Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Imaging spin transport in a semiconductor with an iron-filled carbon nanotube ANDREW BERGER, VIDYA BHALLAMUDI, DOMINIC LABANOWSKI, PALASH BANERJEE, CAMELIA MARGINEAN, DENIS PELEKHOV, DAVID STROUD, P. CHRIS HAMMEL, The Ohio State University, KATHY MCCREARY, ROLAND KAWAKAMI, University of California, Riverside, FRANZISKA WOLNY, THOMAS MUEHL, Leibniz Institue for Solid State and Materials Research, Dresden — There has been much recent progress in the field of spintronic device fabrication, creating a need for characterization tools. We are developing a low-temperature scanned probe microscope with the ability to position, with high precision, a magnetized iron-filled carbon nanotube above a spin-injected semiconductor device [1]. The inhomogeneous field of this unique magnetic probe will be experienced by spins in the sample. We have developed a technique for simulating the effects of such an inhomogeneous field [2]. Crucially, we find that our scanned probe technique can create highly localized spin density features on a length scale comparable to the nanotube diameter. This will allow for spatial mapping of the spin density with high resolution – a capability not possible in current electrical detection schemes. Such experiments may provide information about interface effects, scattering, and material properties which influence spin behavior.

[1] F. Wolny, et al. J. Appl. Phys. 104, 064908 (2008)
[2] V. Bhallamudi, et al. arXiv:1010.3747v1 [cond-mat.mes-hall]

Andrew Berger
The Ohio State University

Date submitted: 03 Jan 2011 Electronic form version 1.4