PHY-M-VF 9

Effective WS 2011/12

1. Module title:	**Quantum Electrodynamics**
2. Field / responsibility of:	Physics / the faculty, the Dean of Studies
3. Module contents:	• Review: Relativistic particle dynamics • Feynman diagrams • Relativistic S-matrix and interaction cross-section • Simple scattering reactions, e.g. electron-proton scattering • Gauge invariance and Ward identities • Renormalization • Regularization (with pulse cutoff and dimensional regularization) • Vacuum polarization, self-energy and vertex correction • Renormalization group and running coupling constant
4. Qualification objectives of the module / competencies to be	Acquiring a fundamental knowledge of relativistic quantum field theory and its
5. Prerequisites for participation:	
a) Recommended knowledge:	Quantum mechanics II
b) Prerequisite courses:	None
6. Module can be used for:	MSc. in Physics, MSc. in Nanoscience, MSc. in Comp. Sci; BSc. in Computational Science
7. Module is offered:	On a yearly basis
8. Module can be completed in:	1 semester
9. Recommended semester of study:	Minimum: 1
10. Overall module workload / number of credit points:	**Workload:** **Total number of hours: 240** **Allocation:** **1. Attendance: 6 credit hours** **2. Independent study (including exam preparation / exam): 150 hours** **Credit points: 8**
11. The module is successfully completed when the requirements below have been met.	
12. Module components:	

Nr.	Req./req. elective	Form of teaching	Subject area / topic	Credit hours	Coursework
PHY-M -VF 9 .1	Required elective	Lecture Study course	Quantum electrodynamics	6	Practical exercises

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13. Module exam:

Nr.	Competence / topic	Type of exam	Duration	Time / notes	Weighting for module grade
PHY-M -VF 9 .1	Quantum electrodynamics			Type of exam: Oral or written or term paper; duration: 20 min, or 105 min, 135 min or 210 min (if it consists of two parts); time: Lecture period to end of semester	1

14. Notes:

Further information will be provided by the instructors at the beginning of the course. The information on "duration" (exam) refers to the oral or written exam. Students of the degree program Computational Science may attend module PHY-M-VF8 (Computational Physics) instead of this module in order to acquire the knowledge recommended for module Quantum Chromodynamics (PHY-M-VF 10).

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