

PHY 3107, Spring 2017, Homework #4

due Tuesday, Feb. 7

- 1.) What is the angular momentum for a hydrogen atom with the electron in the: A) $4f$ state? B) $7h$ state?
- 2.) An electron in the hydrogen atom in the $n=2$ state absorbs a photon and is excited to the $n=4$ state. A) What is the photon wavelength for this transition? B) Subsequently, the atom will “decay” or drop to lower energy states by emitting 1, 2, or 3 photons. What are the possible wavelengths of the emitted photons? [Hint: There are several paths for the decay to take, each of which will give off 1, 2 or 3 photons.]
- 3.) An electron in the hydrogen atom is in the state $n=2, l=1$. A) Find the average radius, $\langle r \rangle$. B) Find the most probable value of the radius.
- 4.) An electron in the hydrogen atom is in the $3d$ state. Find the most probable value of the radius.