Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Anisotropy of Skyrmion Lattice in $Mn_{0.9}Fe_{0.1}Si$ probed by magnetic field orientation dependence of the topological Hall effect and magnetoresistance[1] PETER SIEGFRIED, ANDREW TREGLIA, ALEXANDER BORNSTEIN, University of Colorado Boulder, THOMAS WOLF, Karlsruhe Institute of Technology, MINHYEA LEE, University of Colorado Boulder — We report the magnetic field orientation dependence of the topological Hall effect (THE) and magnetoresistance (MR) of $Mn_{0.9}Fe_{0.1}Si$ in the A-phase within the applied magnetic field (H) temperature (T) phase diagram. In the A-phase a two dimensional Skyrmion lattice is formed in the plane perpendicular to the direction of H, which is responsible for the observed THE signal. At a given T within the A-phase, we investigated the angular dependence of THE and MR at a fixed H to probe the boundaries of the A-phase region. We find the MR signal exhibits a unique H-direction dependence at the entering and exiting of the A-phase, whereas, in the middle H range, i.e. in the core of A-phase, the angular dependence is consistent with what is expected from a perfect 2D Skyrmion lattice. However, THE signals show extreme sensitivity upon entering the A-phase and unexpected angular dependence, yet did not leave any trace through exiting. The discrepancy between the angular dependence of MR and THE signals at the A-phase boundaries indicates a crucial role of Fe impurities as pinning centers for the Skyrmions. We will discuss further our H-orientation dependence of the THE, compared to sweeping H at a fixed angle in Fe doped MnSi.

[1]Work at the University of Colorado was supported by the US DOE Basic Energy Sciences under Award No. DE-SC0006888.

Peter Siegfried
University of Colorado Boulder

Date submitted: 05 Nov 2015 Electronic form version 1.4