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Spin-photon quantum interface in quantum dots

W. Gao[1], P. Fallahi[1], E. Togan[1], A. Deteil[1] and A. Imamoglu[1]

[1]*Institute of Quantum Electronics, ETH zurich, HPT G12, 8093 Zurich, Switzerland*

e-mail: *imamoglu@phys.ethz.ch*

Realization of a quantum interface between flying photonic qubits and stationary spin qubits is expected to play a key role, both in quantum repeaters and realization of quantum networks. Thanks to their superior optical properties and the possibility of integration in photonic nanostructures, semiconductor quantum dots confining a single spin are particularly well suited for this purpose. In this talk, I will describe the observation of spin-photon entanglement [1]. I will also describe our ongoing experiments aimed at transferring quantum information from a propagating photonic qubit onto a single solid-state spin qubit.

References

[1] W. B. Gao, P. Fallahi, E. Togan, J. Miguel-Sanchez & A. Imamoglu, *Nature* **491**, 426–430 (2012)