

# Theory of Superconductivity and Superfluidity (T) - physics7504

Degree - M.Sc. in Physics (PO von 2014)

<i>Module</i>	<b>Elective Advanced Lectures: Theoretical Physics</b>
<i>Module No.</i>	physics70c

<i>Course</i>	<b>Theory of Superconductivity and Superfluidity (T)</b>
<i>Course No.</i>	physics7504

Category	Type	Teaching			Semester
		Language	hours	CP	
Elective	Lecture with exercises	English	2+1	5	WT/ST

## Requirements for Participation:

**Preparation:** Quantum Mechanics, Thermodynamics and Statistics, Quantum Field Theory

**Form of Testing and Examination:** Requirements for the (written or oral) examination: Successful participation in the exercises

**Length of Course:** 1 semester

**Aims of the Course:** The goal of the course is to introduce students to the theory of superconductivity and superfluidity.

**Contents of the Course:** Phenomenological theory of basic superconductivity, type I and type II superconductivity, vortices and their dynamics, Meissner-Ochsenfeld Effekt, microscopic theory of superconductivity: Gor'kov equation, BCS theory, Migdal theorem, strong coupling theory of superconductivity: Eliashberg equation, Andreev scattering, Josephson effect, Anderson theorem: impurity scattering, Collective excitations in superconductors and superfluids, Anderson (Higgs) mechanism for the mass generation. Superfluidity in  $^3\text{He}$ , superconductivity in heavy fermion compounds, high temperature superconductivity and open questions.

**Recommended Literature:** Will be announced in the first lecture