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High RF Magnetic Field Near-Field Microwave Microscope[1]
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Near-field microwave microscopes have been developed to quantitatively image RF and microwave properties of a variety of materials on deep sub-wavelength scales [1]. Microscopes that develop high-RF magnetic fields on short length scales are useful for examining the fundamental electrodynamic properties of superconductors [2]. We are creating a new class of near-field microwave microscopes that develop RF fields on the scale of 1 Tesla on sub-micron length scales. These microscopes will be employed to investigate defects that limit the RF properties of bulk Nb materials used in accelerator cavities, and the nonlinear Meissner effect in novel superconductors. Work funded by the US Department of Energy. [1] S. M. Anlage, V. V. Talanov, A. R. Schwartz, "**Principles of Near-Field Microwave Microscopy**," in *Scanning Probe Microscopy: Electrical and Electromechanical Phenomena at the Nanoscale, Volume 1,* edited by S. V. Kalinin and A. Gruverman (Springer-Verlag, New York, 2007), pp. 215-253. [2] D. I. Mircea, H. Xu, S. M. Anlage, "**Phase-sensitive Harmonic Measurements of Microwave Nonlinearities in Cuprate Thin Films**," Phys. Rev. B **80**, 144505 (2009).

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