Accurate determination of the Effective Mass in the Underdoped High T_c Superconductor $YBa_2Cu_4O_8$

S.E. Sebastian, B. Tan, G.G. Lonzarich (Cavendish Lab., Cambridge Univ., UK); N. Harrison, Z. Zhu (LANL); S.A. Sabok, B. Dabrowski (Argonne Nat. Lab.)

Despite the underdoped high T_c superconductors $YBa_2Cu_3O_{6+x}$ [1] and $YBa_2Cu_4O_8$ [2,3] having very similar Fermi surface cross-sections, their effective masses have been found to be very different. The former has published values of the effective mass of less than 2 electron masses while the latter has published values close to 3. We recently repeated measurements on the latter in magnetic fields extending to 92 T. The signal-to-noise was found to be considerably improved compared to previous studies enabling a more accurate measurement of the effective mass to be made. Our measurements reveal the effective masses of the $YBa_2Cu_3O_{6+x}$ [1] and $YBa_2Cu_4O_8$ [2,3] systems to be nearly identical.

Acknowledgment

A portion of this work was performed at the National High Magnetic Field Laboratory, which is supported by National Science Foundation Cooperative Agreement No. DMR-1157490, the State of Florida, and the U.S. Department of Energy

References

[1] Doiron-Leyraud, N. *et al*., Nature **447**, 565 (2007).
[2] Yelland, E.A., *et al*., Phys. Rev. Lett , **100**, 046004 (2008).
[3] Bangura, A.F., *et al*., Phys. Rev. Lett , **100**, 046004 (2008).