Rabi oscillations decay from interaction with dynamical spin environments\(^1\) 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.


\(^1\)Supported by DOE, NSF, AFOSR.