Topics for 15 min talks (12 min presentation, 3 min discussion)

1. **Phonons in alloys and superlattices**
   What phenomena do occur, and how do corresponding optical measurements look like?
   Literature: C. Klingshirn, Semiconductor Optics, 2nd edition:
   Sect. "Phonons in alloys" (11.1.6) and "Phonons in Superlattices" (11.2.1, 11.2.2)

2. **Cavity Polaritons**
   What are they, dispersion relation, how do spectra look like?
   Literature: C. Klingshirn, Semiconductor Optics, 2nd edition:
   Sect. 17.1 "Cavity Polaritons"

3. **Photoluminescence**
   Experimental setup, physical principle, requirements on material: such as quality of semiconductors, defects etc.
   Literature: M.A. Herman, H. Sitter, Molecular Beam Epitaxy, Springer Series in Materials Science 7 (1989)
   Sect. 5.4 Photoluminescence, in particular 5.4.1: Photoluminescence in Binary Compounds
   (If you cannot find the literature in the library, contact Dr. Michael Hetterich)

4. **Plasmonic nanoscale scattering to enhance performance of photovoltaic and photodetector devices**
   Surface plasmon resonances, absorption in semiconductors
   Starting point for literature (available on D. Schaadt's webpage):
   E. T. Yu, D. Derkacs, S. H. Lim, P. Matheu, and D. M. Schaadt, "Plasmonic nanoparticle scattering for enhanced performance of photovoltaic and photodetector devices, " *Proc. SPIE* **7033**, 70331V (2008)
   U. Geyer, J. Hetterich, C. Diez, D. Z. Hu, D. M. Schaadt, and U. Lemmer, "Nano structured metallic electrodes for plasmonic optimized light-emitting diodes, " *Proc. SPIE* **7032**, 70320B (2008)
   D. M. Schaadt, B. Feng, and E. T. Yu, "Enhanced semiconductor optical absorption via surface plasmon excitation in metal nanoparticles," *Appl. Phys. Lett.* **86**, 063106 (2005)

5. **Birefringence in distributed Bragg mirrors**
   Birefringence, suitable materials, applications in optical devices
   Starting point for literature (available on D. Schaadt's webpage):
   D. M. Schaadt, O. Brandt, S. Ghosh, T. Flissikowski, U. Jahn, and H. T. Grahn, "Polarization-dependent beam switch based on an M-plane GaN/AlN distributed Bragg reflector," *Appl. Phys. Lett.* **90**, 231117 (2007)

6. **Light-emitting diodes (LEDs)**
   Working principle, different materials used, different types of LEDs and their technical design, outcoupling of light, white LEDs

7. **Edge-Emitting Laser Diodes**
   Working principle, stimulated emission, realization of optical resonator in edge-emitting lasers, separate-confinement heterostructures, emission profile (spatial, spectral) of edge-emitting laser diodes, examples for applications

8. **VCSEL (Vertical-Cavity Surface-Emitting Lasers)**
   Working principle and structure, realization of optical resonator, Bragg mirrors, advantages and disadvantages compared to edge-emitters (output power, beam profile, single mode operation etc.), materials used, examples of applications

9. **Quantum dots on prestructured substrates**
   Growth techniques used, self-organized growth of quantum dots using Stranski-Krastanow growth mode (role of strain etc.), positioning of quantum dots by prestructuring of substrates, potential applications

10. **Nitride-based quantum dots**
    Growth techniques used, Stranski-Krastanow growth mode, why nitrides? (potential applications), influence of substrate orientation (growth on polar and non-polar surfaces)

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Light-emitting diodes (LEDs)	
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