Halbleiter-Nanophotonik

SFB 787

Einladung

Es spricht: **Michał Wasiak**
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Zeit: **Donnerstag, 23. Juni 2016, 15:00 Uhr**

Ort: **Technische Universität Berlin**
Institut für Festkörperphysik
Hardenbergstraße 36, 10623 Berlin
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Thema: **„Modeling the Electrical and Optical Phenomena Influencing the High-Frequency Modulation of Vertical-Cavity Surface-Emitting Lasers"**

Abstract:

Gallium arsenide based vertical-cavity surface-emitting lasers (VCSELs) generating radiation in the near-infrared region are widely used in optical data transfer systems at short distances. In such applications, these lasers are biased with voltages modulated with frequencies of tens of gigahertz. Because of parasitic capacitances within the device, the current flowing through the device is delayed and the current's amplitude decreases with the modulation frequency. Another source of the distortion of the signal is the interactions between the carriers and photons in the cavity. Furthermore, the high quality factors of the optical cavities in VCSELs make the cavity photon lifetimes long, on the order of picoseconds. Due to these phenomena the optical signal generated by the VCSEL may be significantly distorted compared to the voltage input signal.

In this talk we present our model of parasitics in VCSELs that is able to predict a given VCSEL's complex impedance as a function of frequency *Z(f)*. We compare the results of our small-signal modulation simulations with the measured *Z(f)* characteristics we obtained in our small-signal modulation response experiments. A good agreement between the theoretical and the experimental results has been observed. An attempt to simulate high-bit-rate eye diagrams is presented and sources of the signal distortion are discussed.

Gäste sind herzlich willkommen!
Prof. Dr. J. Lott