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Momentum dependence of the spectral weight in the single layer high-T_c cuprate $Bi_2Sr_2CuO_{6+\delta}$ studied by ARPES

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High-transition temperature (T_c) cuprate superconductors have attracted a lot of academic researchers because of their high T_c above ~40 K, which cannot be explained by the BCS theory [1]. The high-T_c superconductivity in cuprates has not been clear so far regardless of extensive studies. To understand the mechanism of high T_c in cuprate superconductivity, one of the essential physical parameters is superfluid density (ρ_s) which plays an important role in determining T_c [2].

In this study, we have performed an angle-resolved photoemission spectroscopy (ARPES) study to reinvestigate the relation between coherent spectral weights (SW) on the Fermi surface directly, which seem to correspond to the magnitude of ρ_s and T_c [3]. We measure the electronic structure of the single-layer Bi-based high-T_c cuprate superconductor, $Bi_2Sr_2CuO_{6+\delta}$ (Bi2201), which has one CuO_2 layer in the unit cell and shows a high T_c of 35 K at optimal doping [4]. In this poster, we present the doping and temperature dependence of SW in Bi2201 by using ARPES. In Fig. 1, we show the observed Fermi surface in the superconducting states. By the detailed comparison of Energy-distribution curves at Femri momentum above and below T_c, we have successfully estimated the momentum dependence of SW on the entire Fermi surface. Unexpectedly, the present result is in contrast with the previous ARPES study [3]. From our study, we will discuss the intrinsic momentum dependence of SW in Bi2201 and the origin of the high T_c in cuprates.

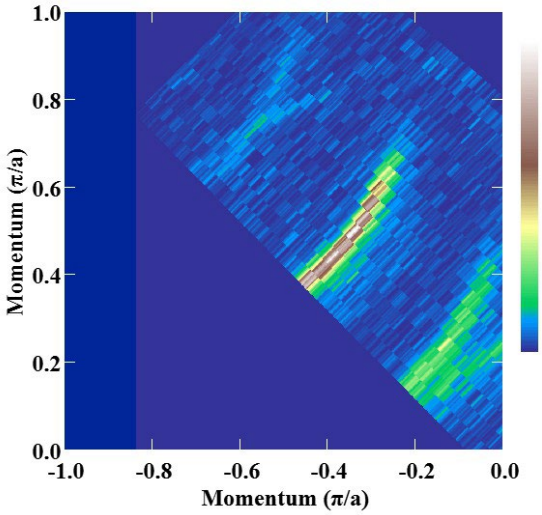

Figure. 1 Fermi surface mapping of Bi2201 taken at $h\nu = 17$ eV, $T = 10$K in the superconducting state from the node to the antinode. We clearly see the main Fermi surface which shows the highest ARPES intensity. The other Fermi surfaces are so-called replicas and shadow.

REFERENCES

1. W. L. McMillan, *Phys. Rev.* **167**, 331 (1968).
2. Y. J. Uemura *et al*., *Phys. Rev. Lett.* **66**, 2665 (1991).
3. T. Kondo *et al*., *Nature* **457**, 296 (2009).
4. A. Iyo *et al*., *J. Phys. Soc. Jpn.* **76**, 094711 (2007).