PHYSIQUE

PHYSICS

Lecturers: **Emmanuel DROUARD, Anne-Segolene CALLARD, Magali PHANER**

| Lecturers : 16.0 | TC : 22.0 | PW : 0.0 | Autonomy : 3.0 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

The aim of this course is to provide the basic knowledges of quantum physics necessary to describe both the matter at microscopic scale and the main processes of radiation - matter interaction (emission, diffusion, absorption). These processes will be addressed both from classical and quantum point of view, and studied in particular in the frame of applications such as light sources and detectors, and lasers.

Keywords : Quantum mechanics, atomic and nuclear physics, photon - matter interactions, wave propagation in media

Programme

- Wave propagation, dispersion.
- Classical description of electromagnetic waves/material media interactions: optical properties of dielectrics and metals.
- Limits of classical physics.
- Wave - particle duality. Schrödinger equation and applications.
- Atomic and molecular physics. Physics of the nucleus.
- Semiclassical/quantum description of the photon matter interaction.
- Light sources and detectors.
- Principles of laser. Properties and applications of lasers.

Learning outcomes

- To be able to apply the Schrödinger equation to simple systems.
- To know how to rely macroscopic properties of matter to their microscopic origins.
- To know how to describe the different radiation - matter interactions.
- To be able to give the orders of magnitude of the energies implied in these interactions.

Independent study

Objectifs : Understanding and assimilating the course.

Méhodes : Now how to remake and interpret tutorials.
On line exercises & multiple choice training.
Microtest and Questions/Answers session with teachers.

Core texts

B. Cagnac, *ATOMES ET RAYONNEMENT, INTERACTIONS ÉLECTROMAGNÉTIQUES*, Dunod, 2005
B. Cagnac *L'ATOME, UN ÉDIFICE QUANTIQUE.*, Dunod, 2005
B.E. Saleh, M.C. Teich*FUNDAMENTAL OF PHOTONICS*, Wiley, 2007

Assessment

Mark=100% knowledge. Mark of knowledge = 85 % final exam + 15%.