

Physics 390: Homework set #4
Due Tuesday November 2, 2004

Reading: Tipler & Llewellyn, Chapter 7

Questions:

1. The $2s$ electron has a greater probability to be close to the nucleus than the $2p$ electron, and also a greater probability to be farther away (see Figure 7-10a). Make an analogy to classical orbits to explain how this is possible.
2. Spherical harmonics, which are eigenfunctions of angular momentum, contain the imaginary number $i = \sqrt{-1}$ (see Table 7-1). Is it all right for a function that is supposed to be associated with observable quantities to contain imaginary numbers? Why or why not?
3. Consider a penny spinning about an axis through its center at the rate of a few revolutions per second. Estimate the value of l .

Problems: 1, 13, 15, 23, 31, 36, 42, 45, 68, 75