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d-Wave Superconductivity and Quasiparticle Dynamics in KFe_2As_2[1] MEGAN A. BOOTHBY, A.J. KOENIG, WENDELL A. HUTTEMA, COLIN J.S. TRUNCIK, NATALIE C. MURPHY, DAVID DEEPWELL, Simon Fraser University, XIANHUI CHEN, University of Science and Technology of China, Hefei, DAVID M. BROUN, Simon Fraser University — Recent work in superconductivity focuses largely on unconventional superconductors that have a layered structure, such as the pnictide, KFe_2As_2. Among other potential benefits, these tend to display a much higher critical temperature than conventional superconductors. It is always interesting to investigate the mechanism for forming Cooper pairs. In our experiment, we probe the nodal structure of the superconducting energy gap in KFe_2As_2 to determine pairing symmetry by using milliKelvin microwave spectroscopy. We find that the superfluid density has a linear temperature dependence, which provides compelling evidence for line nodes and d-wave pairing. We also investigate the relaxation dynamics of thermally excited quasiparticles, wherein we discover a rapid collapse in scattering below T_c, much like the high-T_c cuprate superconductors. I will present surface impedance data taken at temperatures down to 0.1K, from which we obtain complex microwave conductivity and superfluid density.

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