Module title | Semiconductor Lasers and Photonics | Abbreviation | 11-HLF-152-m01
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Module coordinator | Managing Director of the Institute of Applied Physics | Module offered by | Faculty of Physics and Astronomy
ECTS | 6 | Method of grading | Only after succ. compl. of module(s)
Duration | 1 semester | Module level | graduate
Other prerequisites | -- | --
Contents
This lecture discusses the principles of laser physics, based on the example of semiconductor lasers, and current developments regarding components. The principles of lasers are described on the basis of a general laser model, which will then be extended to special aspects of semiconductor lasers. Basic concepts such as threshold condition, characteristic curve and laser efficiency are derived from coupled rate equations for charge carriers and photons. Other topics of the lecture are optical processes in semiconductors, layer and ridge waveguides, laser resonators, mode selection, dynamic properties as well as technology for the generation of semiconductor lasers. The lecture closes with current topics of laser research such as quantum dot lasers, quantum cascade lasers, terahertz lasers or high-performance lasers.

Intended learning outcomes
The students have advanced knowledge of the principles of semiconductor-laser physics. They can apply their knowledge to modern questions and know the applications in the current development of components.

Courses
V (3) + R (1)
Module taught in: German or English

Method of assessment
written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or presentation/talk (approx. 30 minutes).
If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.
Assessment offered: Once a year, summer semester
Language of assessment: German and/or English

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Bachelor’ degree (1 major) Physics (2015)
Bachelor’ degree (1 major) Nanostructure Technology (2015)
Master’s degree (1 major) Functional Materials (2016)