Quantum Mechanics and Atomic Physics 750:361

Prof. Sean Oh, Fall 2011

HW #11

Due date: Monday, Nov. 28, 2011, at the beginning of class

1. A beam of electrons enters a magnetic field B=0.8T. What is the difference in energy between electrons that are “spin up” and “spin down” relative to the field.

2. (a) Write down the quantum numbers for the states described in spectroscopic notation as $^2S_{3/2}$, $^3D_2$, and $^5P_3$.

(b) Determine if any of these states are impossible, and if so, explain why.

Please note that these could describe states with more than one electron.

3. Consider the hydrogen atom in the $4^2F_{5/2}$ state. Taking into account the effects of fine structure, write down the spectroscopic notation of the state that the $4^2F_{5/2}$ is degenerate with, in the absence of an external magnetic field.