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Force-gradient detection of electron spin resonance NEIL JENKINS, JOHN MAROHN, Cornell University — Electron spin resonance of single unpaired electron spins in fused silica has recently been demonstrated [Rugar, *et al*, *Nature* **430** 329 (2004)]. The techniques employed rely on being able to coherently modulate electron spin magnetization for many hundreds of milliseconds, and are thus not well suited for observing unpaired electrons in spin-labeled biomolecules, for example, where the relevant spin relaxation times will be orders of magnitude shorter. In this presentation, we will discuss force gradient methods for detecting and imaging electron spin resonance that are more generally applicable. In our methods, applied rf is used to cyclically saturate electron spin magnetization at twice the cantilever frequency. A theory for the effect will be presented and data from sample-on-cantilever experiments performed at cryogenic temperatures will compare conventional force-detected MRFM to the signal from the force gradient experiment.

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