

Abstract Submitted
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Electron spin dephasing by hyperfine-mediated interactions in a nuclear spin bath¹ LUKASZ CYWINSKI, University of Maryland, College Park, WAYNE M. WITZEL, Naval Research Laboratory, Washington DC, SANKAR DAS SARMA, University of Maryland, College Park — We investigate pure dephasing decoherence (free induction decay and spin echo) of a quantum dot spin qubit interacting with a nuclear spin bath. While for infinite magnetic field B the only decoherence mechanism is spectral diffusion due to dipolar flip-flops of nuclear spins, with decreasing B the hyperfine-mediated interactions between the nuclear spins become important. We give a theory [1] of decoherence due to these interactions which takes advantage of their long range nature. For a thermal uncorrelated bath we show that our theory is applicable down to $B \sim 10$ mT, allowing for comparison with recent experiments on spin echo in GaAs quantum dots [2].

[1] L. Cywinski, W.M. Witzel, and S. Das Sarma, preprint arXiv:0809:0003 (2008).

[2] F.H.L. Koppens, K.C. Nowack, and L.M.K. Vandersypen, Phys. Rev. Lett. **100**, 236802 (2008).

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