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Experimental realization of a strongly interacting quantum memory LIN LI, ALEX KUZMICH, Univ of Michigan - Ann Arbor — A quantum memory is a device which enables the storage and retrieval of quantum states of light. Ground atomic states interact only weakly with the environment and with each other, enabling memories with long storage times. However, for scalable generation and distillation of entanglement within distributed quantum information systems, it is desirable to controllably switch on and off interactions between the individual atoms. We realize a strongly interacting quantum memory by coupling the ground state of an ultra-cold atomic gas to a highly excited Rydberg state. The memory is subsequently retrieved into a propagating light field which is measured using the Hanbury Brown-Twiss photo-electric detection. The results reveal memory transformation from an initially prepared coherent state into the state of single excitation.

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