

## Primary Area of Specialization

# Molecular Physics

Module No.: MN-P-SP-Mol

status quo 08.05.2012

	HPW	estimated effort (h)	credit points
Lecture Course	8	380	16
Problem Class	2	100	
Advanced Seminar	2	120	4
<b>Total</b>	12	600	20

### Literature

Bernath, Spectra of Atoms and Molecules (Oxford University Press)

Townes Schawlow, Microwave Spectroscopy (Dover Publications)

Engelke, Aufbau der Moleküle (Teubner)

### Organization

The Primary AoS Molecular Physics is composed of:

1. 2 core courses Molecular Physics I and II (2 x 3+1 hpw)
2. 1 Specialized course (2 hpw) in Molecular Physics or Astrophysics
3. 1 Advanced seminar (2 hpw)

### Examinations

The module is passed by passing an oral examination covering the topics of all attended courses. To be admitted to the exam, students must actively participate in the problem sessions (including the solution of homework problems) and present a scientific talk in the seminar course.

The grade given for the module is equal to the grade of the oral examination.

### Aims

In the first part of the core courses the students learn the main concepts of molecular physics: separation of electronic, vibrational and rotational motion. Simple molecular spectra can be analyzed on the basis of the problem class. Fundamental group theory is used to predict vibrational and rotational spectra of more complex molecules.

In the second part of the core courses more complex issues of molecular spectra are introduced. The students will be enabled to analyze spectra of complex molecules which are subject to couplings between electronic, vibrational and rotational motions.

In the special courses basic and advanced molecular physics are applied to atmospheric and astronomical environments. This module prepares for topics of current research in molecular physics and provides the basis for the preparation of the master thesis.

### Prerequisites for Participation

None

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Atomic Physics, Molecular Physics and Quantum Mechanics at the level of the bachelor courses in physics

**Frequency**

The advanced seminar is offered in each semester, Molecular Physics I each winter semester, specialized courses alternating.

**Soft Skills**

Elocution and public speaking

**Use in Other Courses of Study**

None

**Coordinators**

S. Schlemmer