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Terahertz nano-spectroscopy and imaging of superfluid surface plasmons in conventional and anisotropic superconductors H. T. STINSON, J. S. WU, B. Y. JIANG, Z. FEI, University of California San Diego, A. S. RODIN, Boston University, B. CHAPLER, A. S. MCLEOD, University of California San Diego, A. CASTRO NETO, National University of Singapore, Y. S. LEE, Soongsil University, M. M. FOGLER, D. N. BASOV, University of California San Diego — We numerically model near-field spectroscopy and superfluid polariton imaging experiments on conventional and unconventional superconductors in the infrared and terahertz regime. Our modeling shows that near-field spectroscopy can measure the magnitude of the superconducting gap in Bardeen-Cooper-Schrieffer superconductors with nanoscale spatial resolution. We demonstrate how the same technique can measure the c-axis plasma frequency, and thus the c-axis superfluid density, of layered unconventional superconductors such as cuprates and pnictides with identical spatial resolution. We discuss the development of a cryogenic terahertz near-field microscope designed to perform these proposed experiments.

Ted Stinson
University of California San Diego

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