TECHNISCHE UNIVERSITÄT CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Mittwoch, 27.11.2019, um 11:15 Uhr

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude,
Raum 2/N013

Dr. Thomas Koprucki

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Multi-Dimensional Modeling and Simulation of Semiconductor Devices

Multi-dimensional modeling and simulation is an important tool in the development of semiconductor devices. Simulations can guide important technological decisions by revealing performance bottlenecks in novel device concepts, contribute to their understanding and help to theoretically explore their optimization potential. The efficient implementation of multi-dimensional numerical simulations for computer-aided design tasks requires sophisticated numerical methods and modeling techniques.

We give in introduction into the fundamental semiconductor device equations, which describe the semi-classical transport of free electrons and holes in a self-consistent electric field using a drift-diffusion approximation. They are the standard model to describe the current flow in semiconductor devices at macroscopic scale. Typical devices modeled by these equations range from diodes and transistors to LEDs, solar cells and lasers and organic semiconductors.

We demonstrate the potential of advanced opto-electronic device simulation by modeling of edge-emitting lasers based on strained germanium microstrips, which combines the electronic structure of semiconductor materials, the carrier transport dynamics in complex device geometries with the interaction of light in the optically active region.

Furthermore, we present recent advances in device-scale modeling of quantum dot based single-photon sources by self-consistently coupling the semi-classical carrier transport models to fully quantum mechanical descriptions for the quantum dot from semiconductor quantum optics.

Alle Zuhörer sind ab 11:00 zu Kaffee und Tee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Prof. Dr. Angela Thränhardt, Tel. 0371 531 37636

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