

# Speed of Light is Special

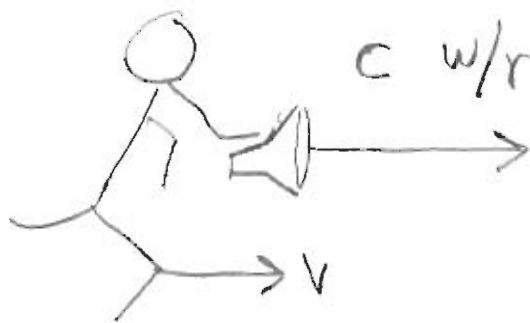


$s$  w/r to runner

expect ball to move at speed  $v+s$  with respect to us.

## LIGHT (in vacuum)

$$c \approx 30 \text{ cm/ns}$$



expect  $c+v$  w/r to us...

But, turns out we see  $c$  too!

→ A consequence of Maxwell's Equations

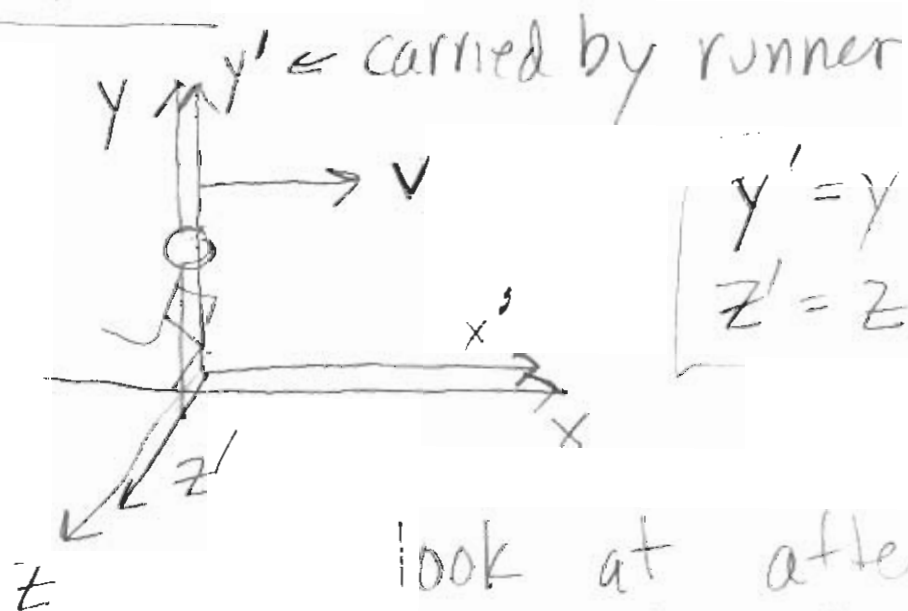
→ Einstein First to tie it into fundamental properties of space + time

→ true for all  $m=0$  particles.

- photons
- gluons - hold quarks together
- (gravitons) → particles of gravity
- one neutrino

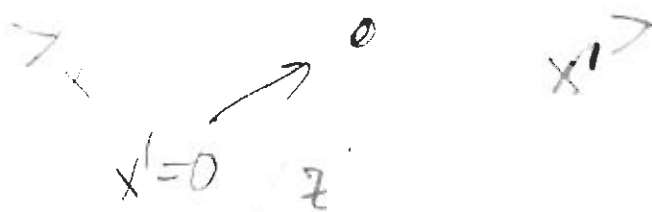
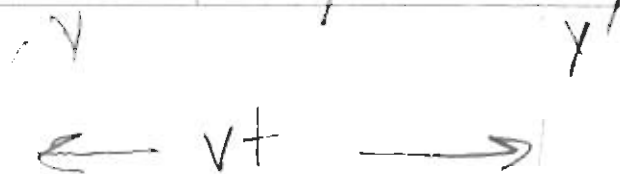
## Two Frame Analysis

"Galilean"



$$\begin{cases} y' = y \\ z' = z \end{cases}$$

look at after  
time + (whose time)



$$x = x' + vt$$

$$t = t' \quad \leftarrow \text{just because we have no concept of time}$$

or  $x' = x - vt$

$$y' = y$$

$$z' = z$$

$$t' = t$$

Galilean

Transformations

Light Pulse, Galilean Style

