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Light shift compensated quantum memories YAROSLAV O. DUDIN, RAN ZHAO, STEWART D. JENKINS, BRIAN KENNEDY, ALEX KUZMICH, Georgia Institute of Technology — Quantum telecommunication could provide secure long-distance data transfer. Direct transmission losses in optical fiber scale exponentially with distance. The quantum repeater protocol allows one to reach polynomial scaling of the communication rate with distance. The quantum repeater relies on long-lived quantum memory elements. Here we report on our recent progress in extending the lifetime of quantum memory based on an ensemble of cold rubidium atoms confined in an optical lattice. Previously observed coherence times ($\sim$ 7 ms) were limited by ac Stark broadening of the ground state hyperfine transition. Two different light shift compensation schemes based on two photon transitions and magnetically-dressed optical potentials are reported. We reach $\sim$1/3 second lifetimes for stored classical light pulses and similar values for single quanta.

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