Modules:

physics700 **Elective Advanced Lectures**
physics710 **Experimental Physics**
physics720 **Applied Physics**

Course: Crystal Optics (E/A)

Course No.: physics736

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

Requirements:

Preparation:

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

Length of Course:
1 semester

Aims of the Course:
Because of their aesthetic nature crystals are termed "flowers of mineral kingdom". The aesthetic aspect is closely related to the symmetry of the crystals which in turn determines their optical properties. It is the purpose of this course to stimulate the understanding of these relations. The mathematical and tools for describing symmetry and an introduction to polarization optics will be given before the optical properties following from crystal symmetry are discussed. Particular emphasis will be put on the magneto-optical properties of crystals in magnetic internal or external fields. Advanced topics such as the determination of magnetic structures and interactions by nonlinear magneto-optics will conclude the course

Contents of the Course:
Crystal classes and their symmetry; basic group theory; polarized light; optical properties in the absence of fields; electro-optical properties; magneto-optical properties: Faraday effect, Kerr effect, magneto-optical materials and devices, semiconductor magneto-optics, time-resolved magneto-optics, nonlinear magneto-optics

Recommended Literature:
R. R. Birss, Symmetry and Magnetism, North-Holland (1966)
R. E. Newnham: Properties of Materials: Anisotropy, Symmetry, Structure, Oxford University (2005)
A. K. Zvezdin, V. A. Kotov: Modern Magnetooptics & Magnetooptical Materials, Taylor/Francis (1997)
Y. R. Shen: The Principles of Nonlinear Optics, Wiley (2002)
K. H. Bennemann: Nonlinear Optics in Metals, Oxford University (1999)