

PC3602: Quantum Mechanics of Atoms and Molecules

1. Lecturer

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2. Reference Books

The main reference books are by S. Gasiorowicz, *Quantum Physics* (Wiley, 2003) and F. Mandl, *Quantum Mechanics* (Wiley, 1992). An advanced reference is by L.D. Landau and E.M. Lifshitz, *Quantum Mechanics* (Pergamon, 1977). Please note that this last book is mainly used for postgraduate course on the subject.

3. Assessment

- a. 4 example sheets
- b. 1 hour 30 minutes examination in May/June (100%)

4. Aim

To better understand quantum mechanics by learning several analytical methods and by applying these methods to atoms and molecules.

5. Outline

- a. Review of basic QM (harmonic oscillator, Dirac notation, matrix representation, etc. 4 lectures)
- b. Angular momentum, hydrogenlike atoms and periodical table (6 lectures)
- c. Approximation methods (Time-independent (2nd order) and -dependent PT, Fermi's golden rule, variational method, helium atom, etc. 6 lectures)
- d. Introduction to molecular QM (H_2^+ ion, molecular orbitals, structures of diatomic molecules, etc. 6 lectures)
- e. Revision and exercises (2 lectures)