

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

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We propose a dephasing-tolerant protocol for quantum sensing of transverse magnetic fields which exploits spin qudit sensors with embedded fault-tolerant quantum error correction. By exploiting longitudinal drives, the transverse field induces logical Rabi oscillations between encoded states, whose frequency is linear in the transverse field to be probed. Numerical simulations show that the present fault-tolerant protocol enables the detection of very small fields, orders of magnitudes below the limit imposed by the coherence time.

Primary author: LEPORI, Luca (Istituto Nazionale di Fisica Nucleare)

Presenter: LEPORI, Luca (Istituto Nazionale di Fisica Nucleare)

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