Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Vortex pinning and local density of states in an inhomogeneous d-wave superconductor[1] DANIEL VALDEZ-BALDERAS, Department of Physics and Astronomy, University of Rochester, DAVID STROUD, Department of Physics, The Ohio State University — We study a model for vortex pinning in a two-dimensional, inhomogeneous, type-II superconductor at low temperatures. The model is based on the Ginzburg-Landau free energy functional with position dependent coefficients, which we chose in such a way that regions with large gap also have large penetration depth. This choice of parameters (suggested by scanning tunneling spectroscopy experiments) results in vortices being pinned by superconducting regions where the gap is large, in contrast to the usual pinning picture. We also compute the density of states of a model BCS Hamiltonian with d-wave symmetry, in which the pairing field is given by the superconducting order parameter appearing in the free energy functional described above. We find that the type of inhomogeneity that we introduce is an indispensable ingredient for our model to reproduce some of the most salient experimental features of the local density of states spectra of cuprates.

[1]NSF Grant No. DMR04-13395

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Date submitted: 23 Nov 2007 Electronic form version 1.4