A superconducting quantum memory with tens of milliseconds coherence time

ABSTRACT

Storing quantum information for an extended period of time is essential for running quantum algorithms with low errors. Currently, superconducting quantum memories have coherence times of a few milliseconds, and surpassing this performance has remained an outstanding challenge.

In this work, we report a qubit encoded in a novel superconducting cavity with a coherence time of 34 ms, an improvement of over an order of magnitude compared to previous demonstrations. We use this long-lived quantum memory to store a Schrödinger cat state with a record size of 1024 photons, indicating the cavity's potential for bosonic quantum error correction.

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