Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Quasiparticle mass enhancement approaching optimal doping in YBa2Cu3O6+x BRAD RAMSHAW, Los Alamos National Laboratory, SUCHITRA SEBASTIAN, Cambridge University, ROSS MCDONALD, Los Alamos National Laboratory, JAMES DAY, University of British Columbia, BENG TAN, Cambridge University, ZENGWEI ZHU, JON BETTS, Los Alamos National Laboratory, RUIXING LIANG, DOUG BONN, WALTER HARDY, University of British Columbia, NEIL HARRISON, Los Alamos National Laboratory — Unconventional superconductivity is almost always found in proximity to other broken-symmetry states. The high-Tc cuprates exhibit a rich phase diagram that includes both spin and charge order. Previous quantum oscillation studies on YBa2Cu3O6+x have addressed how broken symmetry reconstructs the Fermi surface, but the evolution of the Fermi surface toward optimal doping was missing due to the high upper-critical fields. We use magnetic fields approaching 100 tesla to measure quantum oscillations in YBa2Cu3O6+x at three new doping levels with Tcs of 75, 81, and 91 K. We find that the quasiparticle effective mass is strongly enhanced approaching a hole doping of p=0.18—the same doping where experimental signatures of broken symmetry terminate and superconducting properties are enhanced. This is suggestive of a quantum critical point underlying the superconducting dome near optimal doping.

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Date submitted: 13 Nov 2014 Electronic form version 1.4