

## Physics 56400 Assignment #1 – Due August 30<sup>th</sup>

1. Suppose a beam of protons is incident on an iron target. The beam is circular, with radius  $r$  and has a uniform flux within this circular envelope of  $\Phi$ , expressed as particles per unit area per unit time. Using the numbers  $r = 1 \text{ mm}$  and  $\Phi = 10^{12} \text{ cm}^{-2}\text{s}^{-1}$ , calculate the rate at which beam particles hit iron nuclei if the target has a thickness of  $\Delta x = 5 \text{ mm}$  and the radius of an iron nucleus is  $4.73 \text{ fm}$ .
2. Assuming that iron nuclei behave like hard spheres, calculate the rate of backward scatters from this experiment, that is, the rate at which incident beam particles are scattered with an angle  $\theta > \pi/2$ .