12] vstup: $\lambda = 14\,fm$, $B = 0.03\,T$ • hledám E_K, p, v, R

klidová energie alfa částice: $3727.4\,MeV$

$\hbar c = 197.3\,MeV$

1) p

De Broglieho vlnová: $\lambda = \frac{h}{p} \Rightarrow p = \frac{h}{\lambda} = \frac{2\pi\hbar c}{c\lambda} = \frac{2 \cdot \pi \cdot 197.3\,MeV \cdot fm}{c \cdot 14\,fm} = 88.5\,\frac{MeV}{c}$

2) E_K

$$E_K = \frac{2(\pi\hbar c)^2}{\lambda^2 mc^2} = \frac{2(\pi \cdot 197.3\,MeV \cdot fm)^2}{14^2 fm^2 \cdot 3727.4\,MeV} = 1.05\,MeV$$

3) v

$$E_K = \frac{1}{2} m v^2 \Rightarrow v = \sqrt{\frac{2E_K}{m}} = c\sqrt{\frac{2 \cdot 1.05\,MeV}{3727.4\,MeV}} = 0.024\,c$$

4) R

$$\vec{F}_d = \vec{F}_m$$

$$\frac{mv^2}{R} = qvB \Rightarrow R = \frac{mv}{qB} = \frac{6.64 \times 10^{-27}\,kg \cdot 0.024 \cdot 3 \cdot 10^8}{2 \cdot 1.602 \cdot 10^{-19} \cdot 0.03} = 4.97\,m$$