Module: Specialization: Experimental Physics

Module No.: physics61a

Course: Advanced Atomic, Molecular, and Optical Physics

Course No.: physics620

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	WT

Requirements for Participation:

Preparation:
Fundamentals of Quantum Mechanics, Atomic Physics

Form of Testing and Examination:
Requirements for the examination (written or oral): successful work within the exercises

Length of Course:
1 semester

Aims of the Course:
The aim of the course is to give the students a deeper insight to the field of atomic, molecular and optical (AMO) physics. Building on prior knowledge from the Bachelor courses it will cover advanced topics of atomic and molecular physics, as well as the interaction of light and matter.

Contents of the Course:
Atomic physics: Atoms in external fields; QED corrections: Lamb-Shift; Interaction of light and matter: Lorentz oscillator, selection rules; magnetic resonance; Coherent control

Molecular physics: Hydrogen Molecule; Vibrations and rotations of molecules; Hybridization of molecular orbitals; Feshbach Resonances; Photoassociation; Cold Molecules

Bose Condensation; Matterwave Optics

Recommended Literature:
C. J. Foot, Atomic Physics, Oxford University Press 2005
H. Haken, The physics of atoms and quanta, Springer 1996
S. Svanberg, Atomic and molecular spectroscopy basic aspects and practical applications, Springer 2001
W. Demtröder, Molecular Physics, Wiley VCH 2005
T. Buyana, Molecular physics, World Scientific 1997
W. Demtröder, Atoms, Molecules and Photons, Springer 2010
P, Meystre, Atom Optics, Springer 2010