Boğaziçi University
Department of Physics

Phys 311/407 Summer 2013

Problem Set #5

Note: Rohlf 5.1, 5.2, 5.3.

Problem 1:
a) Find the number of cosmic microwave background photons that pass through your body per second. Take a *body* as a 2D rectangular structure with dimensions of (1.8 m) × (0.4 m) for this part. Compare this number with the number of photons per second emitted by the laser defined in question 2. b) How much energy do the cosmic microwave background photons have inside a human body for any given time. Give an average thickness of 0.2 m to the above rectangular-body in order to find the volume for part b.

Problem 2:
How many photons per second can we get out of a 532 nm, 5 W green laser?

Problem 3: (Rohlf 26)
Photons with a wavelength of 200 nm are directed at a silver cathode. What is the maximum kinetic energy of the ejected electrons?

Problem 4: (Rohlf 39 – modified)
In the Bohr model of the hydrogen atom, find the expression of the ratio of the orbital frequency with $n = 3$ to the allowed frequencies that it can radiate? (f_{orbit}/f_{rad} =?)

Problem 5:
What is the minimum wavelength of a photon that can be emitted by a muonic atom that is an atom formed by a proton and μ^- instead of e^-? Use Bohr model.