

Master Physique fondamentale et applications

Physics for photonics 1

Informations

Composante : Faculté des Sciences

Responsable

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Langue(s) d'enseignement

Anglais

Contenu

Photonics is based on the interaction between light and matter. A knowledge of the atom structure and matter physics is needed to understand different types of interaction processes. The main objective of this course is to give students basic notions on atomic physics and statistical physics.

Atomic Physics

Early atomic physics. Hydrogen atom, stationary perturbation theory, fine and hyperfine structure. Atoms in external fields. Oscillating perturbation theory, interactions of atoms with radiation. Manipulation of atoms by light.

Statistical Physics

Microcanonical, canonical and grand canonical distributions. Classical approximation.
Ideal quantum gases. Bose gas, photon gas. Degenerate Fermi gas.

Compétences à acquérir

- The students should develop a thorough understanding of the uncertainty principle in terms of time-energy
- They should be able to write the Schrödinger equation in simple 1D and 3D cases
- They should be in a position to use the Gibbs distributions for solving basic statistical-mechanical problems

Modalités d'organisation

The basic pattern is 2 Lectures (2h each) followed by a problem-solving session (2h). At the end of each lecture, the students are given assignments (problems to solve). During the problem-solving sessions, they present their solutions.

- Lectures in Atomic Physics - 16h
- Problem-solving in Atomic Physics - 8h
- Lectures in Statistical Physics - 20h
- Problem-solving in Statistical Physics - 8h

Bibliographie, lectures recommandées

W. Demtröder, Atoms, Molecules and Photons, Springer, Heidelberg (2018).

C.J. Foot, Atomic Physics, Oxford (2005)

K.K. Likharev, Statistical Mechanics: Lecture Notes, IoP, Bristol (2019)

K.K. Likharev, Statistical Mechanics: Problems with solutions, IoP, Bristol (2019)

Pré-requis obligatoires

A solid mathematical background is indispensable

Further prerequisites: Electromagnetism and Thermodynamics

Prérequis recommandés

Basic knowledge of Quantum Mechanics: harmonic oscillator, spin 1/2

VOLUME HORAIRE

- Volume total: 52 heures
- Cours magistraux: 36 heures
- Travaux dirigés: 16 heures

Codes Apogée

- SPFAU20J [ELP]

Pour plus d'informations

[Aller sur le site de l'offre de formation...](#)



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