Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Quantum oscillation experiments on $YBa_2Cu_3O_{6.60}$[1] JOHN SINGLETON, ROSS MCDONALD, SUSAN COX, National High Magnetic Field Laboratory, SHILIANG LI, PENGCHENG DAI, Physics, University of Tennessee —
Pulsed magnetic fields of up to 75 T and temperatures down to 0.40 K have been used to study single crystals of $YBa_2Cu_3O_{6.60}$. The samples are measured using a MHz technique that is sensitive to small changes in penetration depth in the superconducting state, and to changes in the skin depth in the normal state. Two series of magnetic quantum oscillations are observed, periodic in inverse field; the frequencies are 590 ± 20 T and 1990 ± 40 T. This suggests that the predicted large Fermi surface is broken into smaller pockets due to nesting. These findings are discussed in the context of other recent observations of quantum oscillations in the cuprates, and a magnetically-mediated mechanism for superconductivity, driven by the topological mapping of the d-wave Cooper-pair wavefunction onto the antiferromagnetic fluctuations (due to Fermi-surface nesting) that are observed across the whole cuprate phase diagram [R.D. McDonald et al., J. Phys.: Condens. Matter, in press (2008)].

[1]Supported by DoE grant "Science in 100 T".

John Singleton
National High Magnetic Field Laboratory

Date submitted: 21 Nov 2008 Electronic form version 1.4