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Effects of inhomogeneities and thermal fluctuations on the spectral function of a model d-wave superconductor[1] DANIEL VALDEZ-BALDERAS, DAVID STROUD, Department of Physics, The Ohio State University — We compute the spectral function of a model for high-temperature superconductors, at both zero and finite temperatures T. The model consists of a two-dimensional BCS Hamiltonian with d-wave symmetry, which has a spatially varying, thermally fluctuating, complex gap Δ. Thermal fluctuations are governed by a Ginzburg-Landau free energy functional. We assume that a fraction c_β of the superconductor area has a large Δ (β regions), while the rest has a smaller Δ (α regions). α and β regions are randomly distributed in space. We find that the inhomogeneous gap distribution of Δ affects the spectral function primarily near $\mathbf{k} = (\pi, \mathbf{0})$. For $c_\beta \simeq 0.5$, a split band appears if the difference between the gap magnitudes in the α and β regions is sufficiently large; otherwise, the band is only broadened. Thermal fluctuations also affect the spectral function most strongly near $\mathbf{k} = (\pi, \mathbf{0})$, where the peaks that are sharp and high at zero temperature become reduced, widened, and shifted toward smaller energies as T increases through the Kosterlitz-Thouless transition temperature.

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