Comment on "Superconducting Coherence Peak in the Electronic Excitations of a Single-Layer $Bi_2Sr_{1.6}La_{0.4}CuO_{6+\delta}$ Cuprate Superconductor"

In a recent Letter [1] Wei *et al.* discuss the peak-dip-hump structure (PDH) observed in photoemission spectra in the antinodal region of an optimally doped single-layer Bi cuprate, La-Bi2201. They identify the sharp peak as the superconducting coherence peak (SCP) discussed in multi-layered cuprates, e.g., by Feng *et al.* [2]. We would like to argue especially against this last point on the grounds of earlier published data [3–5] from some of the authors of this comment, which have not been considered by Wei *et al.* [1]. We will show that a more complete investigation of the temperature dependence casts doubt on the interpretation of the sharp peak as presented by Wei *et al.*.

In the here commented article by Wei *et al.*, the central argument for the identification of the sharp peak with the SCP is the investigated temperature dependence. Temperature dependent measurements were done from slightly above T_C down to 10 K. In the opinion of Wei *et al.*, the sharp peak in the antinodal region manifests itself only below T_C correlating with the expected emergence of the SCP. In this interpretation the SCP marks the beginning of superfluid formation which results in the appearance of a coherent quasiparticle excitation. This SCP would then be intimately correlated to superconductivity.

In our previous publications [3–5] we investigated the occurence of the sharp peak in the antinodal region in single-layer La-doped Bi cuprates and also in the superstructure-free Pb-doped material. The sharp peak and following hump, which were labeled S and H in [4], have been observed in the vicinity of the *M* point. They have been found to be separated approximately 16 meV. Towards Γ they move away from each other as shown in the cited publications. Besides the influence of polarization [3] and the wave vector also, the temperature dependence of the sharp peak has been explored up to much higher temperatures than the authors of [1] did. We can irrevocably show that the sharp peak persists to temperatures higher than T_C in contrast to what is claimed in [1]. Actually, the conclusion concerning the temperature dependence of the sharp peak by Wei *et al.* [1] can be challenged already by a closer look at their temperature data. Particularly in Fig. 2c1 in [1] the total disappearance of the feature at 35 K seems to be questionable. Our results, however, suggest that the sharp peak vanishes rather with the pseudogap temperature T^* than with T_C. In Fig. 1 we show data from a slightly overdoped Bi2201 sample which is additionally substituted with Pb. From the temperature dependent series of Fig. 1, which has been partly published in [5], it is evident that the sharp peak still exists above T_C. It vanishes between 60 K and 75 K for this slightly overdoped crystal.

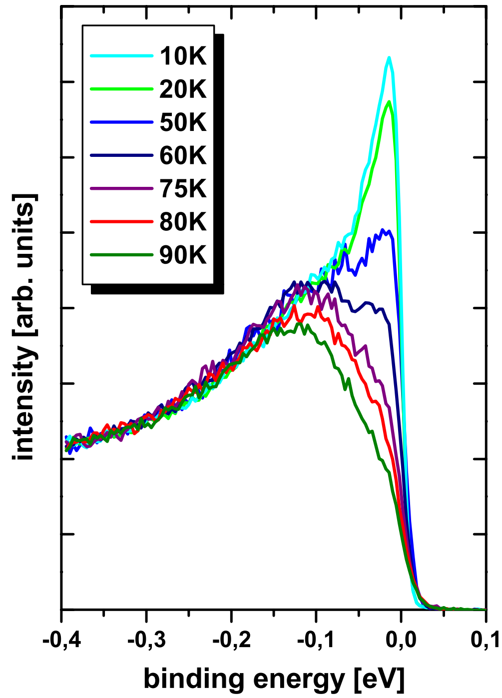

FIG. 1 (color online). Temperature dependence of the line shape of weakly overdoped $(Pb,Bi)_2Sr_{2-x}La_xCuO_{6+\delta}$ ($x = 0.15$, $T_C = 25$ K). The spectra were taken near the *M* point at $0.75(\pi, 0)$, as discussed in [5], where the spectra at $T = 10$ K and at 90 K were exemplary shown. The spectra at $T = 20$ K, 50 K, 60 K, 75 K, and 80 K were added here for clarification of the evolution of the spectral features. As can be seen from a comparison of the spectra, the sharp peak persists above T_C, presumably up to T^*.

These more thorough data on the temperature dependence, in our view, make the interpretation of the sharp peak by Wei *et al.* [1] disputable since they question their main argument. So, either the identification of the sharp peak as an SCP is incorrect or the superfluid density regime extends to temperatures above T_C, presumably up to T^*.

Beate Müller,* Lenart Dudy, Christoph Janowitz, and Recardo Manzke
Humboldt Universitat zu Berlin
Institut fur Physik
Newtonstrasse 15, 12489 Berlin

Received 25 September 2008; published 3 September 2009
DOI: 10.1103/PhysRevLett.103.109701
PACS numbers: 74.72.Hs, 71.18.+y, 79.60.Bm

*bmueller@physik.hu-berlin.de

[1] J. Wei *et al.*, Phys. Rev. Lett. **101**, 097005 (2008).
[2] D. L. Feng *et al.*, Science **289**, 277 (2000).
[3] R. Manzke *et al.*, Phys. Rev. B **63**, 100504 (2001).
[4] C. Janowitz *et al.*, Europhys. Lett. **60**, 615 (2002).
[5] R. Manzke *et al.*, Physica (Amsterdam) **408C**, 780 (2004).

