



**Sonderforschungsbereich 631**

Festkörperbasierte Quanteninformationsverarbeitung



# **SONDERSEMINAR**

**Donnerstag, 24. Juni 2010**

**13:00 Uhr**

**WSI, Foyer**

## **„Role of exciton dephasing and background photons in a QD-nanocavity system”**

Recently, the intriguing phenomenon of pronounced cavity mode emission even for large energy detuning between a single quantum-dot (QD) and a cavity mode has been reported by both experiments and theory. Moreover, there have been several reports on vanishing of vacuum Rabi splitting with increase of optical excitation power. These effects are unusual in that they are not expected from the usual theoretical models of simple cavity-quantum electrodynamics (cQED), which has been constructed based on coupling between an atom and a cavity. However, the environment that surrounds electronic two-level system in the solid-state nanocavity is definitely different from that of the atomic cavity: crystal field or vacuum. This leads to the increase of exciton dephasing rate and the generation of background photons. In this talk, I will discuss the role of these to the unexpected features in QD-nanocavity system, such as off-resonant cavity mode emission and vanishing of vacuum Rabi splitting. Furthermore, I will show an unusual cQED spectral signature in temperature-scanning PL as the effect of larger dephasing rate: cQED assisted attraction between a weakly-coupled cavity and exciton mode.

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