Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Magnetic-field-driven superconductor-insulator transition in underdoped $La_{2-x}Sr_xCuO_4$**[1] XIAOYAN SHI, PING V. LIN, DRAGANA POPOVIĆ, Dept. of Phys. & Natl. High Magnetic Field Lab., Florida State Univ., G. LOGVENOV, MPI-FKF & Brookhaven Natl. Lab., A. BOLLINGER, I. BOZOVIC, Brookhaven Natl. Lab., T. SASAGAWA, Tokyo Inst. of Tech. — We use magnetotransport measurements to probe the magnetic-field-driven superconductor-insulator transition in both an MBE-grown thin film ($x = 0.07$ and $T_c = 4$ K) and a single crystal ($x = 0.06$ and $T_c = 6$ K) underdoped $La_{2-x}Sr_xCuO_4$ samples in $T$ range of 0.1–30 K and fields up to 35 T. Surprisingly, it is possible to perform scaling analysis in both low- and high-temperature regions, where two different scaling exponents and scaling functions are obtained. These results and a detailed analysis of the temperature dependence of the resistivity suggest that a possible intermediate state exists between the superconducting state at zero field and the insulating state at high fields. This intermediate state may be related to the existence of a large region with superconducting fluctuations in $(T, H)$ parameter space. Furthermore, the insulating state in high fields shares similar 2D variable-range hopping behavior as non-superconducting samples with lower doping.

[1]Supported by NSFDMR-0905843, NHMFL via NSF DMR-0654118, the US Department of Energy,Basic Energy Sciences, Materials Sciences and Engineering.

Xiaoyan Shi
Dept. of Phys. & Natl. High Magnetic Field Lab., Florida State Univ.

Date submitted: 16 Nov 2012 Electronic form version 1.4