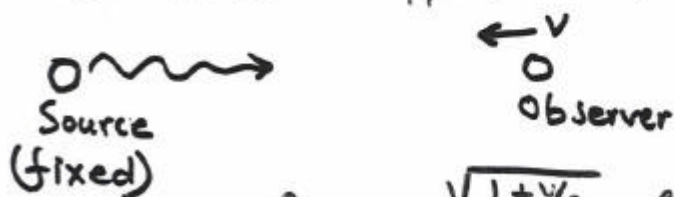


Chapter I

- Michelson-Morley experiment
(non existence of the ether)
 - The two postulates of special relativity
 - Consequences of special relativity
 - Time dilation $\Delta T = \gamma \Delta T'$
 - Length contraction $\Delta L = \frac{\Delta L'}{\gamma}$
- $$\gamma = \frac{1}{\sqrt{1 - v^2/c^2}} = \frac{1}{\sqrt{1 - \beta^2}} > 1$$

The "primed" are the proper quantities.

- Relativistic Doppler shift



$$f_{\text{obs}} = \frac{\sqrt{1 + v/c}}{\sqrt{1 - v/c}} f_{\text{source}}$$

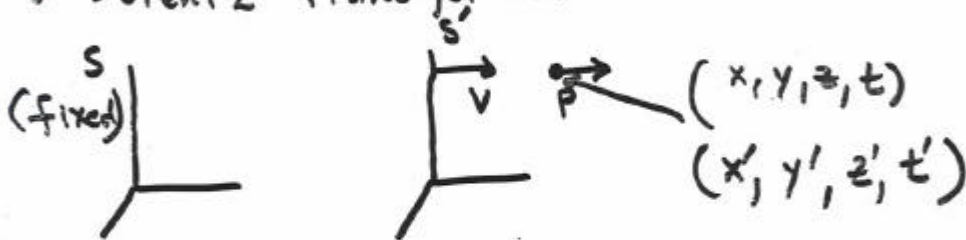
$$f_{\text{obs}} > f_{\text{source}}$$



$$f_{\text{obs}} = \frac{\sqrt{1 - v/c}}{\sqrt{1 + v/c}} f_{\text{source}}$$

$$f_{\text{obs}} < f_{\text{source}}$$

• Lorentz transformation



$$S \rightarrow S' \begin{cases} x' = \gamma(x - vt) \\ y' = y \\ z' = z \\ t' = \gamma(t - \frac{vx}{c^2}) \end{cases} \quad S' \rightarrow S \begin{cases} x = \gamma(x' + vt') \\ y = y' \\ z = z' \\ t = \gamma(t' + \frac{vx'}{c^2}) \end{cases}$$

$$v \ll c \quad \gamma \rightarrow 1$$

Lorentz Transf. \rightarrow Galilean Transf.

$$x' = x - vt \quad t' = t !!!$$