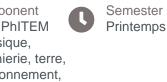


GS_Quantum_UE_Many-body quantum mechanics





Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



> Teaching language(s): English

> Open to exchange students: Yes

> Code d'export Apogée: PAX8NQAH

Presentation

Description

This course gives an introduction to the concepts of many-body quantum mechanics. It describes the quantum statistics of bosons and fermions, and the quantum properties of systems composed of many identical particles. The main theoretical ingredient for this purpose is the creation and annihilation operators of quantum particles, in what is sometimes called the "second quantization formalism".

Content

• Chapter 1: Quantum statistics and theoretical tools in quantum mechanics

Density operator

Bosons, Fermions, quantum statistics

Quantum states of identical particles

· Chapter 2: Bosons and light-matter interactions

Electromagnetic field quantization, field creation and annihilation operators

Fock states, coherent states

Jaynes-Cummings Hamiltonian and vacuum Rabi oscillations

Bose-Einstein condensation and Gross-Pitaevski equation

• Chapter 3: Fermionic systems

Introduction to fermionic creation and annihilation operators





Fermi sea: electrons and holes Hartree-Fock approximation Hubbard model Cooper pairs, Bogoliubov transformation

Course parts

CM Lectures (CM) 26h

Period: Semester 8

Useful info

Campus

> Grenoble - University campus

