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Force-Detected NMR Study of Single-Crystal MgB_2 using Ultrasensitive Oscillators* HAN-JONG CHIA, MARK MONTI, SAMARESH GUCHHAIT, JOHN MARKERT, Physics, University of Texas at Austin, JAE-HYUK CHOI, Mechanical Metrology Group, Division of Physical Metrology, KRISS, Korea, SUNG-IK LEE, Pohang University, Korea — MgB_2 is a unique superconductor with a relatively high T_c and two nearly independent electronic bands. An NMR study of ^{11}B in MgB_2 using polycrystalline samples [1] did not observe any two-band effects, nor a Hebel-Slichter coherence peak, possibly due to large H_{c2} anisotropy (and thus a distribution of T_c's). Anisotropic NMR studies of MgB_2 have proven difficult due to the small size ($\sim$ 10 μm) of high-quality crystals. A large-single-crystal conventional NMR study [2] could not probe the superconducting state due to line broadening. We have set out to use the exquisite sensitivity of Nuclear Magnetic Resonance Force Microscopy (NMRFM) to probe the behavior of ^{11}B in single crystal MgB_2. We have fabricated ultrasensitive mechanical oscillators using e-beam lithography to facilitate detection of the weak ^{11}B resonance; these have resonance frequencies of 1–10 kHz, spring constants of $\sim 10^{-4}$ N/m, and quality factors >3000 at 77 K. We report our initial detection of the ^{11}B nuclear resonance and our plans to study relaxation rates in single crystal MgB_2. [1] H. Kotegawa *et al.*, *Phys. Rev. Lett.* **87**, 127001 (2001). [2] S. Strässle *et al.*, *Physica C* **466**, 168 (2007). *Supported by NSF DMR-0605828 and DGE-0549417.

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