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**Entanglement of remote atomic qubits** DZMITRY MATSUKEVICH, Georgia Institute of Technology, THIERRY CHANELLIERE, STEWART JENKINS, SHAU-YU LAN, BRIAN KENNEDY, ALEX KUZMICH — We report observations of entanglement of two remote atomic qubits, achieved by generating an entangled state of an atomic qubit and a single photon at Site A, transmitting the photon to Site B in an adjacent laboratory through an optical fiber, and converting the photon into an atomic qubit. Entanglement of the two remote atomic qubits, each qubit consisting of two independent spin wave excitations, is inferred by performing, locally, quantum state transfer of each of the atomic qubits onto a photonic qubit and subsequent measurement of polarization correlations in violation of the Bell inequality  $|S| < 2$ . We experimentally determine  $S = 2.16 \pm 0.03$ .

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