

# Physics 113 Quantum Theory Seminar

## Assignment 8 March 14, March 15, 2011

This week we learn about magnetic resonance and coupled angular momentum

### Part 1: Readings

**Zettili** - Chapter 7: Sections 7.1-7.3 Pages 391-424

**Boccio** - Chapter 9(Pages 722-743 Sections 9.4-9.5 ).

All new material. You will need to spend a lot of time reading.

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 understand do all of these problems.

Random choice of presenter.

1. Z7-7 Matrix elements
2. Z7-30 Energy levels: 2 spin 1/2 particles
3. Z7-32 More Energy levels: 3 spin 1/2 particles
4. Boccio 9.7.14 Addition of Angular Momentum
5. Boccio 9.7.16 Deuterium Atom
6. Boccio 9.7.24 More addition of angular momentum

### Part 3: Extra Problems - Presentations

One seminar member has overall responsibility for two problem solutions and their presentation in seminar

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

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

Quality/correctness of presentation = part of seminar grade.

Presentation #1 \_\_\_\_\_

Boccio 9.7.15 Spin = 1 system

Boccio 9.7.49 Properties of an operator

Presentation #2 \_\_\_\_\_

Boccio 9.7.17 Spherical Harmonics

Boccio 9.7.18 Spin in Magnetic Field

Presentation #3 \_\_\_\_\_

Boccio 9.7.20 Spin = 1 particle in a magnetic field

Boccio 9.7.21 Multiple magnetic fields

Presentation #4 \_\_\_\_\_

Boccio 9.7.23 Magnetic Resonance

Boccio 9.7.25 Clebsch-Gordan Coefficients

Presentation #5 \_\_\_\_\_

Boccio 9.7.41 Two Stern-Gerlach Boxes

Boccio 9.7.45 Stern-Gerlach Experiment for a Spin-1 Particle

Presentation #6 \_\_\_\_\_

Boccio 9.7.53 Two Spins in a magnetic Field

Boccio 9.7.56 The Spin Singlet