Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Scanning Hall Probe Microscope and Imaging of Vortex Penetration into Nb A. BOVE, Purdue University, Phys. Dpt., N. KUNDTZ, A. M. CHANG, Duke University, Phys. Dpt., V. GUSIATNIKOV, Stanford Research Systems, ART LICHTENBERGER, U. of Virginia, ECE. — We report on the construction of a scanning Hall probe microscope with 100 nm lateral resolution and a large scan range, which exceeds 40 μm at 4.2 K. The microscope is based on the beetle design and operates between room temperature and 1.5 K. The DSP-based control electronics achieves a high (100 kHz) sampling rate and a low noise. The system is capable of simultaneous tunneling and Hall signal acquisition. The Hall sensor for measuring local magnetic fields is fabricated on a GaAs heterostructure through standard EBL and wet etching. It has an active area of 300 nm x 300 nm and a sensistivity of 0.2 Ω/Gauss. We will present (1) a description of the microscope, and (2) progress on imaging the penetration of vortices and the growth of vortex dendritic patterns into thin Nb films [1] and grid arrays [2].

[1] Altshuler E. *et al.*, Rev. Mod. Phys.**76**, 471 (April 2004)
[2] Hallen H. D. *et al.*, Solid State Commumications **99** (9), 651-654 (SEP 1996)

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Date submitted: 30 Nov 2005 Electronic form version 1.4