Syllabus for Physics 212B

Fall 2012, Physics Department, UCSD

INSTRUCTOR: Congjun Wu (5430 MH)  Email: wucj@physics.ucsd.edu
Time/Place: 12:30 - 1:50am, TUTH, MHA 2623.
Office hour: Wed: 1:00 pm - 2:00pm
TA: Wang Yang  Email: wyang19ninety@gmail.com
TA office number MH5206 office hour: Friday

Books:


2. Sakurai Modern Quantum Mechanics, Publisher: Addison Wesley; Rev Sub edition (September 10, 1993).


4. L. I. Schiff, Quantum Mechanics, McGraw-Hill Companies; 3 edition (June 1968)

Grade:

We will decide the policy during the first class. Basically it will depend on your homework, midterm and the final project. Homework 30%, Midterm 30%, and final exam 40%.

Homework Assignments:

Homework will be assigned every one or two weeks. The TA will teach discussions, and grade homeworks.
Class Schedule

1. Symmetry
   Lect 1: D-matrix and Schwinger-bosons
   Lect 2: Spherical tensor and Wiger-Eckert theorem
   Lect 3: Symmetries and conservation laws
   Lect 4: Discrete symmetries: parity, time reversal, Kramer degeneracy

2. Approximation methods
   Lect 5: Non-degenerate Pertubative theory
   Lect 6: Degenerate pertubative theory
   Lect 7: Quantum transition, Fermi golden rule, spontaneous emission
   Lect 8: Semi-classical approximation WKB

3. Path integral
   Lect 9: Path integral for quantum mechanics.
   Lect 10: Path integral for quantum spins.

4. Scattering theory
   Lect 11 Description of scattering problem
   Lect 12 Partial Waves: phase shifts
   Lect 13 Low energy scattering, bound states, resonance
   Lect 14 The Born Approximation and Optical Theorem

5. Berry phases
   Lect 15. Berry phases;
   Lect 16. Parallel transport

6. Second quantization
   Lect 17: Bose statistics and Fermi statistics
   Lect 18: Second quantization of identical Bose and Fermi systems
   Lect 19: Application of the second quantization