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An integrated diamond nanophotonics platform for quantum optical networks[1] MIHIR BHASKAR, ALP SIPAHIGIL, RUFFIN EVANS, DENIS SUKACHEV, CHRISTIAN NGUYEN, MICHAEL BUREK, BARTHOLOMEUS MACHIELSE, JOHANNES BORREGAARD, HAIG ATIKIAN, CHARLES MEUWLY, Harvard Univ, LACHLAN ROGERS, PETR SIYUSHEV, MATHIAS METSCH, Ulm Univ, JOSE PACHECO, RYAN CAMACHO, EDWARD BIELEJEC, Sandia Natl Lab, FEDOR JELEZKO, Ulm Univ, HONGKUN PARK, MARKO LONCAR, MIKHAIL LUKIN, Harvard Univ — We demonstrate a platform for quantum optical networks based on silicon-vacancy (SiV) and germanium-vacancy (GeV) color centers in diamond nanodevices. By placing SiV centers inside diamond photonic crystal cavities, we realize a quantum optical switch controlled by a single SiV. Raman transitions are used to realize a single-photon source with a tunable frequency and bandwidth in a diamond waveguide. We measure intensity correlations of indistinguishable Raman photons emitted into a single waveguide, observing a quantum interference effect resulting from the superradiant emission of two entangled SiV centers. We incorporate GeV centers into nanoscale waveguides and demonstrate high single atom-photon interaction probabilities in a single-pass. We discuss prospects for a high-cooperativity (C >10) spin-photon interface using GeV centers in diamond nanocavities.

[1]NSF, CUA, AFOSR MURI, ONR MURI, ARL

Mihir Bhaskar
Harvard Univ

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