

# Module: Specialization: Advanced Theoretical Physics

Module No.: physics62c

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 for Participation:

#### 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)