

Seminario di Dipartimento SMFI



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terrà un seminario dal titolo

Demonstrating experimentally the encoding and dynamics of a fault-tolerant logical qubit on a hyperfine-coupled nuclear spin qudit

Abstract:

The realization of effective quantum error correction protocols remains a central challenge in the development of scalable quantum computers. Employing high-dimensional quantum systems (qudits) can offer more hardware-efficient protocols than qubit-based approaches. Using electron-nuclear double resonance, we implement a logical qubit encoded on the four states of a $I = 3/2$ nuclear spin hyperfine-coupled to a $S = 1/2$ electron spin qubit; the encoding protects against the dominant decoherence mechanism in such systems, fluctuations of the quantizing magnetic field. We explore the dynamics of the encoded state both under a controlled application of the fluctuation and under natural decoherence processes. Our results confirm the potential of these proposals for practical, implementable, fault tolerant quantum memories.

giovedì 16/1/2025, ore 16:30, Aula A (plesso matematica)