# Course 606
# Quantum Mechanics 1
### for graduate students
### Fall 2010

*Instructor Valery Pokrovsky*

1. Historical and methodical introduction
2. Wave function. Superposition principle. Uncertainty relation.
3. Schrödinger equation. Solutions of one-dimensional Schrödinger equation.
4. Operators and their algebra. Eigenvalues and eigenfunctions. Operators of physical quantities and measurements.
5. Three-dimensional Schrödinger equation. Conservation of probability. Simple solutions in 3 dimensions.
6. Particle in external electromagnetic field. Gauge invariance. Landau levels.
7. Semiclassical approximation.
8. Quantum mechanics as an evolution problem in the Hilbert space. Dirac transformation theory.
9. Operator approach to the quantum oscillator problem. Coherent states. Squeezed states.
10. Variational methods and perturbation theory. Van der Waals forces.
11. Angular momentum.
12. Spherically symmetric potential. Kepler problem.
13. Scattering.

The main textbook is E. Merzbacher, Quantum Mechanics, third edition, Wiley. Additional recommended textbooks are: Landau and Lifshitz, Quantum Mechanics, Pergamon or Addison-Wesley; Sakurai, Modern Quantum Mechanics, 2-nd edition, Addison-Wesley. Lecture notes are available on the website http://faculty.physics.tamu.edu/valery.

12 homework assignments will be delivered not later than Tuesday each week. They are due Thursday next week. 2 exams are planned: midterm in the middle October and the final exam in December. The grades will be equally distributed between the home assignments and 2 exams. The grade A requires the score more or equal to 90%, the grade B will be given for the score between 80 and 90%, the grade C is between 60 and 80%.
Office hours: Monday 12.30am to 1.30pm and Friday 11.00am to 12.00 or by appointment at the office 457 Physics Building. E-mail address: valery@physics.tamu.edu. Tel. 845-1175.