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Coherent spin precession of multiple spins in an inhomogeneous environment V. KORTAN, M.E. FLATTÉ, University of Iowa Department of Physics and Astronomy — Mn dopants in GaAs, whose core spins are bound anti-aligned to a hole, forming a J=1 ground state of the neutral acceptor, are very sensitive to their environment, including strain [1] and electric fields [2]. This sensitivity affects spin precession by broadening resonance lines and shifting/adding resonant frequencies. Using a low energy Hamiltonian developed for a single Mn ion-hole complex in GaAs [1,2] we have studied spin dynamics of a small collection of spins in the presence of bias electric fields and strain fields. Each Mn ion-hole complex is locally subject to a random electric field in addition to bias fields to determine if coherent spin precession persists. Using these calculations we predict the possible observation of coherent spin precession of small numbers of Mn spins via optical polarization measurements [3], and estimate the strength of the random field necessary to destroy the signal of coherent spin precession. This work supported by NRI through WIN.

[1] A. M. Yakunin, et al, Nature Mat. 6, 512 (2007).
[2] J.-M Tang, Jeremy Levy, and M. E. Flatté, Phys. Rev. Lett. 97, 106803 (2006).
[3] R. C. Myers, et al, Nature Mat. 7, 203 (2008).

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