

Module: Specialization II

Module No.: physics630

Course: **Quantum Optics**

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

Requirements:**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)