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Universität Zürich, Irchel Campus
Réunion annuelle commune à Zürich
26 - 30 août 2019

Programmübersicht
Aperçu du programme

In Zusammenarbeit mit - en collaboration avec
12:30 136  Thermoelectrically cooled THz quantum cascade laser operating up to 210 K

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THz radiation is subject to a wide range of research and technological efforts, but it is limited by a lack of compact and powerful THz sources. A promising candidate is the quantum cascade laser (QCL), although it currently requires cryogenics since they only operate below 200 K. We present the first THz QCL operating on a thermoelectric cooler, up to a record-high temperature of 210 K. The design achieves high-temperature operation thanks to a systematic optimization by means of a nonequilibrium Green's function model, which also reliably reproduces the experimental results. Thanks to the relatively high peak power measured at 206 K (~1 mW), the laser spectra were acquired with a commercial room-temperature detector, making the whole setup cryogenic free.

12:45 137  Ring interband Cascade Lasers Running in Continuous Mode Operation

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We present the first interband cascade lasers fabricated into ring-shaped cavities emitting in continuous wave operation. A second order distributed feedback grating is used for single mode emission and light outputting in vertical direction through the GaSb substrate. In addition, the implementation of an epitaxial-side down mounting scheme facilitates improved heat transport from the active region. The devices with a waveguide width of ~5 µm and an outer diameter of 800 µm show light emission at a wavelength of ~4.38 µm. These newly developed devices are employed in a project for trace gas analysis via the principle of photothermal interferometry.

13:00 138  Optoelectronic devices based on non-polar ZnO/ZnMgO quantum wells

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The performance of state-of-the-art GaAs-based THz-QCLs is limited by parasitic LO phonon transitions, preventing above-200 K operation. This can be overcome by using material systems with higher LO-phonon energies like ZnO, for which above-room-temperature operation in THz-QCLs is predicted. Using novel optoelectronic materials like wurtzite Zn(Mg)O with no internal fields in the m-plane [10-10] orientation, simplifies the design of any QC structure. After the recent demonstration of intersubband absorption in such m-plane ZnMgO structures, we present the first mid-IR Zn(Mg)O-based QCL with peak responsivity of 0.15 mA/W (77 K) at 3 µm wavelength. The responsivity persists up to 300 K.

In addition, we show first photoluminescence measurements from m-plane Zn(Mg)O THz-QCL structures, emitting at ~4.8 THz at liquid-nitrogen temperatures.

13:15 139  n-type Ge/SiGe Quantum Cascade Devices for THz Electroeluminescence

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Exploiting intersubband transitions in Ge/SiGe quantum cascade devices provides a way to integrate terahertz light emitters into silicon-based technology. To date all electroeluminescence demonstrations of Si-based heterostructures have been p-type using hole-hole transitions. In the