The quantum knitting machine: a quantum dot as device for deterministic production of cluster states of many entangled photons.

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Photonic cluster states are a resource for quantum computation based solely on single-photon measurements [1]. We use semiconductor quantum dots to deterministically generate long strings of polarization-entangled photons in a cluster state by periodic timed excitation of a precessing matter qubit [1-2]. 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 [3]

[1] H. J. Briegel, Science **354**, 416 (2016)]
[2] N. H. **Lindner** and T. **Rudolph**, Phys. Rev. Lett. **103**, 113602 (**2009**)
[3] I. Schwartz, et al, Science **354**, 434, (2016).