

Abstract Submitted
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Rabi oscillations decay from interaction with dynamical spin environments¹ V.V. DOBROVITSKI, Ames Laboratory and Iowa State University, Ames, IA 50011, A.E. FEIGUIN, University of Maryland, College Park, MD 20742, and Microsoft Station Q, University of California, Santa Barbara, CA 93106 — Studying decoherence of spins/qubits interacting with a spin bath is important for quantum computation, high-precision metrology, coherent spintronics. Measurements of the Rabi oscillations decay provide much information about the decoherence dynamics and properties of the spin bath in single-spin quantum dots, dopant spins in a solid-state matrix, etc. [1] Also, for a static bath, application of a large Rabi field suppresses decoherence, changing fast exponential decay into slow power-law one. [1] However, internal dynamics of spin environment is important in such systems as NV centers in diamonds, magnetic molecules, and rare-earth dopant spins in solid state, but decay of Rabi oscillations for dynamical spin bath has been little studied. We present a detailed theoretical investigation of Rabi oscillations decay for a dynamic spin bath, demonstrating new unusual decay regimes useful for characterization of the bath and decoherence suppression.

[1] F. H. L. Koppens et al, Phys. Rev. Lett. 99, 106803 (2007); S. Bertaina et al, Nature Nano. 2, 39 (2007); V. V. Dobrovitski et al, quant-ph/0112053.

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V.V. Dobrovitski
Ames Laboratory

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