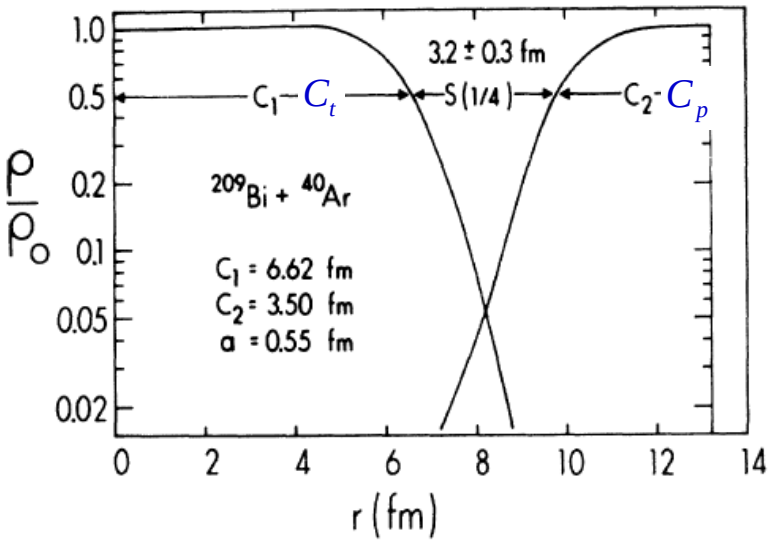
Elastic scattering and nuclear radii

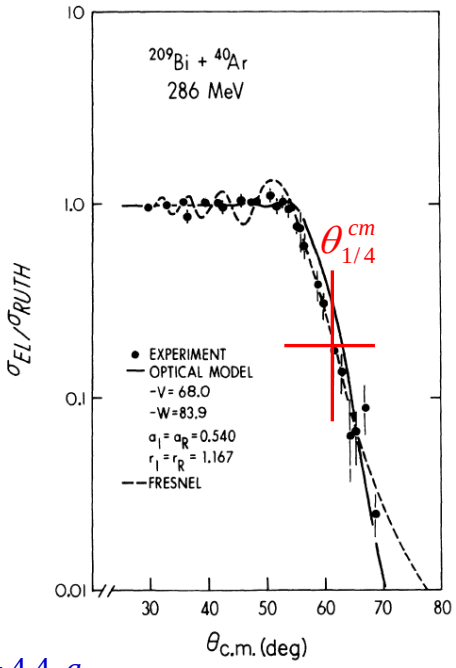
Nuclear interaction radius: (distance of closest approach)

$$R_{\text{int}} = a \cdot \left[\sin^{-1} \frac{\theta_{1/4}}{2} + 1 \right]$$

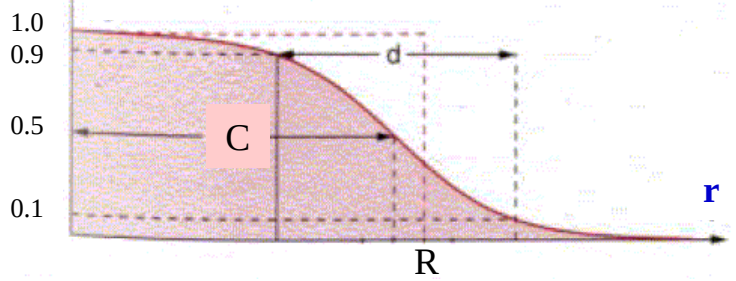
$$R_{\text{int}} = C_p + C_t + 4.49 - \frac{C_p + C_t}{6.35} \quad [fm]$$

Nuclear density distributions at the nuclear interaction radius





$$\frac{\rho}{\rho_0} = \frac{1}{1 + e^{(r-C)/a}}; \quad d = 4.4 \cdot a$$



Nuclear radius for a homogenous charge distribution

$$R_i = 1.28 \cdot A_i^{1/3} - 0.76 + 0.8 \cdot A_i^{-1/3} \quad [fm]$$

Nuclear radius for a Fermi charge distribution

$$C_i = R_i \cdot \left(1 - R_i^{-2}\right) \quad [fm]$$

J.R. Birkelund et al., Phys.Rev.C13 (1976), 133