Devereaux *et al.* Reply: Krantz and Cardona [1] point out that their data on the electronic Raman effect in YBCO, particularly the large signal corresponding to A_{1g} symmetry, invalidate the conclusion of our recent paper [2], that the gap function in high-T_c superconductors like BSCCO has predominantly B_{1g} character. In the following we explicitly demonstrate how the A_{1g} Raman response is always partially screened in such superconductors and present new data which confirm our theoretical picture.

As these authors base their arguments on the fact that scattering in these samples should be dominated by unscreened mass fluctuations [3] we consider it appropriate to recall the full form of the Raman response function in anisotropic superconductors. Writing the Raman vertex γ as a sum $\gamma^S(\mathbf{k})=\gamma_0^S+\gamma_1^S s_k$ of an isotropic (0) and an anisotropic (1) part (using Fermi surface harmonics s_k), where the index S stands for the symmetries $S=B_{1g}$, B_{2g}, and A_{1g}, one may decompose the Raman response function at zero temperature $\chi=\chi_\parallel+\chi_\perp$ with

$$\chi_\parallel=\frac{\langle(\gamma_0^S+\gamma_1^S s_k)\lambda_k\rangle^2}{\langle\lambda_k\rangle}\frac{1}{\epsilon},$$
$$\chi_\perp=(\gamma_1^S)^2\left\{\langle s_k^2\lambda_k\rangle-\frac{\langle s_k\lambda_k\rangle^2}{\langle\lambda_k\rangle}\right\}, \tag{1}$$

into a longitudinal part ($\parallel$), affected by (longitudinal) screening through the dielectric function ϵ of the superconductor, and a transverse part ($\perp$), independent of ϵ. In (1) λ_k ($\propto|\Delta(\mathbf{k})|^2$) denotes the pair response (or Tsuneto) function.

Special cases of (1) include:

(i) Gaps with B_{1g} symmetry $\Delta(\mathbf{k})=\Delta_0(\hat{k}_x^2-\hat{k}_y^2)$ and perfect longitudinal screening $\epsilon\rightarrow\infty$. This is the case studied in [2] [$\epsilon=O(10^4)$ for high-T_c superconductors (HTSC's)] which leads to an unscreened Raman response for B_{1g} and B_{2g} symmetry and a partially screened response for A_{1g} symmetry ("transverse screening"). It is important to emphasize that this partial screening is a direct consequence of the fact that the square of the B_{1g} gap, which enters into λ_k, has a contribution which transforms according to A_{1g} symmetry and thus has a finite overlap with the A_{1g} vertex in (1). It is by this transverse screening that the artificial peak in the A_{1g} channel at $\omega=2\Delta_0$ is removed, leaving a single peak at a *lower* frequency, the height of which scales with the unknown parameter $\gamma_1^{A_{1g}}$.

(ii) Isotropic Raman vertex $\gamma_1^S=0$ and $\epsilon=O(1)$ (unrealistic for HTSC's). In this case the Raman response is given by the mass fluctuation model [3]. For a B_{1g} gap the Raman intensity for A_{1g} symmetry can be predicted to peak at the same position as the B_{1g} spectrum which is in conflict with the observation of [2] but even with the data of the authors of the preceding Comment.

For further clarification of the situation we present Raman data for BSCCO for B_{1g}, B_{2g}, and A_{1g} symmetry in Fig. 1. Also shown is a fit by Eq. (1) with a B_{1g} gap and parameters $\Delta_0=280$ cm^{-1}, $\gamma_1^{B_{1g}}=2.35$, $\gamma_1^{B_{2g}}=1.58$, $\gamma_1^{A_{1g}}=2.23$, and a smearing width $\Gamma/\Delta_0=0.125$. Both the peak positions and the low frequency power-law behavior clearly support the d-wave picture proposed in [2]. In addition, apart from discrepancies in the A_{1g} peak height, the data of Krantz and Cardona are in qualitative agreement with ours and with earlier Raman data on YBCO in [4], where possible gap anisotropies in high-T_c superconductors have been discussed for the first time.

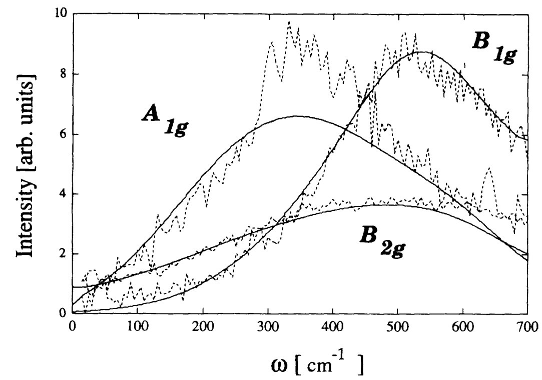

FIG. 1. Electronic Raman scattering in BSCCO for various symmetries. Full lines: Theory using a gap with B_{1g} symmetry on a cylindrical Fermi surface, where analytic expressions can be obtained [5].

In conclusion we may state therefore that the notion of a gap with predominantly (see Ref. [2] for a discussion of limitations) B_{1g} character is supported not only by our own data (see Fig. 1), but also by the data of Krantz and Cardona which hence do not invalidate but rather support our theoretical picture.

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