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Experimental demonstration of Scanned Spin-Precession Microscopy[1] V.P. BHALLAMUDI, C.S. WOLFE, Department of Physics, The Ohio State University, V.P. AMIN, Department of Physics and Astronomy, Texas A&M University, D.E. LABANOWSKI[2], A.J. BERGER, D. STROUD, Department of Physics, The Ohio State University, J. SINOVA, Department of Physics and Astronomy, Texas A&M University, P.C. HAMMEL, Department of Physics, The Ohio State University — We present the demonstration of a new spin-microscopy tool that relies on the precessional response of spins to the spatially heterogeneous field of a micromagnet. In this first experiment, we map the spin density within an optically pumped GaAs sample by recording the variations of a global spin-photoluminescence signal as a function of a micromagnetic probe's position (relative to the pump beam). The spin density map is then obtained by deconvolving the measured signal with an experimentally or theoretically determined response of the spins to their magnetic environment. The response function is sensitive to other important properties, such as spin lifetime and gyromagnetic ratio, and thus these properties can also imaged. Further, the technique can be employed in conjunction with both optical and electrical detection schemes. In the former case it can enhance the imaging resolution while for the latter it can enable imaging. Due to the magnetic nature of coupling between the probe and the spins, this technique has the potential to be material independent and enable subsurface imaging.

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