

Physics 821 - Quantum Mechanics II

Dr. Ian Balitsky, Spring 2015

Course information

1. Information:

- Office: OCNPS 323
- Phone: 683-5814, 269-7383 (JLab)
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- Office hours: TBD

2. Textbook:

- R. Shankar *Principles of Quantum Mechanics*, 2nd ed., Springer 1994

3. Reference books:

- J.J. Sakurai: "Modern Quantum Mechanics" Revised Edition, Addison Wesley 1994.
- L.D Landau and E.M Lifshits, Quantum mechanics. Non-relativistic theory. 3-rd Ed. Pergamonpress, 1991

4. Grade (out of 100%):

- Homework: 40% (collaboration is permitted only at the stage of discussion)
- Midterm : 20%
- Final (comprehensive): 40%

Course Outline

1. Path integrals in Quantum Mechanics

2. Symmetries in Quantum Mechanics

- Translational symmetry
- Rotational symmetry and angular momentum
- Angular momentum in spherical coordinates

3. Spin
 - Spin $\frac{1}{2}$
 - Spin magnetic moment
4. Addition of angular momenta
 - Irreducible tensor operators
 - Wigner-Eckart theorem
5. Variational and WKB methods
6. Many-body systems and spin statistics
 - The two-body problem
 - Pauli principle
 - Fermi gas
7. Scattering theory
 - Scattering in one dimension
 - Cross section
 - Optical theorem
 - Born approximation
 - Partial wave expansion