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【569】 Optical spin-wave storage in a paramagnetic solid state crystal

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Solid-state electronic spins are promising candidates for various applications in quantum information science, such as quantum communication and computation. However, due to their strong magnetic dipoles they are quite susceptible to magnetic noise, which usually limits their coherence lifetimes. Here we demonstrate the storage of a 100 ns optical pulse in a $171\text{Yb}^{3+}:\text{Y}_2\text{SO}_5$ paramagnetic crystal for more than 1 millisecond. For this we utilize the microwave and optical clock transitions that are present in this material at zero magnetic field. The large hyperfine splittings make this system promising as a broadband quantum memory, and potentially couple for coupling of spin systems to superconducting qubits.

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