A multiplexed quantum memory with 49 memory cells entangled with a telecom photon after 10-km-long transmission in fiber. WEI CHANG, CHANG LI, NAN JIANG, XIUYING CHANG, LUMING DUAN, Tsinghua University — In a fiber-based long-distance quantum network, a multiplexed quantum memory with many memory cells is required to enhance the capacity of storage. Telecom-wavelength transmission is also needed to minimize the exponential transmission loss in fiber. Here we report an experimental realization of a multiplexed quantum memory with 49 individually accessible memory cells entangled with a telecom photon after 10-km-long transmission in fiber. A telecom photon (1530nm) entangled with a single photon (780nm) in polarization is transmitted in a 10-km-long single-mode fiber with high transmission fidelity for the entanglement. Then the single photon (780nm) is stored into the memory cell of the multiplexed quantum memory as an atomic spin-wave and the entanglement is established between the memory cell and the telecom photon after long-distance transmission. We demonstrate the high storage fidelity and the quantum property of the memory cells. This work constitutes an important step for its application in quantum information technology.

Wei Chang
Tsinghua University

Date submitted: 06 Feb 2019

Electronic form version 1.4