Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Rydberg blockade of atomic ensemble qubits[1] MINHO KWON, MATT EBERT, DAHAN KIM, THAD WALKER, MARK SAFFMAN, University of Wisconsin — We demonstrate |W>state encoding of multi-atom ensemble qubits. Using optically trapped Rb atoms the T2 coherence time is 2.6(3) ms for an average ensemble number of N = 7.6 atoms and scales approximately inversely with N. Strong Rydberg blockade between two ensemble qubits is demonstrated with a fidelity of 0.89(1) and a fidelity of ∼1.0 when postselected on control ensemble excitation. We will present progress towards entanglement of two ensemble qubits using the Rydberg blockade interaction.

[1]This work was funded by NSF grant PHY-1104531 and the AFOSR Quantum Memories MURI.

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Date submitted: 29 Jan 2015 Electronic form version 1.4