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Ultra-low background retrieval of photons stored in warm Rb vapor EDEN FIGUEROA, Stony Brook University and Max Planck Institute of Quantum Optics, ANDREAS NEUZNER, TOBIAS LATKA, JOSEF SCHUPP, CHRISTIAN NOELLEKE, ANDREAS REISERER, STEPHAN RITTER, GERHARD REMPE, Max Planck Insitute of Quantum Optics — The development of a simple and inexpensive platform for interconnecting light and matter at the quantum level has recently emerged as one of the key challenges of the rapidly evolving field of quantum engineering. Although elementary quantum memory capabilities have been already shown using ensembles of cold atoms or single-atoms in optical cavities, a scalable-friendly architecture might still require room temperature operation. Here we use an ensemble of Rb atoms in the gaseous state and store light pulses at the single-photon level to demonstrate that even in a common vapor cell it is possible to achieve quantum-level operation with ultra-low background noise. We have obtained a measured signal- to-background noise ratio of 3.5, which is the first time this figure of merit has been lifted beyond unity for experiments with room temperature operation. In addition, we also show the capabilities of the system to arbitrarily tailor the temporal properties of the retrieved single-photon-level pulses.

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