

Source
(fixed)

observer

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

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

Lorentz transformation



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

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

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

Lorentz Transf. \rightarrow Galilean Transf.

$$x' = x - vt$$

$$t' = t !!!$$