



SH2500 Atomic and Molecular Physics 6.0 credits

Atom- och molekylfysik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SH2500 valid from Autumn 2009

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completed course the student should be able to:

- Describe in oral and written form the observations in atomic- and molecular physics which led to the modern quantum physics
- Motivate the necessity of using quantum mechanics calculations for describing atomic and molecular processes
- Explain how signatures of the quantum physics are seen in atomic- and molecular physics experiments
- Carry out numerical calculations of simpler processes for free atoms and molecules and their interactions with electric and magnetic fields
- Describe, in oral and written form, and analyze example of experiments which could answer a given scientific question within the basic atomic and molecular physics

Course contents

The atom, the nucleus, the electron and the photon - four necessary steps for the development of quantum physics. The structure of the atom. Atoms in electric and magnetic fields. Fine and hyperfine structure. X-ray spectroscopy. Molecular structure. Rotation-, vibration- and electronic spectra. Chemical bonds. Optical spectroscopy. Laser cooling. Bose-Einstein condensation. Entangled quantum states. The laser principle. Atomic lasers.

Specific prerequisites

Recommended prerequisites: SH1009 Modern Physics.

Course literature

H. Haken och H.C. Wolf: The Physics of Atoms and Quanta, Springer Verlag 2000

Examination

- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Exercise, 1.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Active participation at the lectures. One presentation of a part of the course (ÖVN1; 1,5 university credits). One written examination (TEN1; 4,5 university credits).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.