Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Diffusion of spins in GaAs in the presence of a strongly spatially varying local magnetic field VIDYA BHALLAMUDI, Dept. of Electrical and Computer Engineering, The Ohio State University, ANDREW BERGER, GANG XIANG, YOUNGWOO JUNG, Dept. of Physics, The Ohio State University, DOMINIC LABANOWSKI, Dept. of Electrical and Computer Engineering, The Ohio State University, DAVID STROUD, DENIS PELEKHOV, EZEKIEL JOHNSTON-HALPERIN, Dept. of Physics, The Ohio State University, MARK BRENNER, STEVEN RINGEL, Dept. of Electrical and Computer Engineering, The Ohio State University, P. CHRIS HAMMEL, Dept. of Physics, The Ohio State University —
We report on the effect of a localized, strongly inhomogeneous magnetic field on the behavior of spins in GaAs. Such magnetic fields can provide spatially resolved information regarding spin diffusion, relaxation and precession. The sample in our experiments is a 2 micron thick n-GaAs (3e16 cm^{-3}, Si doped) epitaxial membrane. A circularly polarized pump beam injects the spins into the membrane. The local magnetic field is provided by a micro-magnetic particle mounted on a commercial AFM cantilever. Spin-polarized photoluminescence is then used to measure the Hanle effect. The changes in the Hanle response as a function of the magnetic tip position provide information regarding the microscopic environment experienced by the spins. We also present numerical analysis of the spin diffusion equation for our experimental conditions.

Vidya Bhallamudi
Dept. of Electrical and Computer Engineering, The Ohio State University

Date submitted: 09 Dec 2009 Electronic form version 1.4