

Abstract Submitted
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Noisy (spin) neighbors of a solid state (spin) qubit¹ WAYNE WITZEL, MALCOLM CARROLL, Sandia National Laboratories, NM, LUKASZ CYWINSKI, Institute of Physics, Polish Academy of Sciences, SANKAR DAS SARMA, University of Maryland, College Park — Powerful computational methods have been developed in recent years for understanding decoherence induced by environmental spins. Specifically, the cluster correlation expansion [Phys. Rev. B 78, 085315 (2008)] and adaptations [Phys. Rev. Lett. 105, 187602 (2010)] provide successive approximations that approach the solution to the full quantum mechanical problem for small and large spin baths with good efficiency. We present our findings from these computations. These have implications for solid state spin qubit fabrication and materials choices. In silicon where nuclear spins may be eliminated through isotopic enrichment, we consider other sources of bath spins in the bulk and near interfaces. We also investigate the conditions under which we may abstract out an approximate noise model that is independent of operations applied to the qubit.

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