



Announcement

Theoretical Quantum Optics

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Description

Quantum optics provides a powerful tool to test the counterintuitive predictions of quantum mechanics. This course aims to introduce and provide the basic concepts and theoretical tools of quantum optics. We will discuss how the quantum nature of light and its interaction with matter are described theoretically. After that, we will study how these theoretical concepts are related to experimental achievements in the field of quantum optics.

Instruction language

English

Teaching methods

Lecture (3 hours per week) and Exercise (2 hours per week)

Content

- Field quantization
- Coherent and squeezed states of the radiation field
- Quasi-probability distribution theory
- Quantum coherence functions and interferometry
- Atom-field interaction – semi-classical and quantum theories
- Quantum noise and dissipation
- Optical test of quantum mechanics and experiments in cavity QED

Literature

- C. C. Gerry and P. L. Knight, *Introductory Quantum Optics* (Cambridge University Press, Cambridge, 2005)
- M. O. Scully and M. S. Zubairy, *Quantum Optics* (Cambridge University Press, Cambridge, 1997)
- R. Loudon, *The Quantum Theory of Light* (Oxford University Press, New York, 2000)
- J. C. Garrison and R. Y. Chiao, *Quantum Optics* (Oxford University Press, New York, 2008)

Additional information

Problem sheets will be uploaded to Moodle every week. Student's solutions will be evaluated and exercises will be solved during tutorials (2 hours per week). The final grade will be determined by written or oral examination.

Lecturer

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