Sonderforschungsbereich 631

Festkörperbasierte Quanteninformationsverarbeitung

TECHNISCHE UNIVERSITÄT MÜNCHEN

SONDERSEMINAR

Freitag, 16. Januar 2009

13:00 Uhr

WSI, Seminarraum S 101

"Indistinguishable photons from the resonance fluorescence of a single quantum dot in a microcavity"

Fourier transform-limited single photon sources are among the enabling technologies for many applications in quantum information science such as linear optics quantum computation. We present experimental investigations on the resonance fluorescence emission from a single quantum dot inside a pillar microcavity under continuous-wave resonant laser excitation. The evolution from a single emission line to the characteristic Mollow triplet is observed for increasing pump power and close to ideal single photons have been generated. The coherence time of the photons is almost given by the ideal value of two times the radiative lifetime of the corresponding excitonic transition demonstrating the absence of any pure dephasing processes. Second-order correlation measurements prove the single photon nature of the nearly background free emission showing the successful isolation of the photons of interest from the laser driving field. The indistinguishability of the photons has been measured by two-photon interference measurements which revealed high visibilities of 0.9 demonstrating the high potential of the quantum dot pillar microcavity as a source for quantum optics experiments and in quantum information science.

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