Module: Specialization II

Module No.: physics630

Course: Magnetism/Superconductivity

Course No.: physics634

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

Requirements:

Preparation:

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

Length of Course:
1 semester

Aims of the Course:
To give an introduction to the standard theories of both fields as major example of collective phenomena in condensed-matter physics and comparison with experiments

Contents of the Course:
Magnetism:
orbital and spin magnetism without interactions, exchange interactions, phase transitions, magnetic ordering and domains, magnetism in 1-3 dimensions, spin waves (magnons), itinerant magnetism, colossal magnetoresistance
Superconductivity:
macroscopic aspects, type I and type II superconductors, Ginzburg-Landau theory, BCS theory, Josephson effect, superfluidity, high-temperature superconductivity

Recommended Literature:
L. P. Lévy: Magnetism and superconductivity (Springer; Heidelberg 2000)
P. Mohn: Magnetism in the Solid State - An Introduction (Springer, Heidelberg 2005)
J. Crangle: Solid State Magnetism, Van Nostrand Reinhold (Springer, New York 1991)
C. N. R. Rao, B. Raveau: Colossal Magnetoresistance [...] of Manganese Oxides (World Scientific 2004)
J. F. Annett: Superconductivity, super fluids and condensates (Oxford University Press 2004)
A. Mourachkine: High-Temperature Superconductivity in Cuprates [...] (Springer/Kluwer, Berlin 2002)