Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Electrical Detection of a Skyrmion State in Sputter Deposited MnSi Thin Films[1] BRIAN YOUNGBLOOD, ILYA KRIVOROTOV, Department of Physics and Astronomy, University of California - Irvine — We report a simple method of growing highly ordered B20-phase MnSi films on Si(111) by magnetron sputtering of a stoichiometric target and demonstrate that these films support a skyrmion phase. By measuring the DC magnetoresistance as a function of temperature and applied magnetic field we are able to map a portion of the phase diagram of the MnSi film. For a 15nm film we find an extended region of stability (20K-35K) above 400G for the skyrmion phase, similar to that reported for MBE deposited films. The critical (Curie) temperature (30K) at zero magnetic field is greater than that of thin free-standing single crystal samples and comparable to that of bulk MnSi. We also report measurements of the transverse conductivity in these films, including the topological Hall contribution due to the skyrmions. We further report the observation of temperature hysteresis of the resistance, indicating frustrated order coexisting with the skyrmion phase. Our work simplifies the fabrication of spintronic devices based on MnSi and the helimagnons and skyrmions it hosts. The skyrmions in particular are highly technologically relevant due to the ease with which they can be manipulated by injected angular momentum and their toplogically protected stability.

[1]Work supported by NSF.

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Date submitted: 15 Nov 2013 Electronic form version 1.4