

Abstract Submitted
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Direct observation of bulk Fermi surface at higher Brillouin zones in a heavily hole-doped cuprate W. AL-SAWAI, Northeastern University (NU), Y. SAKURAI, M. ITOU, JASRI/SPring-8, B. BARBIELLINI, NU, P.E. MIJNARENDS, Delft U. of Tech. & NU, R.S. MARKIEWICZ, NU, S. KAPRZYK, AGH & NU, J.-M. GILLET, Ecole Centrale Paris, S. WAKIMOTO, JAEA, M. FUJITA, Tohoku U., S. BASAK, H. LIN, A. BANSIL, NU, K. YAMADA, Tohoku U. — We have observed the bulk Fermi surface (FS) in an overdoped ($x=0.3$) single crystal of $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ by using Compton scattering. A 2-D momentum density reconstruction [1] from measured Compton profiles, yields a clear FS signature in a higher Brillouin zone centered at $\mathbf{p}=(1.5,1.5)$ a.u. The quantitative agreement with density functional theory (DFT) calculations [2] and momentum density experiment suggests that Fermi-liquid physics is restored in the overdoped regime. We have also measured the 2-D angular correlation of positron annihilation radiation (2D-ACAR) [3] and noticed a similar quantitative agreement with the DFT simulations. However, 2D-ACAR does not give a clear signature of the FS in the extended momentum space in both theory and experiment. Work supported in part by the US DOE.

[1] Y. Tanaka *et al.*, Phys. Rev. B **63**, 045120 (2001).

[2] S. Sahrakorpi *et al.*, Phys. Rev. Lett. **95**, 157601 (2005).

[3] L. C. Smedskjaer *et al.*, J. Phys. Chem. Solids **52**, 1541 (1991).

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