

Homework #6

1. Use  $\vec{B} = \frac{1}{4\pi\epsilon_0} \frac{e}{mc^2 r^3} \vec{L}$  to estimate the internal magnetic field in a hydrogen atom. This value characterizes the boundary between a “strong” and “weak” Zeeman field.
  
2. Consider the eight  $n = 2$  states for the hydrogen atom,  $|2\ell jm_j\rangle$ . Determine the energy of each state under weak-field Zeeman splitting and construct a diagram like the one in Figure 6.11 of your textbook to show how the energies evolve as a function of  $B_{\text{ext}}$ . Label each line clearly and indicate the slope of each line on the graph.