# Non-Fermi Liquid magneto-transport in high-temperature superconductor LSCO.

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## Introduction

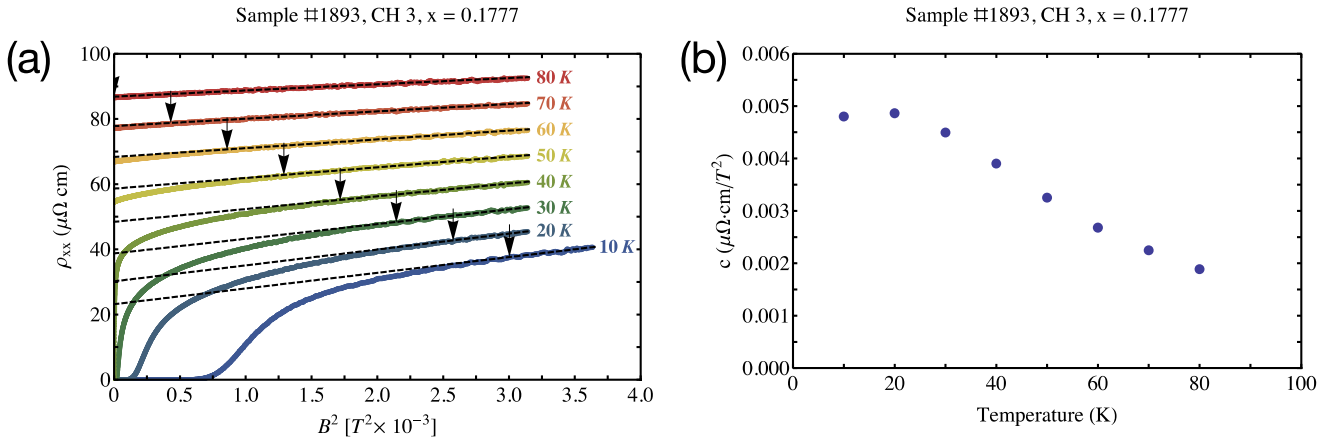
High temperature superconductivity in cuprates is associated with the anomalous metallic behavior of these materials in the normal state above superconducting temperate. Close to optimal doping these systems exhibit anomalous (linear-in-T) temperature dependence of resistivity over a exceptionally broad temperature range, over a 1000K in LSCO family of cuprates. This behavior has been attributed to quantum critical behavior in the metallic state cuprates near critical doping. Magnetoresistance measurements provide novel information about quantum critical behavior of cuprates in this doping range. We use COMBE samples, which have exceptionally fine doping resolution, to study the temperature and doping evolution of magnetoresistance in LSC?O? in the doping range near critical doping.

## Experimental

Our samples, grown by Ivan Bozovic at Brookhaven National Laboratory, require the large bore of the 60 T controlled-waveform magnet due to their unusually large size (10 mm x 10 mm). We have developed custom instrumentation at Pulsed-Field Facility and the DC facility, to measure up to 30 doping simultaneously, which allows full utilization of pulsed-field magnet time. Furthermore, the measurements ensure identical temperature contions for all the doping channels a unique feature of the current setup.

## Results and Discussion

The magnetoresistance in a Fermi liquid metal is expected to be quadratic in magnetic field. Fig. 1a shows magnetoresistance plotted vs square of the magnetic filed which is approximately linear up to ~55T. This plot however reveals a non-Fermi liquid behavior as indicated in Fig. 1b where the coefficient of B-square behavior (the slope of resistivity vs B-square) is plotted vs temperature. This coefficient changes by more that factor of 2 in the measured temperature range which is direct indication non-Fermi Liquid behavior and suggest a small energy scale associated with the relaxation processes responsible for magnetoresistance.

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