Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Reconstructing Magnetization Patterns with an Atomic-Sized Sensor FRANCESCO CASOLA, YULIYA DOVZHENKO, SARAH SCHLOTTER, TONY X. ZHOU, Harvard University, Cambridge USA., FELIX BÜTTNER, MIT, Cambridge USA., RONALD L. WALSWORTH, Harvard University, Cambridge USA., GEOFFREY S. D. BEACH, MIT, Cambridge USA., AMIR YACOBY, Harvard University, Cambridge USA. — Establishing magnetic structures in systems of reduced dimensionality is notoriously challenging. We have used the single spin of a Nitrogen Vacancy (NV) center in diamond to perform scanning magnetometry of skyrmions in Pt/Co/Ta multilayers under ambient conditions [1]. Our atomic-sized sensor can record 2D maps of the stray magnetic field produced by the non-collinear ordered state, at a distance of ~ 30 nm from the surface. We show how to systematically obtain a set of solutions for the underlying spin texture compatible with the measured local field. Such solutions can be reconstructed by fixing the magnetic helicity of the configuration. We then select physically allowed patterns by requiring the topological number for the spin structure to be an integer. Our work is the first instance of spin reconstruction performed by a single scanning NV center. We will discuss possible applications to other two-dimensional ordered states, e.g. in complex oxide interfaces, novel 2D materials, and van der Waals heterostructures. [1] Y. Dovzhenko*, F. Casola*, S. Schlotter, T. X. Zhou, F. Büttner, R. L. Walsworth, G. S. D. Beach and A. Yacoby, arXiv:1611.00673v1 (2016).

Francesco Casola
Harvard University

Date submitted: 16 Nov 2016 Electronic form version 1.4