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**Electron Spin Resonance with Scanning SQUID Sensor** ZHENG CUI, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, Menlo Park, CA, USA, SEAN HART, Department of Applied Physics, Stanford University, CA, USA, RAHIM ULLAH, Department of Physics, Stanford University, CA, USA, JOHN R. KIRTLEY, K. A. MOLER, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, Menlo Park, CA, USA — Electron spin resonance (ESR) is a powerful technique for the study of electron properties in materials, such as spin-orbit coupling, hyperfine interactions, as well as other relaxation processes. Conventional ESR is performed in large magnetic fields (up to several Tesla) with large sample volumes (several milliliters). Disadvantages of the conventional technique include resonance-linewidth broadening due to inhomogeneity in large samples and incompatibility of large magnetic fields with certain samples (e.g. low-$H_c$ superconductors). A Superconducting QUantum Interference Device (SQUID) is an ultrasensitive magnetic flux detector that can measure spin resonance in low fields and small samples. With a magnetic sensitivity of 1000 Bohr magnetons, our scanning SQUID sensor can detect the ESR signal from $10^8$ electron spins at 4.2 Kelvin and 1 Gauss of magnetic field. The scanning capability will enable us to locate and study microscopic devices as well as to spatially resolve micron-scale variations in bulk samples. We will demonstrate scanning SQUID low-field ESR measurements on well-known materials such as DPPH (2,2-diphenyl-1-picrylhydrazyl). [1] L. R. Narasimhan, M. Takigawa, M. B. Ketchen, APL, 65, 1305-1307 (1994).

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