PHYS 622 – HOMEWORK # 10 – DUE MONDAY, 04/26/2010

Problem 1. Calculate the time-averaged power radiated per unit solid angle and the total power radiated by a non-relativistic particle with charge e moving:

a) Along the z axis with displacement $z(t) = z_0 \sin(\omega_0 t)$;

b) In a circle of radius R in the xy plane with constant angular frequency ω_0.

Problem 2. Jackson problem 14.11.

Problem 3. A non-relativistic particle of charge ze, mass m, and initial speed v_0 scatters on a fixed nucleus of atomic number Z at an impact parameter b. Assuming that the deflection of the particle is negligible, show that the total energy radiated is

$$W = \frac{\pi z^4 Z^2 e^6}{3m^2 c^3 v_0 \, b^3} \, .$$