Oral presentation is also OK. Thanks!

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Single-Photon Switching and Entanglement of Solid- State Qubits in an Integrated Nanophotonic System RUFFIN EVANS, ALP SIPAHIGIL, DENIS SUKACHEV, Harvard University Department of Physics, MICHAEL BUREK, Harvard University Paulson School of Engineering, JOHANNES BORREGAARD, MIHIR BHASKAR, CHRISTIAN NGUYEN, Harvard University Department of Physics, JOSE PACHECO, EDWARD BIELEJEC, Sandia National Laboratories, MARKO LONCAR, Harvard University Paulson School of Engineering, MIKHAIL LUKIN, Harvard University Department of Physics — Efficient interfaces between photons and quantum emitters form the basis for quantum networks and enable optical nonlinearities at the single-photon level. We demonstrate a platform for scalable quantum nanophotonics based on silicon-vacancy (SiV) color centers coupled to diamond nanodevices. By placing SiV centers inside diamond photonic crystal cavities, we realize a quantum-optical switch controlled by a single color center. We control the switch using SiV metastable states and observe switching at the single-photon level. Raman transitions are used to realize a single-photon source with a tunable frequency and bandwidth in a diamond waveguide. By measuring intensity correlations of indistinguishable Raman photons emitted into a single waveguide, we observe quantum interference resulting from the superradiant emission of two entangled SiV centers. We also discuss current work to extend the coherence time of the SiV spin degree of freedom, engineer deterministic multi-emitter interactions via the cavity mode, and related work with the Germanium-Vacancy center.

Ruffin Evans
Harvard University Department of Physics

Date submitted: 29 Jan 2017 Electronic form version 1.4