

T_CSUH Special Seminar

Texas Center for Superconductivity at the University of Houston

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Room 102, University of Houston Science Center
4:00 p.m. – 5:00 p.m.

“Theoretical Understanding of Rotational Symmetry Breaking in Sodium-Doped Cuprate Superconductors”

Abstract

The recent atomically resolved STM studies on strongly underdoped NaCCOC revealed a surprisingly complex pattern with the square symmetry of the lattice broken on a local scale. This has raised an interesting question about the origin of the broken local square symmetry. Our theoretical investigation shows that for reasonable parameters the single hole impurity state of t - t' - J model has a doubly degenerate ground state whose components can be represented as states with even (odd) reflection symmetry around the x (y)-axes. The conductance pattern for one state is anisotropic as the STM tip scans above the Cu-O-Cu bonds along the x (y)-axes. This strong anisotropy appears at lower voltages while much weaker anisotropy shows up at higher voltages. Our results agree qualitatively with recent experiments. In addition, we demonstrate that the satisfaction of low-energy sum rules shown in STM measurements strengthens the validity of the description of the low-energy physics by an effective single-band model instead of the three-band model. Some preliminary results will be discussed.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.



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