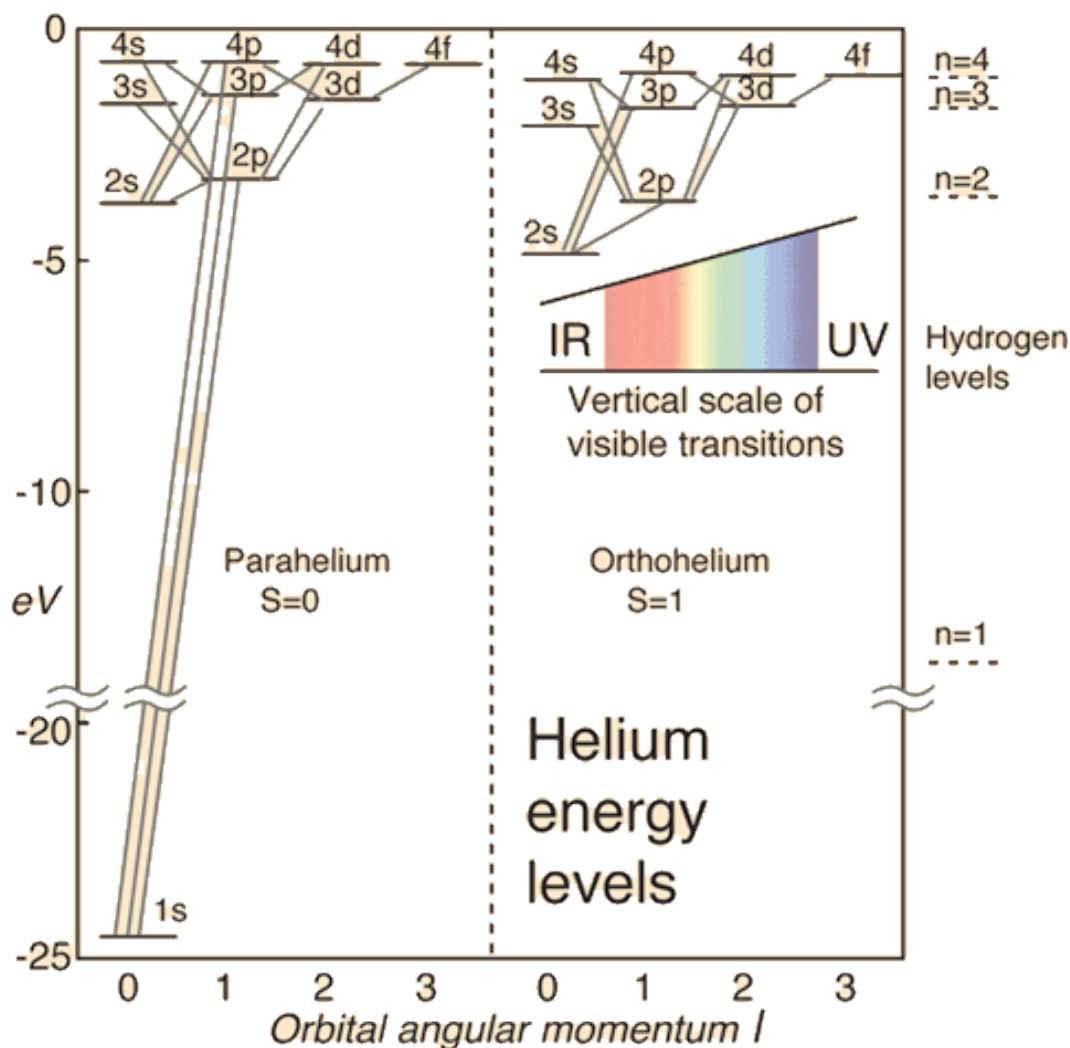


AST 300B – Spring 2018

In-class/take-home Problems Due: Monday April 23rd

42. The ground state electronic configuration of Helium is $1s^2$
- What is the term for this configuration? Hint: you have to use Pauli's exclusion principle to eliminate one term.
 - If one electron is excited to the $1s^1 2s^1$ configuration, what are the terms? Does Pauli Exclusion apply here? Using what you have determined in (a) and (b) and the fact that spin multiplicity does not change in an electric dipole transition, explain the Figure below.



43. The ground state electronic configuration of Iron is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$ and the ground state term is 5D_4 .

- For this term, what is S and L equal to?
- What values of J are allowed for a 5D term?
- What is the statistical weight (g) of the ground term 5D_4 that would go into Boltzmann's equation. (Hint: think about how many projections on a space axis the total angular momentum can have.)
- The ground state term of singly ionized Iron (FeII) is ${}^6S_{3/2}$. Does this term have fine structure splitting? Why or why not?

