Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Spin-Transfer-Torque Driven Domain Wall Motion in (Ga,Mn)(As,P) E.K. VEHSTEDT, Dept of Physics & Astronomy, Texas A&M Uni; Inst of Physics, ASCR vvi, L.P. ZARBO, Inst of Physics, ASCR vvi, K. VYBORNY, Dept of Physics, SUNY Buffalo; Inst of Physics, ASCR vvi, E. DE RANIERI, Hitatch-Cambridge Laboratory, Uni of Cambridge, H.G. KATZGRABER, Dept of Physics & Astronomy, Texas A&M Uni; ETH Zurich, J. WUNDERLICH, Hitatch-Cambridge Laboratory, Uni of Cambridge; Inst of Physics, ASCR vvi, T. JUNGWIRTH, Inst of Physics, ASCR vvi; School of Physics & Astronomy, Uni of Nottingham, J. SINOVA, Dept of Physics & Astronomy, Texas A&M Uni; Inst of Physics, ASCR vvi — Precise control of domain wall (DW) motion in magnetic materials is a prerequisite for the realization of novel non-volatile and down-scalable logic/memory devices which promise to overcome the limitations of current technologies. While magnetic fields are the obvious choice for DW manipulation, in spin-orbit (SO) coupled materials, electric fields provide an additional means of control via current-induced spin torque. We extend the existing theoretical framework used to describe magnetization dynamics in uniform ferromagnets (FM) to dilute FM semiconductors. Analogous to the study of homogeneous systems, we compute the current-induced internal fields (CIF) corresponding to the spin torques and perform a quantitative analysis of the effect of CIFs on DW motion by solving the phenomenological Landau-Lifshitz-Gilbert equations. Microscopic calculations based on an accurate description of the SO coupling effects are used to estimate the observed anisotropies. Our theoretical efforts are complemented by experimental studies in the SO coupled FM (Ga,Mn)(As,P).

E K Vehstedt
Dept of Physics and Astronomy, Texas A&M University;
and Institute of Physics, ASCR v.v.i.

Date submitted: 22 Nov 2011 Electronic form version 1.4