Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Mapping the skyrmion phase diagram in epitaxial FeGe/Si(111) grown by molecular beam epitaxy ADAM AHMED, SARAH DUNSIGER, MOHIT RANDERIA, ROLAND KAWAKAMI, Ohio State Univ - Columbus — Skyrmions are localized magnetic textures which have particle-like behavior and exist in magnetic materials with broken-inversion symmetry. In addition, the stability and size of the skyrmion are determined by the competition between the exchange interaction and the Dzyaloshinskii-Moriya interaction (DMI). However, in light of these potential applications, the skyrmion phase exists primarily with an external magnetic field and temperature range, the existence of skyrmions in bulk versus thin films can be drastically different. We have grown epitaxial thin films of FeGe/Si(111) by molecular beam epitaxy. Through a combination of reflection high energy electron diffraction and x-ray diffraction, we confirm that we obtain high quality single crystal thin films. The skyrmion phase diagram is mapped out with two techniques: susceptibility measurements from SQUID magnetometry and electrical properties via topological Hall effect. We will discuss how both techniques can be complimentary in identifying the existence of skyrmions in the H vs T phase diagram. We also show a thickness dependence ranging from 20 nm films to 1000 nm films and show that the skyrmion phase can be quite robust in our thickest films.

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Date submitted: 11 Nov 2016 Electronic form version 1.4