

Module	<b><i>Scattering Theory</i></b>
Code	76004
Instruction language	English
ECTS credits	6
Credit hours	5
Duration	1 semester
Cycle	regularly
Coordinator	Dean of Physics Studies
Lecturer	PD Dr Maxim A. Efremov
Allocation to study programmes	Physics M.Sc., elective module, 1 <sup>st</sup> or 2 <sup>nd</sup> semester Wirtschaftsphysik M.Sc., elective module, 1 <sup>st</sup> - 3 <sup>rd</sup> semester
Formal prerequisites	None
Recommended prerequisites	Classical Mechanics, Non-relativistic Quantum Mechanics, Classical Electrodynamics
Learning objectives	Students who successfully passed this module <ul style="list-style-type: none"> <li>• are familiar with the methods and concepts of classical and quantum-mechanical theory of scattering processes</li> <li>• are able to transfer their knowledge to other branches of physics</li> </ul>
Syllabus	<ul style="list-style-type: none"> <li>• classical and quantum-mechanic particles interacting by central and non-central potentials in one, two, and three spatial dimensions</li> <li>• elastic and inelastic scattering</li> <li>• three-particle collisions</li> <li>• analytical properties of scattering amplitude and cross-section</li> <li>• dispersion relations and inverse scattering problems</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• R.G. Newton, <i>Scattering Theory of Waves and Particles</i> (Springer-Verlag, 1982)</li> <li>• M.L. Goldberger and K.M. Watson, <i>Collision Theory</i> (Wiley, 1964; Dover, 2004)</li> <li>• L.D. Landau und E.M. Lifshitz, <i>Quantum Mechanics</i> (Pergamon Press, NY, 1958)</li> <li>• H. Friedrich, <i>Scattering Theory</i> (Springer, 2013)</li> </ul>
Teaching and learning methods	Lecture (3 hours per week) Exercise (2 hours per week)
Workload	45 hours lecture (attendance time) 30 hours exercise (attendance time) 105 hours self-study and exam preparation Total: 180 hours
Assessment	Written or oral examination. A prerequisite for the participation in the examination is an ungraded course achievement. Form and scope of the

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examination and of the course achievement are determined and notified by the lecturer at the beginning of the course.

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Examination            new

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Grading procedure    The module grade is the examination grade.

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Basis for                Research in the fields of Quantum Information and Technologies

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