



	PRZED	PO
p	0	0
E	$E_p + E_x$	$(3m_p + m_x)c^2$

$$E_p^2 = m_p^2 c^4 + p^2 c^2 \Rightarrow p = \sqrt{\frac{E_p^2 - m_p^2 c^4}{c^2}}$$

	PRZED	PO
p	p	
mE	$E_p + m_x c^2$?

$$\Rightarrow c^2 m_{inv}^2 = ((3m_p + m_x)c^2)^2 = (E_p + m_x c^2)^2 - p^2 c^2 =$$

$$= \cancel{9m_p^2 c^4} + \cancel{6m_p m_x c^4} + \cancel{m_x^2 c^4} = \cancel{E_p^2} + 2E_p m_x c^2 + \cancel{m_x^2 c^4} - \cancel{E_p^2} + \cancel{m_p^2 c^4}$$

$$\Rightarrow 8m_p^2 c^4 + 6m_p m_x c^4 = 2E_p m_x c^2$$

$$\Rightarrow E_p = \frac{4m_p^2 c^2 + 3m_p m_x c^2}{m_x c^2} = m_p c^2 \left(4 \frac{m_p}{m_x} + 3 \right)$$