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NV magnetic imaging of topological spin patterns in magnetic multilayers FRANCESCO CASOLA, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138, USA., YULIYA DOVZHENKO, XU ZHOU, MARC WARNER, Department of Physics, Harvard University, 17 Oxford St., Cambridge, MA 02138, USA., SARAH SCHLOTTER, GEOFFREY BEACH, Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA., RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138, USA., AMIR YACOBY, Department of Physics, Harvard University, 17 Oxford St., Cambridge, MA 02138, USA. — Scanning diamond microscopes with an atom-like nitrogen-vacancy (NV) color center near the probe tip have recently emerged as a leading tool for the study of nanoscale magnetism in a broad range of systems. We report on the development of a new approach for positiong a single NV centre at a few nanometres from the sample of interest. This is achieved by fabricating our magnetic device at the top of a polished quartz fiber, whose distance from a diamond nanopillar containing NV centers is then controlled via an atomic force microscope feedback. We employ this method for the investigation of thin ferromagnetic Co/Pt multilayers, where interfacial spin-orbit coupling is expected to stabilize complex topologically protected spin textures. The few-nanometers real-space extension of an isolated skyrmion structure in thin magnetic films makes its detection via standard spectroscopic techniques challenging, suggesting how NV magnetometry can be a unique candidate for the study of novel mesoscopic magnetism.

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