

Department of Physics & Astronomy

Dr. Chin-Sen Ting

*Department of Physics and Texas Center for Superconductivity,
University of Houston, Houston, Texas 77204 USA*

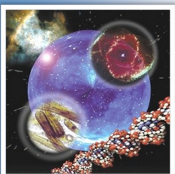
Friday, March 1, 2013

Time: 3:00 p.m. - 4:00 p.m.

BB 3.04.18

Spin-Density-Wave and Superconductivity in Iron-Pnictides

The coexistence of the spin-density-wave (SDW) and superconductivity in electron-doped iron-pnictide superconductors such as $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ is studied by using a two orbital model proposed by our group. By considering the S_{\pm} pairing symmetry for the superconductivity and introducing the onsite Coulomb interaction U and the Hund's coupling J_H for the magnetic order, the phase diagram and the evolution of the Fermi surface as the doping varies can be numerically obtained by the Bogoliubov-de Gennes equations. Our results are consistent with several ARPES experiments. The local density of states (LDOS) has been calculated from low to high doping. We found that the strength of the superconducting coherent peak at the positive energy gets enhanced and the one at the negative energy is suppressed by the SDW order in the underdoped region. The 90° domain wall observed experimentally in $\text{Ca}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ can be generated by slightly changing the values of U and J_H . In addition, the magnetic vortex states has also been calculated for the hole doped $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ (with $x=0.4$). The LDOS at the vortex core exhibits a resonance peak at negative bias energy. All these results are in good agreements with STM experiments. The reason why our model is so successful in explaining a number of experiments is because the asymmetry of the As atoms above and below Fe layer has been considered. This is very important if the Fe layer is at or near the surface as probed by ARPES and STM experiments.



Department Contact Information

Dr. Marcelo Marucho • 210.458.7862 • Marcelo.Marucho@utsa.edu

Nakia Scott • 210.458.5698 • Nakia.Scott@utsa.edu

<http://physics.utsa.edu/>