

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Impurity bound states in multiband extended s -wave superconductors: analysis of iron pnictides¹ ROBERT BEAIRD, ILYA VEKHTER, Louisiana State University, JIAN-XIN ZHU, Theoretical Division, Los Alamos National Laboratory — We examine the effect of a single, non-magnetic impurity on the density of states in an extended s -wave superconductor with both electron and hole Fermi surfaces (FS). We consider $\pm s$ symmetry of the superconducting gap and extend our treatment to include deep gap minima and gap nodes on the electron FS, both suggested for the Fe-pnictides. We use the T -matrix approximation to compare the semi-analytical results for a two-band continuum model with the numerical analysis of the multiband tight-binding model on a lattice. We determine the criteria for the existence of in-gap resonances and find that low-energy resonances occur only for strong scattering with comparable contributions from the intraband and interband scattering components. We also map the local density of states in the vicinity of the impurity, highlighting the clear differences between the cases of deep minima and gap nodes. We show that spatial-imaging of the impurity-induced resonance state by scanning tunneling microscopy can distinguish among the various superconducting gap symmetries.

¹Research supported by US DoE Grant No DE-FG02-08ER46492.

Robert Beaird
Louisiana State University

Date submitted: 23 Nov 2009

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