Oral

Microcavity-mediated coupling of two distant semiconductor quantum dots

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Long distance (1,4 μm) interaction of two InAs/GaAs quantum dots (QD) in a photonic crystal microcavity is observed. Individual and simultaneous coupling of the QDs to the cavity mode is probed by Purcell effect as well as by changes in emission intensity and polarization upon detuning Δ. For one of the QDs the polarization angle Φ continuously rotates from perpendicular to parallel to the cavity mode upon changing its detuning. It follows the empirical law Φ = atan (Δ/b), reversing sign for negative detuning. Inter-QD coupling is demonstrated by resonant optical excitation in the p-states of any of the quantum dots, which results in an increase of the s-state emission of both quantum dots and the cavity mode. The cavity-mediated coupling can be controlled by varying the excitation intensity. These results represent an experimental step towards the realization of quantum logic operations using distant solid state qubits.