Reichweite von Alpha-Strahlung

a)

b)

c)

d)

e)

Bethe-Bloch-Formel

a)

b)

c)

Elektromagnetische Teilchenschauer

a)

b)

$$E_{n\cdot X_0} = \frac{E_0}{2^n}$$
$$X_{\max} = \frac{\ln\left(\frac{E_0}{E_c}\right)}{\ln(2)} X_0$$

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c) $E_c = 84\ \text{MeV}; \quad E_1 = 1\ \text{TeV}; \quad E_2 = 10^8\ \text{TeV}$

$$X_1 = \frac{3}{2}\frac{\ln\left(\frac{E_1}{E_c}\right)}{\ln(2)} X_0 = \underline{\underline{20.31 X_0}}$$

$$X_2 = \frac{3}{2}\frac{\ln\left(\frac{E_2}{E_c}\right)}{\ln(2)} X_0 = \underline{\underline{60.17 X_0}}$$

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d) $H_0 = 8\ \text{km}; \quad X_E = \ \text{g/cm}^2; \quad X_0 = 37.8\ \text{g/cm}^2$

$$X_1 \stackrel{!}{=} X_E\, \mathrm{e}^{-\frac{h}{H_0}}$$
$$\Rightarrow h = -\ln\left(\frac{X_1}{X_E}\right) H_0 = \underline{\underline{2.35\ \text{km}}}$$

$$X_2 \stackrel{!}{=} X_E\, \mathrm{e}^{-\frac{h}{H_0}}$$
$$\Rightarrow h = -\ln\left(\frac{X_2}{X_E}\right) H_0 = \underline{\underline{-6.34\ \text{km}}}$$

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e)