Physics

INTERPLANE PENETRATION DEPTH IN ORGANIC SUPERCONDUCTORS, T. Olheiser[1], Z. Shi[1], D.D. Lawrie[1], R.W. Giannetta*[1], R. Prozorov[2], J. Schlueter[3], H. H. Wang[3], U. Geiser[3] University of Illinois at Urbana-Champaign[1], Department of Physics, Urbana, Illinois 61801, Iowa State University[2], Department of Physics and Astronomy, Ames, Iowa 50011, Argonne National Laboratory[3], Chemistry and Materials Science Division, Argonne, Illinois 60439, russg@uiuc.edu

Interplane penetration depth ($\lambda_\perp$) measurements have been performed on single crystals of κ-$(ET)_2Cu[N(CN)_2]Br$ and κ-$(ET)_2Cu(NCS)_2$ organic superconductors. Measurements were taken in the temperature range 0.4 K ≤ T ≤ 12 K using a tunnel diode oscillator technique, in which the superconductor is placed inside the inductor of a self-resonating LC circuit, causing a shift in the resonant frequency of the circuit that is directly related to the interplane penetration depth. A method of deducing the penetration depth from the frequency shift will be described. Converting penetration depth to superfluid density, we find that $1 - \rho_\perp \propto T^N$, with N = 1.5 +/- 0.2. This power law behavior strongly indicates an order parameter with nodes, in agreement with several previous measurements that show *d*-wave pairing in these materials. In addition, we also find that $\lambda_\perp$ (0.4 K) = 120-150 μm.

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