

Dephasing-tolerant quantum sensing for transverse magnetic fields with spin qudits

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We propose a protocol for quantum sensing of transverse magnetic fields which exploits spin qudits manipulated by longitudinal drives to obtain Rabi oscillations whose frequency is linear in the transverse field to be probed. Decoherence affecting the system is overcome by exploiting the qudit multi-level structure to embed fault-tolerant quantum-error correction within the sensing protocol, thus making it robust against the most important noise source. The resulting protocol enables the detection of tiny transverse magnetic fields with remarkable sensitivity, as we demonstrate by numerical simulations.

Title

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