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Phenomenological model of the bipartite electronic structure of Bi2Sr2CaCu2O8+d: Predicting bulk thermodynamic quantities from tunneling spectroscopy J.W. ALLDREDGE, University of Colorado Boulder, K. FUJITA, Cornell University, JINHO LEE, Brookhaven National Laboratory, M. WANG, Cornell University, H. EISAKI, AIST -Tsukuba, S. UCHIDA, University of Tokyo, P.J. HIRSCHFELD, University of Florida, J.C. DAVIS, Cornell University, K. MCELROY, University of Colorado Boulder — Using high quality local STM maps with corresponding quasiparticle interference data, we develop a complete phenomenological description of the density of states in $Bi_2Sr_2CaCu_2O_{8+d}$. This not only describes the local density of states but also consistently describes the spectral density of states derived from the QPI. The model consists of a d-wave gap structure at high energy. At low energies is has an additional higher harmonic term in the d-wave gap. Using this we capture not only the high energy gap signature but also the low energy features in the LDOS which accompany the termination of the QPI signal and this allows us to quantitatively measure the features across a wide series of dopings showing consistence between real and k-space. The use of this simple model allows us to successfully predict superfluid density, confirming that our model can successfully determine bulk physics from a local measurement.

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