

PHY-M-VF 15

Effective SS 2015 / Please also note the remarks in item 13.

1. Module title:	Light-Matter Interaction
2. Field / responsibility of:	Faculty of Physics, Dean of Studies
3. Module contents:	<ul style="list-style-type: none"> • Introduction and overview • Fundamentals of atomic transitions • Linear optics of molecules and solids • Optical properties of nanostructures • Nonlinear susceptibility and nonlinear wave equation • Second and third order nonlinear phenomena • Coherent optics of the two-level system • Non-perturbative optics • Ultra-fast dynamics • Introduction to quantum optics • Photon statistics, single-photon sources
4. Qualification objectives of the module / competencies to be acquired:	Acquiring fundamental knowledge of the interaction of light with atoms, molecules and solids. Understanding different regimes from linear and nonlinear optics to the basics of quantum optics. Semiclassical, quantum mechanical and quantum optical concepts will be covered as well as current experimental methods and applications. Students will be able to understand advanced aspects in the field of optical and nonlinear optical properties of condensed matter.
5. Prerequisites for participation:	
a) Recommended knowledge:	Solid-state physics, quantum mechanics I
b) Prerequisite courses:	None
6. Module can be used for:	MSc. in Physics
7. Module is offered:	On a yearly basis
8. Module can be completed in:	1 semester
9. Recommended semester of study:	1
10. Overall module workload / number of credit points:	Workload: Total number of hours: 240 Allocation: 1. Attendance: 4 credit hours 2. Independent study (including exam preparation/ exam): 180 hours Credit points: 8
The successful completion of all assignments listed in items 11 and 12 is a prerequisite for receiving the credit points mentioned in item 10.	

PHY-M-VF 15

Effective SS 2015 / Please also note the remarks in item 13.

11. Module components:					
Nr.	Req./req. elective	Form of teaching	Subject area / topic	Credit hours	Coursework
PHY-M-VF 1 5.1	Compulsory	Lecture Practical course	Light-matter interaction	4	
12. Module exam:					
Nr.	Competence / topic	Type of exam	Duration	Time / notes	Weighting for module grade
PHY-M-VF 1 5.1	Light-matter interaction			Oral or written; duration: 20 min, or 105 min or 135 min; time: Lecture period to end of semester	1
13. Notes:					
Further information will be provided by the instructors at the beginning of the course.					