your name(s)_____

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Physics 851 Exercise #14 - Monday, Nov. 22

The Rutherford cross section for a charge e of wave number k scattering off a target charge Ze is

$$\left(\frac{d\sigma}{d\Omega}\right)_{\text{Rutherford}} = \frac{Z^2e^4m^2}{(\hbar k)^4(1-\cos\theta)^2}.$$

Now, consider two charges, a positive charge Ze at the origin and a negative charge $-Ze$ at $a\hat{z}$.

1. What is the differential cross section?
2. What are the angles at which the cross section vanishes?
3. On a logarithmic plot, graph the differential cross section vs. θ for $ka = 1, 4, 10$. Scale the cross section by the factor $Z^2e^4m^2/(\hbar k)^4$.