

Module title		Abbreviation
Renormalization Group Methods in Field Theory		11-RMFT-Int-201-m01
Module coordinator		Module offered by
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
<p>This course is complementary to the discussion of Wilson's renormalization group (RG) as covered in the course „Renormalization Group and Critical Phenomena“ (11-CRP). This course focuses on the diagrammatic formulation of RG flow equations and its relation to diagrammatic perturbation expansions. For interacting fermion systems, this is of particular relevance in the context of the functional renormalization group. A possible outline of the course is:</p> <ol style="list-style-type: none"> 1. Wilson's RG 2. Path integral formulation of interacting fermions 3. Bethe-Salpeter-equation 4. RG flow equations for the one-particle and the two-particle vertex 5. Comparison of flow equations with diagrammatic resummation schemes (such as the „random phase approximation“) 6. RG flow equations for spin systems 		
Intended learning outcomes		
Familiarity with modern diagram based techniques for interacting many-body systems. In-depth understanding of the theoretical framework addressing a range of phenomena in correlated electron systems including superconductivity, charge and spin density waves, and nematic instabilities.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (4) + R (2) Module taught in: English		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes).</p> <p>If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.</p> <p>Language of assessment: English Assessment offered: Once a year as announced</p>		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Physics International (2020)		

