Physics 113 Quantum Theory Seminar

Assignment 13 April 18,April 19, 2011

This week we study Identical Particles and the Structure of Atoms.

Part 1: Readings

Zettili - Chapter 8(Pages 455-475)
Boccio - Chapter 12(Pages 999-1040)
PRESENTATIONS: Chapter 14(Sections 14.3-14.4 Pages 1112-1117)

All new material.

You must do the readings BEFORE attempting the problems in order to get a good grasp of the overall content of the week's material to be understood. A problem should then make you look more carefully at specific parts of the readings that are necessary for the solution of that particular problem!

Prior to discussing any problems, we will deal with any questions and/or discussion of the readings.

Part 2: Everyone Problems

Everyone must do all of these problems.
Random choice of presenter.

1. Boccio 12.9.1- Two Bosons in a Well
2. Boccio 12.9.2- Two Fermions in a Well
3. Z8-17,18,19 - Spectroscopic notation
4. Boccio - 12.9.5 - Hund's rule
5. Boccio - 12.9.9 - 2 interacting particles

Part 3: Extra Problems - Presentations

Each seminar member has responsibility for 2 problem solutions/presentation.

Look at/try to solve other problems besides your own responsibility.

You will not understand other solutions without attempting or at least thinking about the problem before seminar.

Presentation #1 _____

Z8-9 - 4 Bosons in a well

Boccio - 12.9.11 - In a harmonic potential

Presentation #2 _____

Z8-10 - 4 fermions in a well

Boccio - 12.9.12 - 2 particles interacting via delta function

Presentation #3 _____

Boccio - 12.9.3 - Two spin 1/2 particles

Boccio - 12.9.15 - The Structure of helium

Presentation #4 _____

Boccio - 12.9.6 - Russell-Saunders Coupling in Multielectron Atoms

Boccio - 12.9.10 - LS versus JJ coupling

Presentation #5 _____

PRESENTATION: Boccio Section 14.3 - Spin-Orbit Coupling in Complex Atoms; Origin of Fine Structure

Presentation #6 _____

PRESENTATION: Boccio Section 14.4 - Zeeman Effect in Complex Atoms

Final Problem #3 - Only consult with Professor

Boccio - 12.9.13 - 2 particles in a square well (solution written up in LaTex)