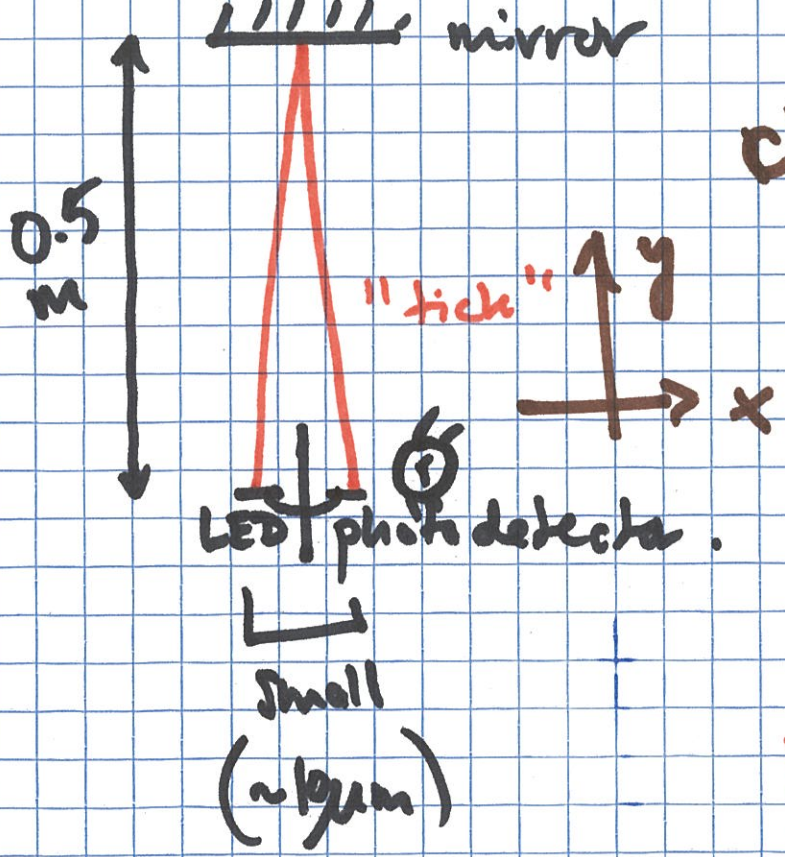
NYU Physics I 2017-11-30.

Agenda. — reading — ch2, 3.

— questions.

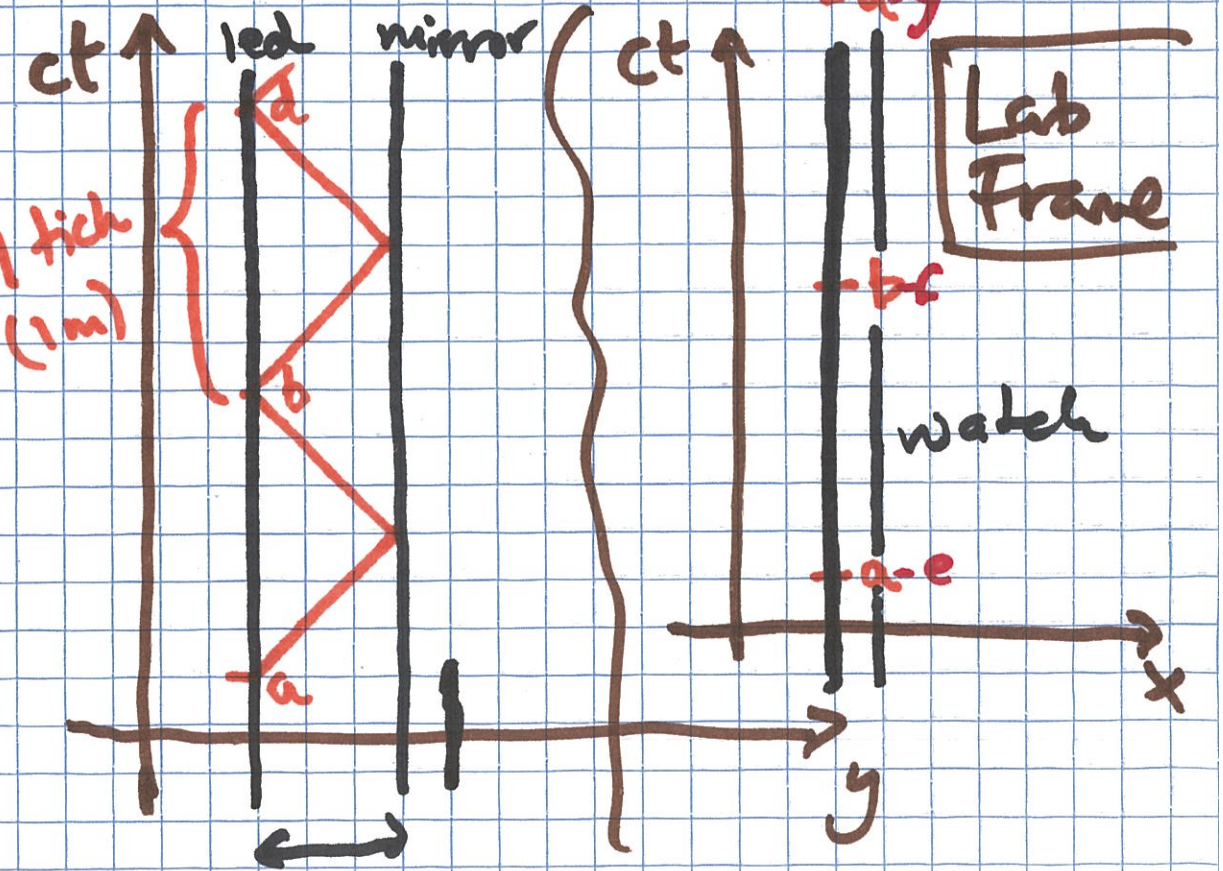
— time dilation.

