



Habilitandenkolloquium

Dienstag, 07. Juni 2016, 15:15 Uhr

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“Physics and Challenges of Quantum Cascade Lasers“

Quantum Cascade Lasers (QCLs), based on the transitions between spatially quantized conduction-band states in semiconductor heterostructures, represent an ideal laser source for the mid-infrared through the THz spectral range. Theoretically predicted already in 1971, they were first demonstrated in 1994. The QCL requires a stack of typically over 1000 separate layers with thicknesses of 1 to 20 nm and a required accuracy of less than one atomic monolayer.

This talk describes the challenges and successes of our work on this fascinating device. Major milestones resulting from our work are: record in short-wavelength (mid-infrared) QCL emission, high-temperature operation of the short-wavelength QCL, experimental discovery of the dominant scattering mechanisms in QCLs, low-threshold QCL design approach, and continuous-wave operation.

In this talk I will summarize the various aspects of physics required for the design and understanding of these lasers, and discuss the main challenges of the field: efficiency, heat removal, and brilliance

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