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Investigating Links Between Enhanced Inhomogeneity and Robustness of the Superconducting State in Severely Underdoped, Ultrathin CaYBCO STANLEY STEERS, THOMAS LEMBERGER, BRIAN BAKER, The Ohio State University — Multiple experiments in recent years have shown evidence for intrinsic inhomogeneity in the cuprate superconductors upon approach to the superconductor to insulator transition (SIT). We present experimental evidence of anomalous suppression of both the diamagnetic response and the resistivity in ultrathin Ca-doped YBCO over tens of Kelvin. We then present further experiments to investigate to what extent this suppression is related to increased inhomogeneity upon approach to the SIT. Finally, we compare these results in CaYBCO to experiments in other cuprate compounds from the literature.

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