

Abstract Submitted
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Development of Magnet-on-Oscillator Low Temperature NMR Force Microscopy¹ J.W. PASTER, J.T. MARKERT, Department of Physics, The University of Texas at Austin — We report recent advances for our nuclear magnetic resonance force microscopy (NMRFM) experiment. Force detection of nuclear spins is made possible by coupling NMR spin flip sequences to a mechanical oscillator. Periodic inversion of the spins in a magnetic field gradient provides the ac coupling force. The force sensitivity for NMRFM improves with decreasing distance between a small gradient magnet and the spins in a sample. Adapting a perpendicular oscillator orientation allows us to decrease the magnet-to-sample distance, providing increased sensitivity. We've also adapted a magnet-on-oscillator design. With this approach, we can perform experiments using oscillating cantilever-driven adiabatic reversal, a technique which has been used to detect single electron spins below the surface of a solid [1]. We've integrated an optical fiber interferometer to measure an oscillator's motion with sub nanometer precision. We can routinely measure the resonance frequencies, quality factors, and spring constants of various oscillators.

[1] Rugar D et al. Nature. 2004;430:329–332

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