

Glassy Effects in the Low Temperature Transport and Noise in Lightly Doped $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$

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Abstract. We report a study of the c-axis magnetotransport and noise on high quality single crystals of $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ (LSCO) with $x = 0.03$. Transport measurements were performed at temperatures $0.110 \leq T$ (K) ≤ 50 and in magnetic fields $0 \leq B$ (T) ≤ 18 parallel and perpendicular to the c axis. It is well-known that $x = 0.03$ LSCO samples at low T find themselves in the spin-glass regime (the spin-glass transition temperature $T_g \sim 7$ K). In this regime, we find that the c-axis resistance exhibits insulating behavior with the variable-range hopping T dependence. Our study reveals for the first time the signatures of glassiness, such as hysteretic behavior, memory effects, and history dependence, in transport [1] of lightly doped cuprates. The glassy effects decrease with increasing T and vanish at ~ 1.5 K. The noise measurements were carried out up to 0.3 K. We have observed distinct switching fluctuations in the time-dependent resistance, with switching times varying from several minutes to several hours [2]. This switching noise is superimposed on other low-frequency fluctuations both in $B = 0$ and in B parallel to the c-axis of the crystal. The careful analysis of the noise has established non-Gaussian statistics indicating the importance of interactions in this system. The possible origins of the observed phenomena will be discussed. They include the emergence of electronic heterogeneity, where the hole-rich regions in CuO_2 planes are separated by the hole-poor antiferromagnetic domains.

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REFERENCES

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2. Raičević, I., Jaroszyński, J., Popović, D., Jelbert, G., Panagopoulos, C., and Sasagawa, T., *Proceedings of SPIE* (submitted).