Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Angular Dependence of Vortex Annihilation Field in Asymmetric Co Nanodots* RANDY DUMAS, KAI LIU, Physics Department, UC Davis, THOMAS GREDIG, CHANG-PENG LI, IVAN K. SCHULLER, Physics Department, UC San Diego — Magnetization reversal via a vortex state is a common occurrence in sub-micron magnetic nanodots. We have investigated arrays of 500 nm polycrystalline Co dots prepared by e-beam lithography. The circular symmetry of the dots has been broken by introducing a flat edge to the dots. Magneto-optical Kerr effect (MOKE) measurements and micromagnetic simulations confirm the reversal mechanism of the dots is via the nucleation, propagation, and annihilation of a vortex core. The asymmetric dot shape favors vortex nucleation from the flat edge and therefore allows for control over the vortex chirality. Additionally, by modifying the applied field sweep, we can control which side of the dot the vortex annihilates from. We have studied the vortex annihilation field as a function of the angle between the applied field and the flat edge of the dot. At small angles, the annihilation field depends on the chirality of the vortex and annihilation is easier from the flat edge of the dot. The difference in annihilation fields for the two chiralities is strongly dependent on the angle of the applied magnetic field. This behavior is due to the complex motion of the vortex core across an asymmetric dot during reversal. *Work supported by ACS-PRF, AFOSR-MURI, and the Alfred P. Sloan Foundation.

Randy Dumas
Physics Department, UC Davis

Date submitted: 26 Nov 2007 Electronic form version 1.4