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Leroy Apker Award Talk: Transport measurements of a model cuprate superconductor

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High-temperature superconductivity in the cuprates has been the subject of intense research since its discovery in 1986 by J. G. Bednorz and K. A. Müller. The fundamental challenge posed by these materials is that they exhibit strong electronic correlations, giving rise to anomalous properties, such as the observation that the resistivity in optimally hole-doped samples is linear in temperature from the superconducting transition temperature up to very high temperatures. The scope of this work was to explore the phase diagram through transport measurements of a model compound. Specifically, the resistivity, magneto-resistance, Hall effect and thermoelectric power were measured for single-crystal samples of $HgBa_2CuO_{4+\delta}$ (Hg1201). The outcome of these measurements is highly surprising. Despite the complexity of the phase diagram, conventional Fermi-liquid metallic behavior is observed in the pseudogap regime below optimal doping.