Physics 51 Section
Homework 9
Monday, October 26, 2020

35P1: A thin, plastic disk of radius R has a charge q uniformly distributed over its surface. If the disk rotates at an angular frequency ω about its axis, show that the magnetic dipole moment of the disk is

$$\mu = \frac{\omega q R^2}{4}.$$

(Hint: The rotating disk is equivalent to an array of current loops.)

35E12: The dipole moment associated with an atom of iron in an iron bar is 2.22 μ_B. Assume that all the atoms in the bar, which is 4.86 cm long and has a cross-sectional area of 1.31 cm^2, have their dipole moments aligned.

(a) What is the dipole moment of the bar?

(b) What torque must be exerted to hold this magnet at right angles to an external field of 1.53 T?