Abstract Submitted
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Slow light in a pure nuclear spin system[1] MEI-JU LU, JONATHAN WEINSTEIN, University of Nevada, Reno — Atomic ensembles have found use in a variety of important experiments in quantum information: quantum memory, quantum repeaters, and deterministic single photon generation. In these experiments, quantum information is transferred between photons and atomic hyperfine states. Unfortunately, the hyperfine states involve electron spin, and electronic angular momentum is highly susceptible to decoherence from inelastic collisions and inhomogeneous magnetic fields. On the other hand, it has been long known from NMR experiments that long coherence times can be obtained with pure nuclear spin states. By using standard electromagnetically-induced-transparency techniques with atoms with a J=0 ground state and non-zero nuclear spin, we have obtained strong coupling between photons and pure nuclear spin states. We use laser ablation and helium buffer-gas cooling to produce a sample of cryogenically-cooled ground-state atomic Yb-173 with optical density up to 80. We have obtained a narrow (< 100 Hz) and deep transparency window, showing good atom-field coherence, and have demonstrated slow light in this pure nuclear-spin system.

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