

# Physics 113 Quantum Theory Seminar

## Assignment 13    April 24, 2013

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

### Part 1: Readings

**Zettili** - Chapter 8(Pages 455-475)

**Boccio** - Chapter 12(Pages 989-1041)

**Boccio** - Chapter 14(Sections 14.3-14.4 Pages 1112-1117)

### Part 2: Problems

1. Boccio 12.9.1- Two Bosons in a Well
2. Boccio 12.9.2- Two Fermions in a Well
3. Z8-9 - 4 Bosons in a well
4. Z8-10 - 4 fermions in a well
5. Boccio - 12.9.3 - Two spin 1/2 particles
6. Z8-17,18,19 - Spectroscopic notation
7. Boccio - 12.9.5 - Hund's rule
8. Boccio - 12.9.9 - 2 interacting particles
9. Boccio - 12.9.10 - LS versus JJ coupling
10. Boccio - 12.9.12 - 2 particles interacting via delta function
11. PRESENTATION: Boccio Section 14.3 - Spin-Orbit Coupling in Complex Atoms; Origin of Fine Structure
12. PRESENTATION: Boccio Section 14.4 - Zeeman Effect in Complex Atoms

### Final Problem #3 - Only consult with Professor

- Boccio - 12.9.15 - The Structure of helium(solution written up in LaTeX)