rest mass / invariant mass

- according to special relativity, relative to the observer, mass of an object increases with its velocity.
- but objects at rest tends to have "normal" rest that resists applied force. It is the minimum mass that object can have.
- Another explanation is that: the mass the object or system has that is independent of the motion of the system.
- system's total energy and momentum that remains same in all reference frames.

$$m_0^2 c^2 = \left(\frac{E}{c}\right)^2 - |p|^2$$

$$\text{for } c = 1 \longrightarrow m_0^2 = E^2 - p^2$$

- In center of momentum frame, inv. mass = total mass in rest frame

Ex

Invariant mass of 2-particle collision

$$m_0^2 = (E_1 + E_2)^2 - |\vec{p}_1 + \vec{p}_2|^2$$