

Program	Level of studies		Second cycle	
	Program name		Physics	
Course name	QUANTUM MECHANICS III			
Course ID	Semester	Course status	ECTS credits	L+E
PTH9611	I	ELECTIVE	6	3+2
Lecturer	Prof. dr. Dejan Milošević			
Aims and intended learning outcomes	The aim of the course is that students learn quantum mechanics at a higher level than in the introductory course. The knowledge of quantum mechanics is deepened through various examples and applications. The learning outcome is mastering the formalism of quantum mechanics and its applications in various areas of modern physics.			
Course content				
<p>Formalism of quantum mechanics: Axioms of quantum mechanics. Unitary transformations. Time evolution of the system. Representations of quantum mechanics. Path integrals. Symmetry principles and conservation laws. Discrete transformations. Galilean transformation.</p> <p>Angular momentum: Angular momentum and rotation. The addition of the angular momenta. Clebsch-Gordan's coefficients.</p> <p>Approximative methods for time-dependent problems in quantum mechanics: Time-dependent perturbation theory. Adiabatic approximation. Berry phase. "Sudden" approximation.</p> <p>Quantum mechanics of many particle systems: Identical particles. Bosons and fermions. Pauli's principle. Multielectron atoms. Molecules. Examples.</p> <p>Interaction of quantum systems with an electromagnetic field: A charged particle in an electromagnetic field. Dipole approximation. Photoionization. Interaction with magnetic field. Aharonov-Bohm effect. Rabbi's experiment.</p> <p>Quantum collision theory: Scattering cross-section. Scattering amplitude. Born approximation. Method of partial waves. Green's method. General properties of the T-matrix. Collisions of identical particles. Collisions of complex particles. Inelastic collisions.</p>				
Student workload (hours)		Grading		
Lectures and Exercises	75	Assessment method	Points	
Exam preparation	75	Partial exam	50	
Assignments		Final exam	50	
Other				
Total	150			
		Total	100	
Literature				
<p>Mandatory:</p> <p>D. Milošević, Kvantna mehanika I and Kvantna mehanika II, 2015. (available at e-learning)</p> <p>Lecture notes</p> <p>L. I. Šif, Kvantna mehanika, Vuk Karadžić, Beograd, 1968.</p> <p>Recommended:</p> <p>B. H. Bransden, C. J. Joachain, Quantum mechanics, Prentice Hall, Harlow, 2000.</p> <p>A. Messiah, Quantum mechanics, North-Holland, Amsterdam, 1968.</p> <p>C. Cohen-Tannoudji, B. Diu, F. Laloe, Quantum mechanics, Wiley, New York, 1977.</p>				
Remarks				