Home Work PHY 554 #13. **Due November 12, 2018**

HW 1 (4 points): For 3 GeV electron storage ring with circulating current of 500 mA and a bending radius of ρ=8 meters calculate the energy loss per turn, the critical photon energy, total synchrotron radiation power and the photon beam spectral brightness at critical photon energy. Assume horizontal geometrical emittance of 1 nm rad (1e-9 mrad), vertical emittance of 20 pm rad (20e-12 m rad, at the radiation point βx=0.5 m; βy=1.5 m.

HW 2 (6 points): For the 3 GeV storage ring described above, consider an undulator with 40 periods and with K=1 installed in the straight section. Assume horizontal geometrical emittance of 1 nm rad (1e-9 m rad), vertical emittance of 20 pm rad (20e-12 m.rad) at the radiation point βx=βy=2.5 m.

(a) Find undulator period that fundamental wavelength will be 0.5 nm (5 Å)
(b) What will be spectral brightness at the fundamental wavelength?