



*Im Rahmen des Physikkolloquiums spricht*

**Prof. Dr. Artur Zrenner**

*Universität Paderborn und Center for Optoelectronics and  
Photonics Paderborn (CeOPP)*

*über*

## **Coherent optoelectronics: Quantum dot two-level systems and micro-cavities**

### **Abstract:**

In optical experiments on single quantum dot photodiodes the exciton ground state transition appears as a two-level system with a lifetime limited line width of a few  $\mu\text{eV}$ . For the case of pulsed laser fields and in the absence of decoherence, the ground state exciton represents a quantum bit (qubit), which can be also tuned by electric fields. Excitations with ps laser pulses result in qubit rotations. Using fast electric signals, which are phase-locked to ps-laser pulses, the coherent control of an exciton qubit can be obtained by electric switching. Most recent electronics designs for coherent control are based on an ultrafast SiGe hetero-bipolar technology.

A second topic to be presented in this context is the physics of coherently excited micro-cavities. On the basis of photonic crystal cavities with electric read-out it became possible to probe optical ps excitations in a phase sensitive way. Phase based frequency discrimination and the coherent control of cavity excitations are demonstrated along those lines. The presented functionalities are available for room temperature operation.

**Datum: Do, 17.11.2016**

**Zeit: 17:15 Uhr**

**Ort: HS 8**