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Far infrared study of magnetic field-induced normal state of the high temperature superconductor LSCO.

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We report on the ab-plane optical properties of the magnetic field induced
normal state of La1.94Sr0.06CuO4 (Tc=5.5 K), the first such study. We apply strong
magnetic fields up to 16 T along the c-axis . We find that the magnetic fields, which are strong enough to destroy superconductivity, induce a gap-like depression in the optical conductivity at low frequency along with parallel growth
of a broad absorption peak at higher frequency, just above the gap. The loss of low frequency conductivity in the gap region is in good agreement with dc magneto resistance measurements on samples from the same batch. The
spectral weight loss in the depression at low frequency is
recovered by the spectral weight in the broad peak. Significantly, this spectral weight equals the spectral weight of the superconducting condensate. We interpret our data in terms of a field-induced SDW state that coexists with superconductivity in low fields and grows in amplitude with field in agreement with neutron scattering results of Lake et al. and the phase diagram proposed by Demler et al.

B. Lake et al. Nature, 415, 299, (2002).
E. Demler, S, Sachdev and Y. Zhang, PRL, 87, 067202 (2001).

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