

NORMAL-STATE HALL EFFECT IN HIGH- T_c $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ AT LOW TEMPERATURES

F.F. Balakirev, J.B. Betts, A. Migliori (NHMFL, LANL); G.S. Boebinger (NHMFL / FSU, Physics); I. Tsukada, Y. Ando (CRIEPI, Tokyo, Japan)

We report Hall effect measurements in the normal state of the high- T_c superconductor $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ (LSCO). The Hall resistivity was measured by suppressing superconductivity in 65T magnetic field, thus revealing the normal-state behavior in the low temperature limit down to 0.5K. The Sr doping x is varied from underdoped ($x=0.08$) to overdoped ($x=0.22$) regimes in a set of 7 thin film samples which were prepared by Pulsed Laser Deposition. The resistivity and Hall voltage were measured simultaneously using digital lockin technique developed at NHMFL.

Temperature dependencies of the Hall coefficient, R_H , at high magnetic field in LSCO thin film samples with different levels of Sr doping are plotted on Fig. 1. We find that $R_H(T)$ saturates in samples with $x \leq 0.16$ in the low temperature limit while in samples with $x \geq 0.17$ the $R_H(T)$ remains temperature dependent down to the lowest temperature measured. We also find a discontinuity in the doping dependence of the Hall coefficient at around the same doping level suggestive of a phase transition near optimal doping.

Acknowledgements

The work at the National High Magnetic Field Laboratory was supported by the National Science Foundation, DOE Office of Science, and the State of Florida.

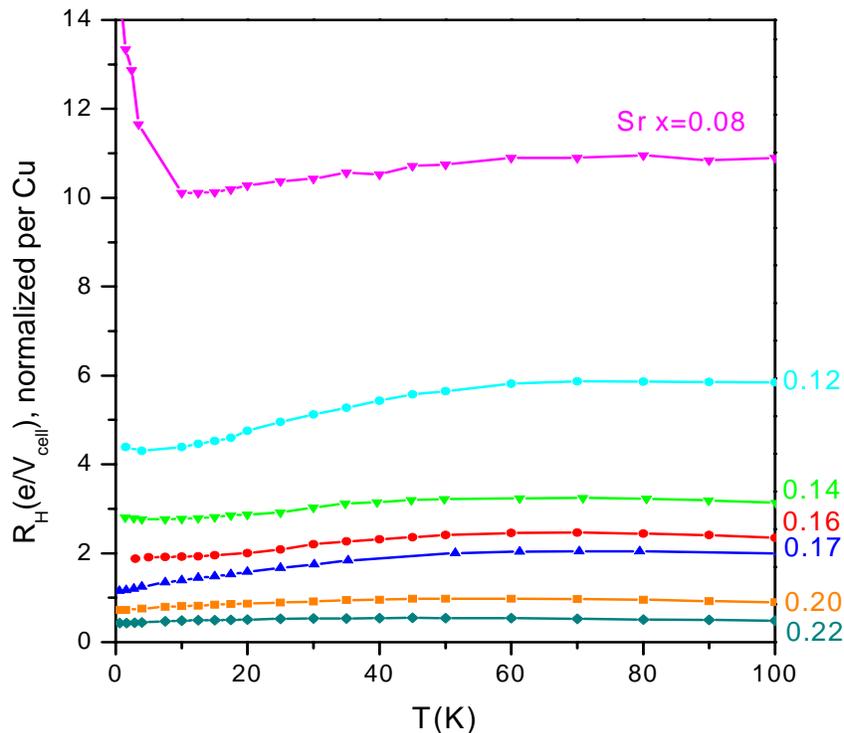


Figure 1. Temperature dependence of the Hall coefficient at 65T in $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ thin film samples with different levels of Sr doping x .