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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.

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