Lecture on **Laser Physics** by M. Eichhorn*

**WS 17/18**

**Lecture:** Thursday 09:45-11:15 IPQ Seminar room, Bldg.: 30.10

*(Start 26.10. with 2 lectures: 09:45-11:15 + 11:30-13:00)*

**Tutorial:** Thursday 11:30-13:00 IPQ Seminar room, Bldg.: 30.10

1.) Quantum mechanical fundamentals of lasers
   → Einstein relations and optical transitions

2.) The laser principle
   → Population inversion, rate equations and relaxation oscillations

3.) Optical resonators
   → Linear resonators, modes and line width
Lecture on **Laser Physics** by M. Eichhorn (cont’d)

4.) Generation of short and ultra-short pulses
   → Q-switching and Mode-locking

5.) Laser examples and their applications
   → HeNe, Nd³⁺, Tm³⁺, Ti:Sa, Fiber and Disc lasers
Special Dates

• Change in dates
  
  • **November 9, 2017** next lecture and tutorial
  • **November 16 + 23, 2017:** no lecture or tutorial
  • …

• Important dates or changes can also be found on the IPQ lecture homepage, e.g. some slots between two tutorials will be used for additional lectures
Tutorial

• Will take place every two weeks (in average) on Thursday 11:30-13:00 IPQ Seminar room

• Start: November 9, 2017

• Problems:
  • Sheets are handed out at the end of the lecture and are to be solved for the day of the next tutorial.
  
  • The sheets may be collected at the beginning of a tutorial without prior announcement.
  
  • Collected sheets are evaluated.
Final exam

• An oral exam is scheduled at the end of this semester.

• Preliminary date: February 22 or March 1, 2018 (depending on the number of candidates)

• Exams are also possible during summer term

• Thematic range: Content of the lecture (scriptum) and the tutorial
Scriptum

• A scriptum is available online on the lecture IPQ-page

• The scriptum contains all chapters in crypted PDF format

• Password: given by the lecturer

The scriptum is only intended to be used by the students attending this lecture for the scope of this lecture and the exam. It may not be transferred or copied to any third party!
Books

• English:

  • M. Eichhorn
    *Laser physics*
    (Springer)
    = Scriptum in English

  • A. E. Siegman,
    *Lasers*
    (University Science Books)

  • B. E. A. Saleh, M. C. Teich,
    *Fundamentals of Photonics*
    (Wiley-Interscience)

• German

  • M. Eichhorn
    *Laserphysik*
    (Springer)
    = Scriptum in German

  • F. K. Kneubühl, M. W. Sigrist,
    *Laser*
    (Teubner)