**Toward Highly efficient microwave memory through quantum interference using a superconducting artificial atom**

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Microwave quantum memory is a key component for large-scale superconducting-circuit-based quantum networks. In our previous study, we developed a $Λ$-type superconducting artificial atom using a single qubit-resonator system with parametric modulation to achieve slow light and microwave storage based on electromagnetically induced transparency. However, storage efficiency is limited by incomplete pulse compression within the single-atom medium and bidirectional emission. To overcome these limitations, we theoretically propose a microwave storage approach using a chiral artificial atom, leveraging quantum interference effects similar to electromagnetically induced transparency. By optimizing the dynamical control of parametric modulation applied to the chiral atom, we achieve full compression of the microwave pulse and unidirectional emission, significantly enhancing storage efficiency. Our results demonstrate that the classical fidelity of the retrieved pulse remains near unity across a broad range of pulse widths, and by tuning the modulation phase, the emission direction can be precisely controlled. These findings provide a viable pathway toward highly efficient quantum information processing in superconducting circuits.