

Module title		Abbreviation
Quantum Mechanics II		11-QM2-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	undergraduate	--
Contents		
<p>„Quantum mechanics 2“ constitutes the central theoretical course to be taken within the international Master’s program in physics. While the specific emphasis can be adjusted individually, the core topics that are supposed to be covered should include:</p> <ol style="list-style-type: none"> 1. Second quantization: fermions and bosons 2. Band structures of particles in a crystal 3. Angular momentum, symmetry operators, Lie Algebras 4. Scattering theory: potential scattering, partial wave expansion 5. Relativistic quantum mechanics: Klein-Gordon equation, Dirac equation, Lorentz group, fine structure splitting of atomic spectra 6. Quantum entanglement 7. Canonical formalism 		
Intended learning outcomes		
<p>In-depth knowledge of advanced quantum mechanics. Thorough understanding of the mathematical and theoretical concepts of the listed topics. Ability to describe or model problems of modern theoretical quantum physics mathematically, to solve problems analytically or using approximation methods and to interpret the results physically. The course is pivotal to subsequent theory courses in astrophysics, high energy physics and condensed matter/solid state physics. The course is mandatory for all Master’s students.</p>		
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>Assessment offered: In the semester in which the course is offered and in the subsequent semester Language of assessment: 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) Physics International (2020)

Master's degree (1 major) Quantum Engineering (2020)