

Condensed Matter Physics

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

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Course: Introduction to neutron scattering

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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 elastic and inelastic neutron scattering experiments.

Contents of the course:

The lecture introduces to the techniques of elastic and inelastic neutron scattering that can be used to determine the crystal or magnetic structure as well as the dispersion of nuclear or magnetic excitations. Topics covered are

- Crystal structures and reciprocal space
- Neutron powder diffraction
- Single-crystal diffraction
- Structure refinements
- Inelastic neutron scattering
- Phonon dispersion
- Magnetic excitations
- Examples of current research (high-temperature superconductors, manganates with colossal magnetoresistivity, multiferroics, ...)
- Polarized neutron scattering

Recommended literature:

Skriptum (available during the course)

S. W. Lovesey, Theory of Neutron Scattering from Condensed Matter, Oxford (1981)

G. E. Bacon, Neutron Diffraction, Oxford (1979)

Shirane, Shapiro and, Tranquada, Neutr. Scattering with a triple-axis spectrometer, Cambridge (2002)

Izyumov, Ozerov, Magnetic Neutron Diffraction Plenum (1970)

W. Marshall and S.W. Lovesey, Theory of thermal neutron scattering, Oxford (1971)

G.L. Squires, Introduction to the theory of Thermal Neutron scattering, Cambridge (1978)

T. Chatterji, Neutron Scattering from Magnetic Materials, Elsevier B.V., Amsterdam (2006).