

**Module: Specialization II**

Module No.: physics630

**Course:**  universität**bonn**
**Advanced Theoretical Condensed Matter Physics**

Course No.: physics638

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+2	7	ST

**Requirements:****Preparation:**

physics617 (Theoretical Condensed Matter Physics)

**Form of Testing and Examination:**

Requirements for the examination (written): successful work with the exercises

**Length of Course:**

1 semester

**Aims of the Course:**

Survey of methods of theoretical condensed matter physics and their application to prominent examples in regard to current research

**Contents of the Course:**

Bosonic systems:

Bose-Einstein condensation

Photonics

Quantum dynamics of many-electrons systems:

Feynman diagram technique for many-particle systems at finite temperature

Quantum magnetism, Kondo effect, Renormalization group techniques

Disordered systems: Electrons in a random potential

Superconductivity

**Recommended Literature:**

A. A. Abrikosov, L.P. Gorkov; Methods of Quantum Field Theory in Statistical Physics (Dover, New York 1977)

W. Nolting; Grundkurs Theoretische Physik Band 7: Vielteilchentheorie (Springer, Heidelberg 2002)

A. C. Hewson, The Kondo Problem to Heavy Fermions (Cambridge University Press, 1997)

C. Itzykson, J.-M. Drouffe; Statistical Field Theory (Cambridge University Press 1991)

J. R. Schrieffer; Theory of Superconductivity (Benjamin/Cummings, Reading/Mass, 1983)