

Abstract Submitted
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Determining the Critical Condition for Superconductivity in $\text{Bi}_2\text{Sr}_2\text{CaCuO}_{8+\delta}$ T. REBER, S. PARHAM, Y. CAO, J. WAUGH, H. LI, University of Colorado, N. PLUMB, Paul Scherrer Institute, Q. WANG, Los Alamos National Lab, G. GU, Brookhaven National Lab, Y. YOSHIDA, Y. AIURA, H. EISAKI, AIST, G. ARNOLD, D. DESSSAU, University of Colorado — Using the tomographic density of states (TDoS) ARPES-based technique we present a detailed study of the temperature and doping dependences of the pair-forming, represented by the gap magnitude (Δ), and pair-breaking, represented by the scattering rate (Γ), processes in BSCCO. We find that Δ is finite through the superconducting transition, T_C , and ceases only at the higher temperature T_{Pair} , which corresponds with the T_{Onset} from Nernst experiments rather than the T^* tied to the antinodal pseudogap. Furthermore, we find Γ is large and strongly temperature dependent and T_C is strongly correlated with the ratio of Δ/Γ . Consequently, the presence of pairs is not sufficient for superconductivity: the pair-breaking processes must also be diminished to the point that pairs have a long enough lifetime to develop long range coherence.

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