**PHYSICS 852**
**Quantum Mechanics II**
Spring 2002
Professor *Vladimir Zelevinsky*

**Lectures**: Monday, Wednesday, Friday 10:20 - 11:10, Room 317 PA
**Office hours**: Tuesday 1:00 - 3:00 or by appointment, Room 202 Cyclotron; Phone 333-6331; e-mail ZELEVINSKY@nscl.msu.edu
**Textbook**: *E.Merzbacher*, Quantum Mechanics, third edition
**Grading**: Homework 30% (assigned every week on Wednesday), Quizzes 10%, Midterm exam 20% (March), Final exam (QM Subject Exam) 40%.
**Teaching Assistant** Qinghong Cao, Office PA 253; e-mail cao@pa.msu.edu
**Tentative program**:

1. *Review*: Semiclassical approximation. Quantization rules. Tunneling. Semiclassical level density. Idea of path integrals. [Chapter 7]

2. Three-dimensional motion. Reduction of a two-body problem. Central field. Spherical functions. Hydrogen atom (discrete spectrum). [Chapters 11,12]

3. Scattering theory. Phase analysis and Born approximation. Low-energy and high-energy scattering. Quasistationary states. Analyticity. Scattering matrix and many-channel reactions. [Chapters 13,20]

4. Angular momentum. Algebra and irreducible representations. Spin and orbital momentum. Angular momentum coupling. Wigner-Eckart theorem. [Chapters 11,16,17]

5. Stationary perturbations. Atom in electric and magnetic fields. [Chapters 8, 18]

6. Time-dependent perturbations. Transition probability. Adiabatic and sudden perturbations. Atom in time-dependent fields. [Chapter 19]

7. Identical particles, Bose- and Fermi-statistics, secondary quantization. Atoms, molecules and nuclei. [Chapters 21,22]

8. Quantization of electromagnetic field. Radiation theory. [Chapter 23]

9. Introduction to relativistic quantum mechanics. [Chapter 24]