

# Summary

Relativistic momentum and energy

$$\mathbf{p} = \frac{m_0 \mathbf{u}}{\sqrt{1 - (u/c)^2}} \quad E = \frac{m_0 c^2}{\sqrt{1 - (u/c)^2}}$$

$m_0 = \text{rest mass}$   
 $u = |\mathbf{u}|$

Not valid for massless particles,  $m_0 = 0$ , e.g. photon. Since  $u = c$ , always,  $p, E = 0 \times \infty$ .

Relativistic energy momentum relation

$$E^2 = m_0^2 c^4 + c^2 p^2 \quad m_0 = \text{rest mass}$$

$p = |\mathbf{p}|$

Valid also for massless particles.