

Heralded Storage of a Photonic Quantum Bit in a Single Atom

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<http://dx.doi.org/10.1103/PhysRevLett.114.220501> [2]

Combining techniques of cavity quantum electrodynamics, quantum measurement, and quantum feedback, we have realized the heralded transfer of a polarization qubit from a photon onto a single atom with 39% efficiency and 86% fidelity. The reverse process, namely, qubit transfer from the atom onto a given photon, is demonstrated with 88% fidelity and an estimated efficiency of up to 69%. In contrast to previous work based on two-photon interference, our scheme is robust against photon arrival-time jitter and achieves much higher efficiencies. Thus, it constitutes a key step toward the implementation of a long-distance quantum network.

- [01.10.+i Encoding, processing and transmission of information via physical systems](#) [3]
- [32.20.+m Quantum memories/storage of qubits](#) [4]
- [33.10.+a Cavity QED \(atoms or ions\)](#) [5]
- [QIPC](#) [6]
- [SIQS](#) [7]
- [15.10.Ne Neutral atoms: electronic states](#) [8]
- [15.10.Ph Photons](#) [9]
- [15.20.-e Quantum Optics: Experimental system](#) [10]
- [15.20.Ca Cavity QED](#) [11]

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