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Imaging Magnetic Skyrmions Under Ambient Conditions with an Atomic-Sized Sensor YULIYA DOVZHENKO, FRANCESCO CASOLA, Harvard University, SARAH SCHLOTTER, MIT, TONY X. ZHOU, Harvard University, FELIX BUETTNER, MIT, RONALD L. WALSWORTH, Harvard University, GEOFFREY S. D. BEACH, MIT, AMIR YACOBY, Harvard University — Magnetic skyrmions are particle-like topologically-protected spin structures, which commonly crystallize in chiral magnets at cryogenic temperatures. Recently stable room-temperature skyrmions were reported in stacks of thin magnetic films[1,2]. Establishing the microscopic structure of these skyrmions in the presence of external magnetic fields is a key experimental challenge, calling for a quantitatve room-temperature approach. We use a scanning Nitrogen-Vacancy (NV) center to image skyrmions at a Pt/CoFeB interface as well as in Pt/Co/Ta multilayers in ambient conditions[3]. We perform full vector magnetometry of the local magnetic fields produced by the films. We establish the presence of a Néel-type skyrmion. In addition to static magnetic signal, we discover a modulation of the NV spin transition linewidth suggesting the presence of thermal fluctuations of the spin structure. Our results identify NV magnetometry as a promising local probe for both static magnetization structures and spin fluctuations in a variety of low-dimensional condensed matter systems. [1] Woo, S. *et al. Nat. Mater.* **15,** 501–506 (2016). [2] Moreau-Luchaire, C. *et al. Nat. Nanotechnol.* **11,** 444–448 (2016). [3] Dovzhenko*, Y., Casola*, F. *et al.* arxiv:1611.00673 (2016).

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