

## FKE-Seminar

**Prof. Michael Feiginov**

*TU Wien*

*Institute of Electrodynamics, Microwave and Circuit Engineering*

# THz resonant-tunnelling diodes

**Dienstag, 21. Februar 2017, 14:00 s.t.**

Seminarraum E 362, Floragasse 7, 1. Stock, 1040 Wien

Abstract: Resonant-tunnelling diodes (RTDs) are among the most basic quantum devices. The operating frequencies of RTDs were assumed to be fundamentally limited by the resonant-state lifetime. We have shown both theoretically and experimentally that one can overcome the limitation in special RTDs with a heavily doped collector. Exploiting such RTDs we have achieved the operating frequency of  $\sim 1.1$  THz and later on  $\sim 1.5$  THz and show that substantially higher frequencies should be achievable with RTD oscillators. RTD oscillators have the highest fundamental operating frequency for the active electronic semiconductor devices nowadays. Our THz RTD oscillators are extremely compact: their size is just a fraction of a square millimetre. Additionally, the oscillators are relatively simple, they work at room temperature and only a simple voltage source is required for their operation. The combination of such properties in one device is unique for existing THz source. Such THz sources should enable plenty of real-world THz applications. Further on, a concept of a microstrip RTD oscillator will be presented, which is similar to a quantum cascade laser (QCL) with a metal-metal waveguide and a single QCL period (an RTD) as the active core.

Host: G. Strasser