

# Summary

Relativistic momentum and energy

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

$m_0$  = 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

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

Valid also for massless particles.