

Condensed Matter Physics

Module No.: MN-P-SP-CondMat, MN-P-PN-CondMat, MN-P-WaMa

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Course: Optical Spectroscopy

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| Category | Type | Language | Teaching Hours | CP | Semester |
|--------------------|---------|----------|----------------|----|----------|
| Specialized Course | Lecture | English | 2 | 3 | |

Requirements for participation:

Basic knowledge of condensed matter physics

Type of module examinations:

One oral examination at the end of the module

Duration of the course:

1 semester

Aims of the course:

Understanding of the basic concepts and techniques of optical spectroscopy on solid-state samples.

Contents of the course:

Topics covered are:

- Electromagnetic waves in matter, dielectric function
- Electromagnetic response of metals and insulators, Drude-Lorentz model
- Kramers-Kronig relations
- THz spectroscopy (time domain and cw)
- Fourier-transform spectroscopy
- Ellipsometry
- Examples of current research (phonons, magnons, orbital excitations, superconductors, ...)

Recommended literature:

Skriptum (available during the course)

Dressel/Grüner: Electrodynamics of Solids: Optical Properties of Electrons in Matter (Cambridge, 2002)

Klingshirn: Semiconductor Optics (Springer, 1997)

Kuzmany: Solid-State Spectroscopy: An Introduction (Springer, 2009)