Homework 10 PS405

Due: Monday, November 13, 2016

Problems are from "The Physics of Nuclei and Particles," by Richard A Dunlap

Chapter 3

3.4 (a) For an 8 MeV α-particle incident on Au nuclei. What is the impact parameter when the particle is scattered at 90°?

b = _____ fm

(b) What is the point of closest approach for the α-particle scattered at 90°?

r_{min} = _____ fm

(c) What is the kinetic energy of the α-particle at the point of closest approach?

KE_{min} = _____ MeV

3.6 (a) Using the data shown in Figure 3.9, estimate the width of the surface region of a nucleus; that is, the distance over which the density drops from 90% of its central value to 10% of its central value?

t = _____ fm

(b Using the result of part (a), estimate the value of *a* in equation (3.18).

a = _____

3.7 (a) For 10 MeV α-particles incident on Au nuclei, calculate the total scattering cross section for scattering angles $\theta > 1^o$, $\theta > 5^o$, and $\theta > 20^o$.

(b) For the conditions given in part (a), calculate the differential scattering cross section for $\theta = 1^o$, $\theta = 5^o$, and $\theta = 20^o$.

3.8 (a) For the scattering of 0.1 MeV electrons from ^{119}Sn nuclei, calculate the relative size of the relativistic correction to the differential scattering cross section for scattering angles of 20° and 90°.

(b) Repeat part (a) for 1 MeV and 100 MeV electrons.