length contraction.



Clock ticks at a "rate" of $c\Delta t = 1\,m \sim 3.3\,ns$

@ rest in the lab.



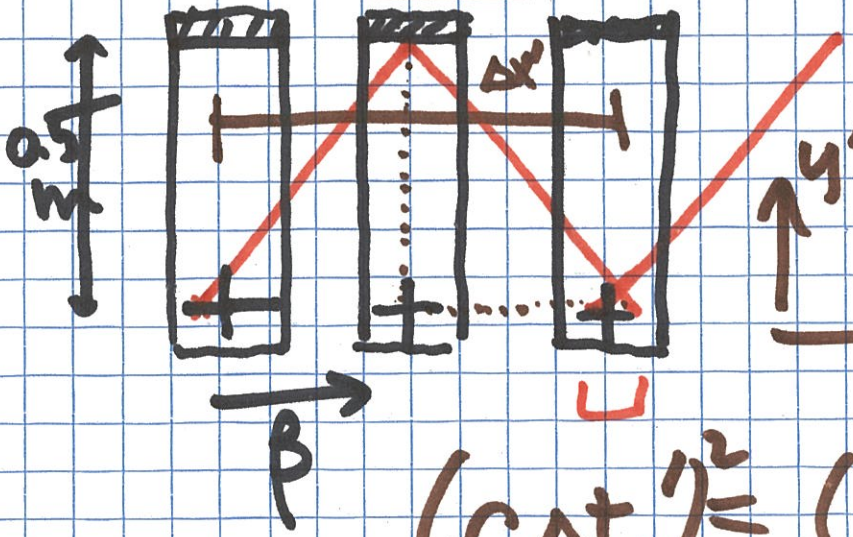
(~~more short~~ is ~~the~~ x-~~direction~~!)

Fly through the lab in the -ve x direction @ β

Rocket frame

$\beta \equiv \frac{v}{c}$

$0 < |\beta| < 1$



$$(c\Delta t')^2 = (\Delta x')^2 + (2\Delta y')^2$$

$$\left(\tfrac{1}{2}c\Delta t'\right)^2 = \left(\tfrac{1}{2}\Delta x'\right)^2 + (\Delta y')^2$$

$$\frac{\Delta x'}{c\Delta t'} \equiv \beta$$

$$(c\Delta t')^2 = (c\Delta t'\beta)^2 + (2\Delta y')^2$$

$2\Delta y'$ = clock tick interval in the lab frame or $c\Delta t$

$$(c\Delta t')^2(1-\beta^2) = c\Delta t$$

$$c\Delta t' = \frac{c\Delta t}{\sqrt{1-\beta^2}} \qquad \gamma \equiv \frac{1}{\sqrt{1-\beta^2}}$$

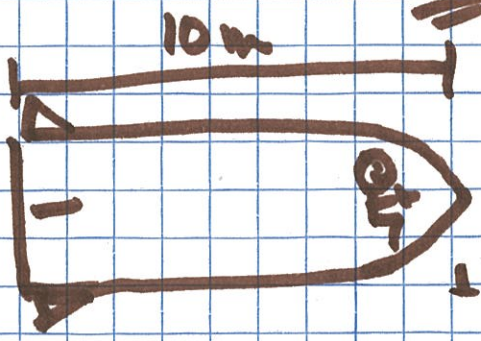
$$c\Delta t' = \gamma\, c\Delta t$$

(in this case).

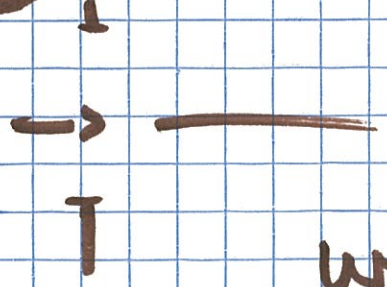
time dilation — moving clock ticks slowly.

$$\vec{p} = \gamma m \vec{v}$$

Symmetry: If rocket is moving w.r.t. lab @ -β
Then lab is moving w.r.t. rocket @ +β



$c\,T_{crossing} = N_{crossing}\,cst$



we don't agree on the length !!