Home Work PHY 554 #9.   **Due October 11th, 2021**

HW 1 (3 points):

Consider an electron storage ring at an energy of 2 GeV, a circulating current of 300 mA and a bending radius of ρ=5 meters. Calculate the energy loss per turn, the critical photon energy, and the total synchrotron radiation power.

HW 2 (2 points): Make a short argument about why the trajectory of a charged particle can not intersect with light cone more than once (see slide #9 from the lecture 12)

HW 3 (5 points):
As shown in slide #17, the angular distribution of radiation power is given by

$$\frac{dP(t_r)}{d\Omega} = \frac{1}{4\pi\varepsilon_0} \frac{e^2}{4\pi c} \frac{\dot{\beta}^2}{(1-\beta\cos)^3} \left[1 - \frac{\sin^2\theta\cos^2\phi}{\gamma^2(1-\beta\cos\theta)^2} \right]$$

Show that for $g^{-4} << q << 1$ and $g >> 1$, the angular spread of the radiation power is in the order of g^{-1}.