IV. SUMMARY

We have observed the evolution of the electronic structure with hole doping in lightly-doped Bi2212 from the insulator (with high-temperature metallic behavior) to the superconductor. The results show rigid-band-like shifts of (the remnant of) the LHB with hole doping. The chemical potential is shifted downward and a QP feature appears around $E_{\rm F}$ just above the LHB. This evolution of the electronic structure, together with the shift of the momentum position of the maximum of the LHB, are similar to those reported for Bi2201 and Na-CCOC but are different from LSCO. In order to establish whether the different t''s and different strength of electron-phonon coupling are responsible for the different doping evolution of LSCO and Bi2212, systematic studies on other cuprate families as well as further theoretical studies are desired.

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[1] A. Ino, C. Kim, M. Nakamura, T. Yoshida, T. Mizokawa, Z.-X. Shen, A. Fujimori, T. Kakeshita, H. Eisaki, and S. Uchida, Phys. Rev. B **62**, 4137 (2000).

[2] T. Yoshida, X.J. Zhou, T. Sasagawa, W.L. Yang, P.V. Bogdanov, A. Lanzara, Z. Hussain, T. Mizokawa, A. Fujimori, H. Eisaki, Z.-X. Shen, T. Kakeshita, and S. Uchida, Phys. Rev. Lett. **91**, 027001 (2003).

[3] A. Ino, T. Mizokawa, A. Fujimori, K. Tamasaku, H. Eisaki, S. Uchida, T. Kimura, T. Sasagawa, and K. Kishio, Phys. Rev. Lett. **79**, 2101 (1997).

[4] F. Ronning, T. Sasagawa, Y. Kohsaka, K.M. Shen, A. Damascelli, C. Kim, T. Yoshida, N.P. Armitage, D.H. Lu, D.L. Feng, L.L. Miller, H. Takagi, and Z.-X. Shen, Phys. Rev. B **67**, 165101 (2003).