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Electronic Density of States of a Superconductor with a Spatially Varying Gap and Phase Fluctuations: A Monte Carlo Simulation[1]
DANIEL VALDEZ-BALDERAS, DAVID STROUD, Department of Physics, The Ohio State University — Recent experiments have shown that the superconducting energy gap in some high-T_c superconductors is spatially inhomogeneous. Motivated by these experiments, and using exact diagonalization of a model d-wave Hamiltonian (T. Eckl et al. PRB 66 140510), combined with Monte Carlo simulations of a Ginzburg-Landau free energy functional, we have calculated the electronic density of states $n(E)$ of a model high-T_c superconductor with an inhomogeneous gap. The free energy functional incorporates both phase and amplitude fluctuations together with quenched disorder. It leads to a superconducting transition temperature T_c well below the pseudogap temperature T_{c0}, and has a spatially varying gap at very low T, both consistent with experiments in underdoped Bi2212. Our calculated $n(E)$ shows coherence peaks for $T < T_c$, which disappear for $T > T_c$. We will also present calculated results for both the global and local $n(E)$ as a function of temperature and disorder.

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