



Sonderforschungsbereich 631
Festkörperbasierte Quanteninformationsverarbeitung



SEMINARANKÜNDIGUNG

Dienstag, 03. Februar 2009

17:15 Uhr

WSI, Seminarraum S 101

“Selective excitation of single spins in a nanowire quantum dot”

The unprecedented material and design freedom makes semiconducting nanowires very attractive for novel opto-electronics. Quantum dots incorporated in nanowires enable experiments on both quantum optics and electron transport. This system has the potential to form a quantum interface between these separate fields of research. A crucial element for such interface is control over the spin of an exciton by means of photon polarization.

Optical spectra, however, have so far been hampered by broad linewidths, insufficient for identifying quantum states. We demonstrate clean $\text{InAs}_{0.25}\text{P}_{0.75}$ quantum dots embedded in InP nanowires with excellent optical quality. Narrow linewidths enable us to selectively excite and detect single exciton spins. We control spin excitation by the polarization or the energy of the excitation light. The dots exhibit exciton-spin memory demonstrating that nanowires are a viable alternative to the system of self-assembled dots with new design options to interface single photon with single electron devices.

Furthermore, we succeeded in fabricating electrical contacts on vertically aligned nanowire quantum dots. Such devices enable us to investigate electric field dependence, and eventually to prepare a particular charge state. Preliminary results will be shown.

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