

PHYSICAL KINETICS

- **12 October**

- LECTURE 1**

- Liouville theorem, distribution function and the Boltzmann equation. Hypothesis of molecular chaos and collision integral. Examples of electron collisions in solids. Detailed balance. Maxwell, Bose-Einstein and Fermi-Dirac distributions.*

- **14 October**

- LECTURE 2**

- τ - approximation for collision integral. Diffusion equation, linear response, conductivity and the Einstein relations. Magnetoresistance, the Hall effect and thermo-power for electrons in metals.*

- **19 October**

- LECTURE 3**

- Derivation of Hydrodynamics from Kinetics. Kinetic coefficients of atomic gases.*

- **21 October**

- LECTURE 4**

- Self-consistent field and collision-less dynamics for plasma. Plasma oscillations and the Landau damping. Plasma echo.*

- **26 October**

- LECTURE 5**

- **28 October**

LECTURE 6

Diffusion approximation for the Boltzmann equation. Fokker-Plank equation for heavy particle in a gas of light particles. Hot electrons in semiconductors and weakly ionised plasma. Electron temperature, current-voltage characteristics, the energy relaxation rate.

- **2 November**

LECTURE 7

Coulomb collisions in plasma. Landau collision integral for the Coulomb scattering. Heat transport from electrons to ions. Running away.

- **4 November**

LECTURE 8

Boundary problem for kinetic equation. Normal and anomalous skin-effect.

- **9 November**

LECTURE 9

Kinetics of cascade processes. Ballistic phonons in dielectrics. Non-local phonon thermo-conductivity.

- **11 November**

APPENDIX 10

Dynamical Derivation of Boltzmann Equation.

- **16 November**

LECTURE 11

Fluctuation of the distribution function. Equilibrium and

non-equilibrium noises. Example: Noise of hot electrons in semiconductors.

- **18 November**

LECTURE 12

Quantum kinetics. Wigner function and kinetic equation. Magnetic resonance. Bloch equation. Longitudinal and transverse relaxation rates. Dynamic Line Narrowing of the ESR on conducting electrons

- **23 November**

SUPERVISION - 1

- **25 November**

SUPERVISION - 2