Module title: Many Body Quantum Theory  
Abbreviation: 11-QVTP-092-m01

Module coordinator: Managing Director of the Institute of Theoretical Physics and Astrophysics  
Module offered by: Faculty of Physics and Astronomy

ECTS: 8  
Method of grading: numerical grade  
Only after succ. compl. of module(s): --

Duration: 1 semester  
Module level: graduate  
Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents
This will usually be a course on quantum many particle physics approached by the perturbative methods using Green’s functions.  
An outline could be:

1 Single-particle Green’s function  
2 Review of second quantization  
3 Diagrammatic method using many particle Green’s functions at temperature T=0  
4 Diagrammatic method for finite T  
5 Landau theory of Fermi liquids  
6 Superconductivity  
7 One-dimensional systems and bosonization

Intended learning outcomes
The students have mastered the principles of quantum field theory in many-particle systems. They are able to apply the acquired methods to current problems of Theoretical Solid-State Physics.

Courses: (type, number of weekly contact hours, language — if other than German)  
R + V (no information on SWS (weekly contact hours) and course language available)

Method of assessment: (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)  
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)  
Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.
Language of assessment: German, English

Allocation of places
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Additional information
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### Module description

**Referred to in LPO I**  (examination regulations for teaching-degree programmes)

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**Module appears in**

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