Modules:

physics700 **Elective Advanced Lectures**
physics710 **Experimental Physics**

Course: Laser Cooling and Matter Waves (E)

Course No.: physics735

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture	English	2	3	WT/ST

Requirements:

Preparation:
Basic thermodynamics: fundamentals of quantum mechanics, fundamentals of solid state physics

Form of Testing and Examination:
Written or oral examination

Length of Course:
1 semester

Aims of the Course:
The in-depth lecture shows, in theory and experiments, the fundamentals of laser cooling. The application of laser cooling in atom optics, in particular for the preparation of atomic matter waves, is shown. New results in research with degenerated quantum gases enable us to gain insight into atomic many particle physics

Contents of the Course:
Outline: Light-matter interaction; mechanic effects of light; Doppler cooling; polarization gradient cooling, magneto-optical traps; optical molasses; cold atomic gases; atom interferometry; Bose-Einstein condensation of atoms; atom lasers; Mott insulator phase transitions; mixtures of quantum gases; fermionic degenerate gases

Recommended Literature:
P. v. d. Straten, H. Metcalf; Laser Cooling (Springer, Heidelberg 1999)