Momentum Dependence of the Superconducting Gap in $Bi_2Sr_2CaCu_2O_8$ [Phys. Rev. Lett. 74, 2784 (1995)]

H. Ding, J. C. Campuzano, A. F. Bellman, T. Yokoya, M. R. Norman, M. Randeria, T. Takahashi, H. Katayama-Yoshida, T. Mochiku, K. Kadowaki, and G. Jennings

The last sentence of the penultimate paragraph and the last paragraph of the paper need to be replaced by the following:

In fact, the X quadrant data were taken with a photon polarization (Fig. 2) such that only initial states even under reflection in the ΓX mirror plane should contribute. Since a single particle band of $d_{x^2-y^2}$ symmetry is odd with respect to ΓX, emission from the main band should not be observed near the diagonal. However, emission from the even symmetry combination of the $\pm\mathbf{Q}$ superlattice umklapp bands is allowed (this also explains why there is a weak polarization dependence in the X quadrant as compared to the Y quadrant). Therefore, the observed "hump" in the X quadrant (Fig. 4) is due to the measured gap being on the umklapp band, and the gap can be large along the diagonal direction since this corresponds to a location on the main band approximately 20° away from the diagonal.

In the Y quadrant the intrinsic gap should be readily observable, since the main Fermi surface is clearly separated from the umklapp ones (Fig. 1). This leads to the question of the significance of the small gaps in the Y quadrant. The error bars in Fig. 4 indicate that the gap at point 12 is consistent with zero. Although this is not true for point 13, we do not want to attach too much significance to data at a single point. Given the current data, then, the existence of a "hump" in the Y quadrant is questionable. This issue can only be definitely resolved by further experiments with better momentum sampling and an analysis of the data using a frequency dependent line shape.

While a hump necessarily implies anisotropic s-wave pairing, an extended region of zero or small gap may be consistent with a number of models: dirty d wave or a gap with d-wave symmetry that is not of the simple $\cos(k_x) - \cos(k_y)$ form, or certain anisotropic s-wave models.

0031-9007/95/75(7)/1425(1)$06.00