

Abstract Submitted
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Local measurement of the superfluid density in the pnictide superconductors $Ba(Fe_{1-x}Co_x)_2As_2$ across the superconducting dome LAN LUAN, T.M. LIPPMAN, Stanford institute for materials and energy science, SLAC, C.W. HICKS, School of Physics and Astronomy, University of St Andrews, O.M. AUSLAENDER, Physics Department, Technion-Israel Institute of Technology, J.A. BERT, JIUN-HAW CHU, J.G. ANALYTIS, I.R. FISHER, K.A. MOLER, Stanford institute for materials and energy science, SLAC — We locally measure the superfluid density $\rho_s(T)$ in $Ba(Fe_{1-x}Co_x)_2As_2$ single crystals with magnetic force microscopy and scanning SQUID susceptometry. These high-precision, local-probe-based techniques enable us to measure both the zero temperature value of the superfluid density $\rho_s(0)$ and the temperature variation, to distinguish homogeneous from spatially varying responses, and to report systematic behavior as a function of Co doping across the superconducting dome. We find that $\rho_s(T)$ increases sharply with decreasing temperature below the superconducting transition temperature T_c of both optimally doped and underdoped compounds, and that $\rho_s(0)$ falls more quickly with T_c on the underdoped side of the dome than on the overdoped. These observations, as well as the increasing temperature induced change of $\rho_s(T)$ at low temperatures upon underdoping, are consistent with magnetic fluctuation mediated pairing and the coexistence of magnetism and superconductivity.

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