

LAST CLASS:

The relativistic energy is

$$E = \gamma mc^2 \quad \gamma = \sqrt{\frac{1}{1 - \frac{v^2}{c^2}}}$$

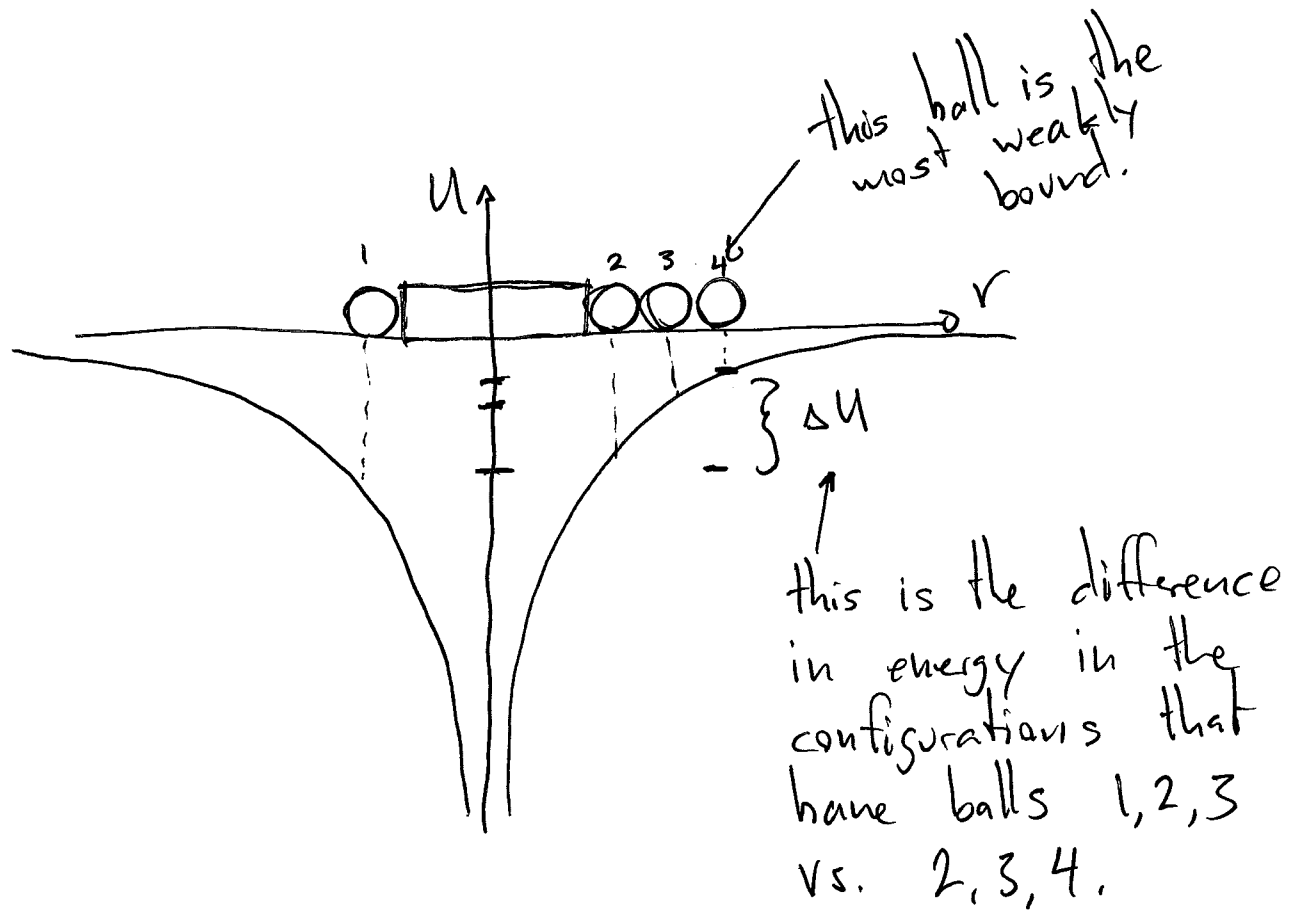
Taylor expanding at low ~~energies~~ velocities
(i.e. $\frac{v^2}{c^2} \ll 1$) we get

$$E = mc^2 + \frac{1}{2}mv^2 + \dots$$

↑ ↑
mass kinetic
energy energy

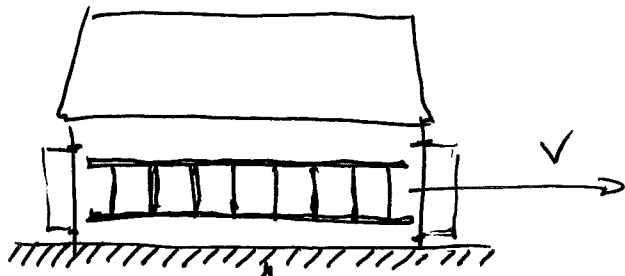
⇒ Energy is conserved, but mass can be converted into kinetic energy and vice versa.

RAIL GUN:



For the rail gun, when ~~the~~ ball 1 comes ball 4 leaves with ΔU extra energy.

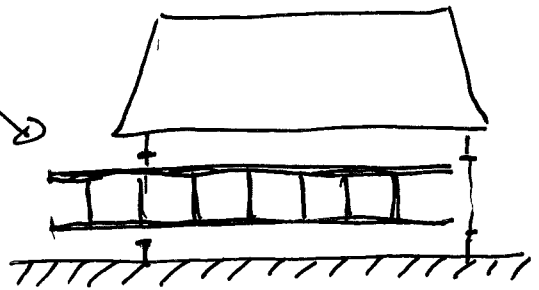
Barn door paradox:



I see a ladder fly through a barn near the speed of light.

When ladder is in the barn we close the doors.

In ladder frame, ladder is longer and barn is shorter. It doesn't fit!



I can't close the doors anymore. Which is true? Does the ladder fit or not?

Relativity of Simultaneity:

The door on the right closes first in the ladder frame.

