Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Magnetic field induced ordering and phase diagram in underdoped LSCO JESSE HALL, McMaster University, TOOMAS RÕÕM, URMAS NAGEL, DAN HÜVONEN, National Institute for Chemical Physics and Biophysics, D. HAWTHORNE, S. WAKIMOTO, H. ZHANG, University of Toronto, JUNGSEEK HWANG, Sungkyunkwan University, SEIKI KOMIYA, Central Research Institute of Electric Power Industry, THOMAS TIMUSK, McMaster University — The existence of ordered phases in superconducting cuprates has come under intense scrutiny with the revelation of charge-ordering near the superconducting transition in YBCO. Previous results demonstrating the existence of exotic ordered phases, including the existence of stripe order, and the richness of the magnetic-field/doping/temperature phase diagram, suggest that the underdoped region of the phase diagram may contain a wealth of information that has yet to be revealed. We turn our attention to $La_{2-x}Sr_xCuO_4$ on the boundary of superconductivity by studying the far-infrared optical properties of three single crystals with x=0.05, 0.06, and 0.07; the first is non-superconducting, the others have transition temperatures of 6 K and 12 K respectively. By applying a magnetic field up to 17 T we are able to suppress superconductivity where it exists and compare the field-induced normal state to that induced by temperature or by doping. By studying the optical conductivity of these materials and the changes in the spectral weight with temperature and field, we can gain insight into the field induced ordered states of underdoped cuprate superconductors.

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Date submitted: 14 Nov 2014 Electronic form version 1.4