



Sonderforschungsbereich 631
Festkörperbasierte Quanteninformationsverarbeitung



im Juni 2006

SEMINARANKÜNDIGUNG

Dienstag, 27. Juni 2006

14.30 Uhr

WSI, Seminarraum S 101

„ cQED-Experiments with single quantum dots in high quality micropillar cavities “

In this talk I will present recent experiments on light-matter interaction of single quantum dot excitons in high quality micropillar cavities. In particular, spectroscopic studies of the weak and strong interaction regimes between single quantum dot excitons and electric fields given by single photons will be discussed. The cavities are based on undoped GaAs/AlAs VCSEL structures with embedded InGaAs quantum dots from which micropillars with diameters between 1.0 μm and 4 μm are realized by reactive etching. The cavity photon lifetimes range from about 2 to close to 20 ps. In the weak coupling regime we observe e.g. an enhancement of the exciton and biexciton emission probability due to the Purcell effect. By using dots with large dipole moment we observe clear anticrossing effects due to strong interaction characterized by a vacuum Rabi splitting of up to 140 μeV . Tuning two quantum dot excitons into resonance with the optical mode allows us to realize a coherent photonic coupling of these quantum dots mediated by the strong light field in the cavity with a line splitting of 250 μeV on resonance. In addition, I will present low threshold lasing in micropillar cavities with a low number of quantum dots contributing to lasing.

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