# Efficient Quantum Memory for Photonic Polarization Qubits

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Quantum memory (QM) is a device that can convert and store the flying photonic qubits into stationary atomic system and then retrieve on demand. The ability of QMs to synchronize probabilistic events makes them a key component in scalable quantum technologies, such as quantum repeaters for long-distance quantum communication. We present our experimental work on the quantum memory for photonic polarization qubits using the protocol of electromagnetically induced transparency (EIT) in cold cesium atoms. The heralded single photons with a bandwidth of ~2 MHz are generated from cavity-enhanced spontaneous parametric down-conversion. We achieved a storage efficiency of > 70% and a qubit fidelity of > 96 %. I will also discuss the requirement and issue to push the EIT-based optical memory towards the broadband regime. Finally, I will also present our work on quantum frequency conversion of heralded single photons using the cavity-enhanced sum-frequency generation with a PPKTP nonlinear crystal.