Program	Level of studies		Second cycle	
	Program name		Physics	
Course name	SCATTERING THEORY			
Course ID	Semester	Course status	ECTS credits	L+E
PTH9681	I	ELECTIVE	6	3+1
Lecturer	Prof. dr. Aner Čerkić			
Aims and intended learning outcomes	Aim of the course is to introduce students into non-relativistic quantum scattering theory. Expected outcomes: Adopting the basic ideas and concepts of the quantum scattering theory. Mastering the mathematical apparatus of the quantum scattering theory. Getting acquainted with the applications of the quantum scattering theory			

Course content

Description of collision processes
Basic definitions. Kinematics.
Potential scattering
Potential scattering: General features. The method of partial waves. The integral equation of potential scattering. The Coulomb potential. The scattering of identical particles. The Born series. Semi-classical approximations. Variational methods. Time-dependent potential scattering.
General scattering theory
Quantum dynamics. The collision matrix. Transition probabilities and cross-sections. The determination of the collision matrix. Two-potential scattering.
Applications
Two-body collisions. Three-body collisions. The optical potential.

Student workload (hours)		Grading	
Lectures and Exercises	60	Assessment method	Points
Exam preparation	50		
Assignments	30		
Other	10	Midterm exam	50
Total	150	Final exam	50
		Total	100

Literature

Mandatory literature:
1. C. J. Joachain, *Quantum collision theory*, North-Holland, Amsterdam, 1975.
Additional literature:
1. S. Sunakawa, *Kvantovaja teorija rassejanija*, Mir, Moskva, 1979.
2. Dževad Belkić, *Principles of quantum scattering theory*, Institut of Physics Publishing, Bristol, 2004.
3. J. R. Taylor, *Scattering theory: The quantum theory of nonrelativistic collisions*, John Wiley & Sons, New York, 1972.
4. L. D. Landau, E. M. Lifšic, *Teoretičeskaja fizika. Tom III: Kvantovaja mehanika. Nereljativistkaja teorija*, Nauka, Moskva, 1989.

Remarks