



PHY1341 Atoms and molecules

[30h+10h exercises] 4 credits

This course is taught in the 2nd semester

Teacher(s): Pierre Defrance, André Nauts
Language: French
Level: First cycle

Aims

The objective of the course is to present the fundamental aspects of the structures and properties of atoms, ions and diatomic molecules.

Main themes

Part I Physics of atoms

- The structure of atoms and ions is based on a brief review of some relevant results of quantum mechanics and spectroscopy
- Hydrogenoid systems, quantum defect
- Many-electron atoms : Hartree-Fock method and Self-Consistent-Field approximation, central field and corrections, coupling schemes, isoelectronic series

Part II Molecular Physics

- Born-Oppenheimer approximation.
- Electronic states: adiabatic states, molecular orbitals, terms
- Symmetries and correlation diagrams of diatomic molecules
- Vibrational and rotational states
- Radiative transitions, selection rules
- Introduction to molecular dynamics

NB: An introduction to various illustrations by means of user-friendly computer codes in atomic and molecular structure and dynamics is provided during the supervised practical works.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisite : basic courses in physics and quantum mechanics

Other credits in programs

PHYS13BA	Troisième année de bachelier en sciences physiques	(4 credits)	Mandatory
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