

Condensed Matter Physics

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

Version: 07.02.2014 JH

Course: Experimental methods in condensed matter physics

Lecturers: Hemberger, Michely, Busse

Email: hemberger@ph2.uni-koeln.de

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

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 experimental concepts in condensed matter science
Knowledge of basic fields and important applications

Contents of the course:

The lecture introduces to modern experimental approaches in condensed matter physics. Basic concepts are illustrated with examples of physical problems investigated employing different methods.

Topics covered are

- Introduction on sample preparation
- X-ray powder diffraction
- Specific heat, thermal expansion
- Magnetization and magnetic susceptibility
- DC transport
- Dielectric spectroscopy
- Photo-emission spectroscopy
- Inelastic scattering (neutrons, light)
- THz spectroscopy / Optical spectroscopy
- Scanning probe microscopy/spectroscopy (AFM, STM)

Recommended literature:

Skriptum (available during the course)

Ibach/Lüth: Solid-State Physics: An Introduction to Principles of Materials Science

Oura/Lifshits/Saranin/Zotov/Katayama: Surface Science - An Introduction

Fox: Optical Properties of Solids

Buckel/Kleiner: Superconductivity

Bergmann/Schäfer: Experimentalphysik (Band 6: Festkörper)

Ashcroft/Mermin: Solid State Physics