Relativistické vztahy pro energii

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$$X = \begin{pmatrix} ct \\ \vec{x} \end{pmatrix} \qquad U = \frac{dx}{d\tau} = \frac{dx_u}{dt}\frac{dt}{d\tau} = \frac{dx_u}{dt}\gamma = \begin{pmatrix} \gamma c \\ \gamma \vec{u} \end{pmatrix}$$

$$\boxed{P = m_0 \cdot U = m_0 \begin{pmatrix} \gamma c \\ \gamma \vec{u} \end{pmatrix} = \begin{pmatrix} m_0 \gamma c \\ m_0 \gamma \vec{u} \end{pmatrix}}$$

$$\boxed{P = \begin{pmatrix} \frac{E}{c} \\ \vec{p} \end{pmatrix}}$$

$$\frac{E}{c} = m_0 \gamma c$$

$$\vec{p} = m_0 \cdot \gamma \vec{u}$$

$$m_0 \gamma \equiv m$$

$$m \equiv \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\boxed{\begin{aligned} E &= m_0 \gamma c^2 \\ \vec{p} &= m_0 \gamma \vec{u} \end{aligned}}$$

$$\boxed{\begin{aligned} E &= m c^2 \\ \vec{p} &= m \cdot u \end{aligned}}$$

$$\Downarrow$$

$$\Delta E = \Delta m c^2 = \gamma m_0 \cdot c^2$$

$$\begin{aligned} W_k = E_{celk} - E_{klid} &= m c^2 - m_0 c^2 \\ &= m_0 c^2 \gamma - m_0 c^2 = m_0 c^2 [\gamma - 1] \end{aligned}$$

$\Delta m = \frac{\Delta E}{c^2}$ základní vztah jaderné energetiky

týká se fúze a štěpení

$$p^2 = -m_0^2 c^2 \Rightarrow -\frac{E^2}{c^2} + \vec{p}^2 = -m_0^2 c^2$$

$$E^2 = p^2 c^2 + m_0^2 c^4$$

energie pro foton: $E = pc$