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Nanoscale Fourier-transform magnetic resonance imaging JOHN NICHOL, TYLER NAIBERT, WILLIAM ROSE, University of Illinois at Urbana-Champaign, ERIC HEMESATH, LINCOLN LAUHON, Northwestern University, RAFFI BUDAKIAN, University of Illinois at Urbana-Champaign — Magnetic resonance force microscopy is a promising technique for nanoscale magnetic resonance imaging, but the detection sensitivity must still be improved to reach the single proton level. Multiplexed imaging schemes, such as Fourier encoding, are used in clinical magnetic resonance imaging for sensitivity enhancement. Here, we report a method for Fourier encoding nanoscale samples, where statistical fluctuations dominate the spin polarization. The protocol uses periodic encoding pulses to create correlations in the spin fluctuations. We demonstrate this technique using a silicon nanowire mechanical oscillator as a force sensor to image ^{1}H spins in a polystyrene sample. The sample is encoded using pulsed magnetic field gradients generated by a nanoscale current-carrying wire. We reconstruct a 2-dimensional projection of the proton density in the sample with 10 nm resolution.

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