

Solid State physics part I and II

Lecturer: Marek Godlewski, godlew@ifpan.edu.pl

Lectures: Monday 11:30 – 13:00, Wednesday 9:00-10:30

First lecture: October 7, 2024

Place: Room A, Institute of Physics

Topics covered by the lectures:

Part I – 1st semester

1. Introduction to quantum mechanics and solid state physics
2. Crystals - ionic, covalent and van der Waals bonds
3. Electrons in crystals, effective mass
4. Density of states
5. Energy bands
6. Fermi-Dirac statistics, Fermi level
7. Dopants in crystals
8. Physics of p-n junction
9. Lattice vibrations

Part II – 2nd semester

1. Boltzmann kinetic equation – scattering processes
2. Electron in crystal – effect of an electric field
3. Electron in crystal – effect of an electric and magnetic field
4. Hall effect
5. Electron in magnetic field – quantum model
6. High frequency e-m field – interaction with electrons
7. Metallic reflection
8. Plasma frequency

9. Spectroscopy

10. Lasers – Einstein equations

11. Radiative and nonradiative recombination processes

12. Free and bound excitons

Bibliography:

Kittel Solid State Physics