Due: Friday, 12/05, 2:10pm, PHYS360 Assignment 13

Reading:

1. Griffiths, Ch.5, pg. 201-218. Prepare for reading quiz, Friday, 12/05.
   a) Understand how the "symmetrization" of wavefunction is required of systems representing identical particles, pg203-205
   b) Understand the foundation of the Pauli exclusion principle, pg 204
   c) Know the requirement for the wavefunction of a system of identical bosons
   d) Know the requirement for the wavefunction of a system of identical fermions
   e) Know possible spins for bosons and fermions, pg 204
   f) Understand the exchange operator, pg 205
   g) Understand exchange forces, pg. 207-210
   h) Understand "term notation" as discussed in class
   i) Know which wavefunctions are symmetric (antisymmetric) for spin-1 systems.
   j) Know the difference between para and orthohelium, pg 212-213
   k) Be able to write down the electron configuration for any atom, pg 217
   l) Be able to specify the ground state of any atom in "term notation," pg 217

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Problems:

In the following problems, *l*, *s*, and *j*, refer to the total orbital angular momentum, total spin, and the grand total angular momentum, respectively.

1. What are the possible values of *l* for:
   a) Four *p* electrons?
   b) Three *p* and one *f* electrons?

2. i) What kind of terms can result from the following values of *l* and *s*?
   a) $l = 2,\ s = \frac{7}{2}$
   b) $l = 5,\ s = \frac{3}{2}$
   c) $l = 3,\ s = 3$

   ii) What are the *l*, *s*, *j* values and multiplicities of the following terms?
   a) ${}^3D_2$
   b) ${}^4P_{5/2}$
   c) ${}^2F_{7/2}$
   d) ${}^3G_3$

3.
   a) Write out the three Hund's rules (you may copy them from Problem 5.13, pg 218).
   b) Show that the ground states for the first three elements in the "neon" configuration" (Z = 11 to 18) are consistent with *each* of Hund's rules.

4. Problem 5.6, pg. 210
5. Problem 5.7, pg. 210
6. Problem 5.14, pg 218