

[mex56] Rutherford scattering formula

Derive the scattering cross section

$$\sigma(\theta) = \left(\frac{\kappa}{4E}\right)^2 \frac{1}{\sin^4(\theta/2)}, \quad \kappa = \frac{ZZ'e^2}{4\pi\epsilon_0}$$

for elastic scattering of particles with electric charge Ze and energy E from stationary atomic nuclei with charge $Z'e$. Note that $\sigma(\theta)$ does not depend on whether the beam is positively or negatively charged.

Solution: