SK2821 Experimental Molecular Physics 6.0 credits

Experimentell molekylfysik

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

Establishment

Course syllabus for SK2821 valid from Autumn 2009

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

Recommended prerequisites:
Quantum physics for F4 (SI2170) or Laser spectroscopy for F4 (SK2800), or corresponding knowledge

Language of instruction

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

Intended learning outcomes

The course aims to give basic knowledge about advanced experimental physics, such as the use of modern IR spectrometers, high resolution spectrometers, laser measurement methods as LIBS (Laser induced brekdown spectroscopy) and Laser Raman spectroscopy. After the course the student will be able to:

- perform experiments on rotation and vibration spectroscopy
- use LIBS technology to measure concentration of metals
- use laser induced fluorescence techniques to measure vibrational constants
- use Laser Raman techniques on larger molecules in the liquid phase
- synthesizes of molecular spectra with known molecular constants
- use laser spectroscopy to measure vibrational and rotational temperatures
- perform calculations applying the Franck-Condon approximation

Course contents

Grating spectrometers. Principles of molecular transitions. Laser spectroscopy. Laser induced fluorescence. Experiments on iodine. Time-resolved spectroscopy and measurements on molecular iodine and its life-time. Laser induced breakdown spectroscopy. Measurements on metal samples. Determinations of elemental concentrations. Laser Raman spectroscopy and measurements on liquid nitrogen. Use of Notch filters. Infrared spectroscopy. Measurements on carbon monoxide. Determination of rotational constants. Synthesizes of molecular spectra from molecular constants.

Course literature

Handouts. Lars-Erik Berg, Olli Launila

Examination

- LAB1 - Laboratory Experiments, 6.0 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.

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

LAB1 - Laborations, 6.0 credits, grade scale: P, F

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.