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Magneto-transport near a quantum critical point IAN HAYES, NICHOLAS BREZNAY, University of California Berkeley, ARKADY SHEKHTER, ROSS MCDONALD, National High Magnetic Field Lab, Los Alamos, JAMES ANALYTIS, University of California Berkeley — The physics of quantum critical phase transitions connects to some of the most difficult problems in condensed matter physics, including metal-insulator transitions, frustrated magnetism and high temperature superconductivity. Near a quantum critical point (QCP) a new kind of metal emerges, whose thermodynamic and transport properties do not fit into the unified phenomenology with which we understand conventional metals - the Landau Fermi liquid (FL) theory - characterized by a low temperature limiting T-linear specific heat and a T^2 resistivity [1]. Studying the evolution of the T dependence of these observables as a function of a control parameter leads to the identification both of the presence and the nature of the quantum phase transition in candidate systems. In this study we measure the transport properties of basp, at $T < T_c$ by suppressing superconductivity with high magnetic fields. At sufficiently low temperatures, the resistivity of all compositions ($x \geq 0.31$) crosses over from a linear to a quadratic temperature dependence, consistent with a low temperature FL ground state. As compositions with optimal T_c are approached from the overdoped side, this cross-over becomes steeper, consistent with models of quantum criticality where the effective Fermi temperature T_F goes to zero.

[1] Landau, L. The theory of a fermi liquid. Journal of Experimental and Theoretical Physics 6, 920 (1957).

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