Time dilation

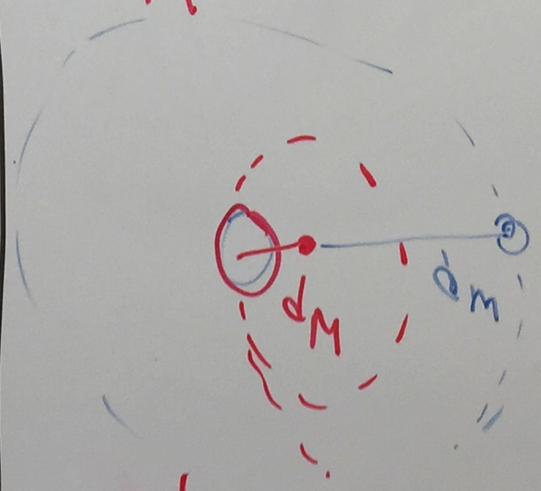
clock in S' appears slow by factor $\frac{1}{\gamma} = \sqrt{1-\frac{v^2}{c^2}}$ to S

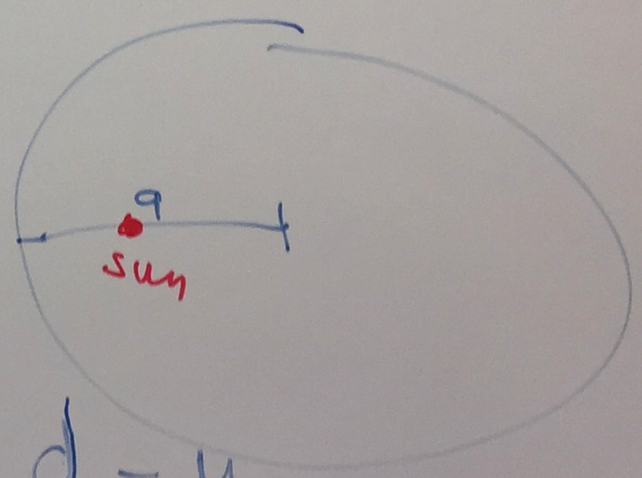
$$\frac{\#\text{ of atoms in state } i}{} = C \frac{g_i}{e^{E_i/kT}}$$

$$\omega^2 r = \frac{G \cdot M}{r^2} \qquad \omega = \frac{2\pi}{T}$$

$$\omega^2 = \frac{G(M+m)}{a^3}$$

$$V_M = \omega \cdot d_M \qquad V_m = \omega \cdot d_m$$





$$d_M = \frac{m}{M+m} \cdot a \qquad d_m = \frac{M}{M+m} a$$

Look @ Binary systems

Red / Blue shift

Doppler effect

Event:

(ct, x, y, z)

S = me $\simeq$ inertial system

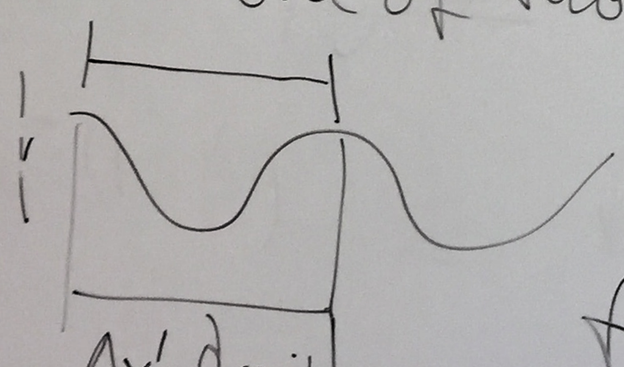
$$\left.\begin{aligned} ct &= \gamma cT \\ x &= \gamma \tfrac{v}{c} cT \end{aligned}\right\} \quad x - \frac{v}{c} ct = 0$$

$$\frac{1}{\gamma} cT = ct - \frac{v}{c} x$$

$$= ct - \frac{v^2}{c^2} ct$$

$$= \left(1 - \frac{v^2}{c^2}\right) ct = \frac{1}{\gamma^2} ct$$

S' = one of those stars $\simeq$ // moving @ v relative to S



$$\Delta t' = T = \frac{1}{f} \qquad f = \frac{c}{\lambda}$$

S': 1st max @ $(0,0,0,0)$

2nd max @ $(cT, 0, 0, 0)$