Module: Specialization: Advanced Experimental Physics

Module No.: physics62a

Course: Quantum Optics

Course No.: physics631

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	ST

Requirements for Participation:

Preparation:

Form of Testing and Examination:
Requirements for the examination (written or oral): successful work with the exercises

Length of Course:
1 semester

Aims of the Course:
Make the students understand quantum optics and enable them to practically apply their knowledge in research and development.

Contents of the Course:
Bloch Vector, Bloch equations,
Quantization of the electromagnetic field; representations;
coherence, correlation functions; single-mode quantum optics; squeezing;
interaction of quantized radiation and atoms;
two & three level atoms; artificial atoms;
quantum information
Laser cooling; quantum gases

Recommended Literature:
R. Loudon; The quantum theory of light (Oxford University Press 2000)
G. J. Milburn, D. F. Walls; Quantum Optics (Springer 1994)
D. Meschede; Optik, Licht und Laser (Teubner, Wiesbaden 2nd edition. 2005)
M. O. Scully, M. S. Zubairy; Quantum Optics (Cambridge 1997)
P. Meystre, M. Sargent; Elements of Quantum Optics (Springer 1999)
U. Leonhardt; Measuring the quantum state of light (Cambridge University Press,Cambridge 1997)
W. Vogel, D.-G. Welsch; Quantum Optics (Wiley VCH, 3rd edition 2006)