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An Angle Resolved Thermodynamics Study of Cuprate Superconductors XIAOQING ZHOU, HAOXIANG LI, STEPHEN PARHAM, JUSTIN WAUGH, University of Colorado at Boulder, JOHN SCHNEELOCH, RUIDAN ZHONG, Brookhaven National Lab, GENDA GU, University of Colorado at Boulder, HELMUTH BERGER, Départment de Physique, Ecole Polytechnique Fédérale de Lausanne, KUNIHIKO OKA, University of Colorado at Boulder, HIROSHI EIASKI, Nanoelectronics Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), GERALD ARNOLD, DANIEL DESSAU, University of Colorado at Boulder — The thermodynamics properties of a system contain vital information on its electronic states, the contribution of which in typical bulk measurements is averaged and integrated over momentum and energy space, and needs to be carefully isolated from other contributions such as that of phonons. In this work, we demonstrate that the distribution of electronic entropy over momentum and energy space can be directly probed using Angle Resolved Photoemission Spectroscopy, establishing photoemission as an alternative and complimentary probe of electronic thermodynamics. With a series of BSCCO samples that spans the cuprate phase diagram, we investigate their entropy evolution as a function of doping, momentum, energy and temperature, and explore their implications in regards to the nature of the pseudogap phase and possible Fermi surface reconstruction scenarios.

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