Statistical physics

Introducing

Description

Fundamental assumptions of statistical physics. Macroscopic states, microscopic states and density of states.
Closed systems in equilibrium, microcanonical distribution. Temperature and Boltzmann distribution. Z, U and S functions. Thermodynamic link.
Closed systems in contact with a thermostat, canonical distribution.
Systems in contact with a particle reservoir, grand canonical distribution. Chemical potential.
Fermions and Bosons. Fermi Dirac and Bose Einstein distributions. Application examples.

Objectives

At the end of this module, the student should have understood and be able to explain (main concepts):
Basic principles of statistical physics (origin of entropy).
Microcanonical distribution, temperature, partition function and U, S functions.
Canonical and grand canonical distributions
Fermi-Dirac and Bose Einstein distributions.

The student should be able to:
Calculate the equilibrium properties of a simple closed and open system.
use the Fermi Dirac or Bose Einstein distributions in solid-state physics.

Necessary prerequisites

- Classical mecanic
- Hamiltonian Mecanic
- Thermodynamique
- Electrostatic
- Electromagnetism

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse