MAR17-2016-020061

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

On-demand generation of entangled multiphoton states from a confined spin in a semiconductor quantum dot

EMMA SCHMIDGALL, University of Washington

Photonic cluster states are a resource for measurement-based quantum computation, where calculations are performed by single photon measurements. We use a spin confined in a semiconductor quantum dot to deterministically generate long strings of polarization entangled photons in a cluster state by periodic timed excitation of this precessing matter qubit. In each period, an entangled photon is added to the cluster state formed by the matter qubit and the previously emitted photons. In our prototype device, the qubit is the confined dark exciton, and it produces strings of hundreds of photons in which the entanglement persists over five sequential photons. The measured process map characterizing the device has a fidelity of 0.81 with that of an ideal device. Further feasible improvements of this device may reduce the resources needed for optical quantum information processing.