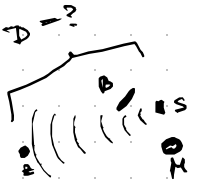
Specijalna teorija relativnosti

1.

$v = 0{,}6c$

$t_1 = 1250\,s$



$d = ct_1 = 3{,}75 \cdot 10^{11}\,m$

$t_2 = \frac{d}{v} = 2083333\,s$

$t_2 = \frac{t_{20}}{\sqrt{1 - \frac{v^2}{c^2}}}$ $\quad t_{20} = 1666\,s$

2.

$m_p = 938{,}27\,MeV/c^2$

$m_w = 2\,MeV/c^2$

$m_d = 4{,}5\,MeV/c^2$

$\frac{2m_w + m_d}{m_p} \approx 0{,}9\%$

$E(v) = \gamma mc^2 = \underbrace{(\gamma - 1)mc^2}_{\text{kinetička energija}} + \underbrace{mc^2}_{\text{energija mirovanja}}$

$p = \gamma mv$

$\gamma \approx \frac{v^2}{2c^2}$

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

$E = mc^2$

$E = E_k + mc^2 = 2mc^2$

$4m^2c^4 = p^2c^2 + m^2c^4$

$p = \sqrt{3}\,mc$

$E = mc^2$

$m = \frac{E}{c^2}$

što je ovo

3.

$M \rightarrow m_1, m_2$ $\quad T_1, T_2 = ?$

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

$p_1, p_2 = ?$

$\vec{p}_1 = -\vec{p}_2 \,/^2$

$|\vec{p}_1|^2 = |\vec{p}_2|^2$

$E = Mc^2$

$E = E_1 + E_2 \rightarrow E_2 = E - E_1 \,/^2$

$E_2^2 = (E - E_1)^2$

$|p_2|^2 = |p_1|^2$

$m_2^2c^4 + p^2c^2 = (E - E_1)^2$

$m_2^2c^4 + p_1^2c^2 = (E - E_1) \rightarrow m_2^2c^4 + E_1^2 - m_1^2c^4 = (E - E_1)^2$

$m_2^2c^4 + E_1^2 - m_1^2c^4 = E^2 - 2EE_1 + E_1^2$

$m_2^2c^4 - m_1^2c^4 = M^2c^4 - 2Mc^2(T_1 - m_1c^2)$

$$T_1 = c^2 \frac{(M - m_1)^2 - m_2^2}{M^2}$$

4.