

Module title		Abbreviation
Introduction to Fractional Quantisation		11-EFQ-161-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)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
<p>The course will elaborate on instances of fractional quantisation in nature, mostly employing examples from the following list:</p> <ol style="list-style-type: none"> 1. Midgap states in polyacetylene 2. Abelian quantised Hall states (Laughlin states, fractional charge and statistics, hierarchy states, effective Chern-Simons theory) 3. Non-Abelian quantised Hall states (Pfaffian states, Majorana fermions, non-Abelian statistics, Read-Rezayi states) 4. Spin chains (Haldane-Shastry model, spinon excitations, holon excitations in the Kuramoto-Yokoyama model, Yangian symmetry) 5. Chiral spin liquids (Abelian and non-Abelian) 6. Kitaev models (toric code model, honeycomb model). 		
Intended learning outcomes		
The students become familiar with emergent phenomena in many-particle systems and with Anderson's philosophical principle of "More is different" by studying specific examples of quantum condensates exhibiting fractional quantisation.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (3) + R (1) Module taught in: German or 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>written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or 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>Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: German and/or English</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) Mathematics (2016) Master's degree (1 major) Physics (2016)		

Master's degree (1 major) Mathematical Physics (2016)
Master's degree (1 major) Computational Mathematics (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Master's degree (1 major) Computational Mathematics (2019)
Master's degree (1 major) Mathematics (2019)