Summary

Binding energy

$$(\text{mass of combo})c^2 = (\text{mass of constituents, far apart})c^2 + BE$$

$$(\text{mass of combo})c^2 < (\text{mass of constituents, far apart})c^2 \quad \text{for bound states}$$

Energy and Momentum:

$E_0 = mc^2$ $\qquad$ $E=?$ $\quad p=?$

$E_0 = mc^2$ $\qquad$ Rest ● $\qquad$ Moving: ●⟶

E_0 = Energy of a particle at rest

- What about kinetic energy & momentum when moving

- What is the velocity of a slow particle:

$$p = mu \implies u = \frac{p}{m} = \frac{c^2 p}{mc^2} = \boxed{c^2 \frac{p}{E} = u}$$

This also works for light:

$$u = c^2 \frac{p}{E} = c\left(\frac{cp}{E}\right) = c \quad \checkmark$$

So $\boxed{u = c^2 \frac{p}{E}}$