**Quantum storage and manipulation of heralded single photons in atomic memories based on electromagnetically induced transparency**

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Optical quantum memory is an important component in the long-distance quantum communication based on quantum repeater protocol. To outperform the direct transmission of light with quantum repeaters, it is crucial to develop quantum memories with a high fidelity, high efficiency, high bandwidth and long storage time. We demonstrate the storage and manipulation of heralded single photons generated from cavity-enhanced spontaneous parametric downconversion (SPDC) in the atomic memory based on electromagnetically induced transparency (EIT). We show that nonclassical correlations are preserved between the heralding and the retrieved photons after storage process. We further demonstrate that the waveform or bandwidth, and the nonclassical correlation of the heralded single photons can be manipulated. We have achieved a memory efficiency of 36% and 70% for cesium EIT system operated at D2 line and D1 line, respectively. Our results can be scaled up with ease and thus lay the foundation for future realization of large-scale applications in quantum information processing. We will also present our results towards a higher memory bandwidth.