

S. 113/15

$$E_{kin} = E - E_0 = 50 \text{ MeV} - 0,511 \text{ MeV} = 49,5 \text{ MeV}$$

$$\frac{E_{kin}}{E} = \frac{49,5 \text{ MeV}}{50 \text{ MeV}} = 0,99 = 99 \%$$

$$\frac{m}{m_0} = \frac{m \cdot c^2}{m_0 \cdot c^2} = \frac{E}{E_0} = \frac{50 \text{ MeV}}{0,511 \text{ MeV}} = 98:1$$

$$\frac{m_0}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} = m \rightarrow \sqrt{1 - \left(\frac{v}{c}\right)^2} = \frac{m_0}{m} \rightarrow 1 - \left(\frac{v}{c}\right)^2 = \left(\frac{m_0}{m}\right)^2$$

$$\rightarrow 1 - \left(\frac{1}{98}\right)^2 = \left(\frac{v}{c}\right)^2 \rightarrow \frac{v}{c} = \sqrt{1 - \left(\frac{1}{98}\right)^2}$$

$$\rightarrow v = 0,9999 c = 2,9998 \cdot 10^8 \frac{m}{s}$$