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Competing orders in LSCO probed by heat transport SHIYAN LI, University of Sherbrooke, Canada, D. G. HAWTHORN, University of Toronto, Canada, LOUIS TAILLEFER, University of Sherbrooke, Canada and Canadian Institute for Advanced Research, K. YAMADA, Tohoku University, Japan — We elucidate the nature of the thermal metal-to-insulator transition in $La_{2-x}Sr_xCuO_4$ (LSCO) [1] through measurements of the thermal conductivity κ performed very close to the transition, down to temperatures as low as 50 mK and in magnetic fields H up to 17 T. For a single crystal with x = 0.15, a monotonic increase in the residual linear term κ_0/T is observed up to 17 T, as expected for a d-wave superconductor. For a crystal with x = 0.144, however, we observe an initial increase in κ_0/T at low field, followed by a decrease when H exceeds a critical field H^*. This result is consistent with recent neutron scattering measurements on a similar sample [2], which show that static spin-density-wave (SDW) order is not present in zero field, but sets in at a critical magnetic field H^*, and then co-exists/competes with superconductivity (SC) for $H > H^*$. Taken together, these two measurements reveal that the SC phase gives way to a phase which is both magnetic and insulating, whether by increasing magnetic field or by decreasing doping. Using low-energy quasiparticle transport, we map out the $T = 0$ field-doping ($H - x$) phase diagram of LSCO. [1] D.G. Hawthorn et al., Phys. Rev. Lett. 90, 197004 (2003); X.F. Sun et al., Phys. Rev. Lett. 90, 117004 (2003). [2] B. Khaykovich et al., Phys. Rev. B 71, 220508(R) (2005).

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