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Tomography of a high-fidelity spin-photon entangled state[1] PETER MCMAHON, KRISTIAAN DE GREVE, LEO YU, JASON PELC, CHANDRA NATARAJAN, NA YOUNG KIM, EISUKE ABE, Stanford University, SEBASTIAN MAIER, CHRISTIAN SCHNEIDER, MARTIN KAMP, SVEN HOEFLING, Universitaet Wuerzburg, ROBERT HADFIELD, Heriot-Watt University, ALFRED FORCHEL, Universitaet Wuerzburg, M.M. FEJER, YOSHIHISA YAMAMOTO, Stanford University — The generation of entanglement between a quantum memory and a flying qubit is an important step towards building a quantum repeater node. Entanglement between a photon and a matter qubit has been demonstrated in several systems, including neutral atoms, trapped ions, NV centers and quantum dots. Quantum dots have a natural advantage that their radiative lifetimes are short, and therefore the rate of entanglement generation can be much faster than in other systems. We have recently demonstrated entanglement between an electron spin in a quantum dot, and the polarization of an emitted photon. In addition, the photon is converted to the low-loss 1550 nm band, which is important for implementing long-distance quantum communication systems. In this talk, I will present the reconstruction of the full density matrix of the entangled spin-photon state that we produce. We calculate the fidelity of the state from the density matrix, and conclude that it is $> 90\%$.

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