

Module title		Abbreviation
Quantum Mechanics II		11-QM2-092-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	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		
<p>"Quantum mechanics II" constitutes the central theoretical course of the international Master's program in Physics. It builds upon basics which are acquired in the lecture "Quantum mechanics I" of the Bachelor's degree. 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 quantisation: 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		
The students acquire in-depth knowledge of advanced quantum mechanics and have a thorough understanding of the mathematical and theoretical concepts of the listed topics. They are able to describe or model problems of modern theoretical Quantum Physics mathematically, to solve problems analytically, to use 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.		
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)		
<p>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)</p> <p>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.</p> <p>Language of assessment: German, 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

Bachelor' degree (1 major) Physics (2010)
 Bachelor' degree (1 major) Physics (2012)
 Bachelor' degree (1 major) Nanostructure Technology (2012)
 Bachelor' degree (1 major) Mathematical Physics (2009)
 Bachelor' degree (1 major) Mathematical Physics (2012)
 Master's degree (1 major) Mathematics (2012)
 Master's degree (1 major) Mathematics (2010)
 Master's degree (1 major) Physics (2010)
 Master's degree (1 major) Physics (2011)
 Master's degree (1 major) Nanostructure Technology (2011)
 Master's degree (1 major) Nanostructure Technology (2010)
 Master's degree (1 major) Mathematical Physics (2012)
 Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
 Master's degree (1 major) FOKUS Physics (2010)
 Master's degree (1 major) FOKUS Physics (2011)
 Master's degree (1 major) Computational Mathematics (2012)