L26 Relativity.

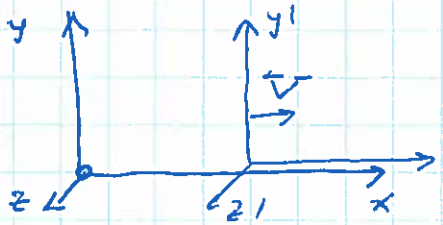
$r = (x, y, z)$ – relative to selected coordinate frame.
t – time – relative to selected (moment) origin in time.

all measurements depend on selected reference frame, but Laws of nature do not. (invariant)

special relativity – relative motion of unaccelerated frames
general relativity – motion of accelerated frames.
GR – foundation of relativistic theory of gravity.

Galilean Relativity:

Newton's Laws are invariand (hold true) when we go from one inertial frame to another.
Newton's Laws are invariant under Galilean transf.



a) at some moment in time two frames are at the same origin
b) We call this origin of time ($t=0$) and sync the clocks in both frames $t=0, t'=0$

Consider an event: $r = (x, y, z)$ at time $t \neq 0$
Event in frame S is (x, y, z, t)
What is the relation between (x, y, z, t) and (x', y', z', t') for the same event.

$x' = x$
$z' = z$
$x' = x - Vt$
$t' = t$

Galilean transformation

$$\boxed{\vec{r}' = \vec{r} - \vec{V}t, \quad t' = t}$$

$$\vec{v}' = \vec{v} - \vec{V}$$

$y = y'$
$z = z'$
$x = x + Vt$
$t = t'$