

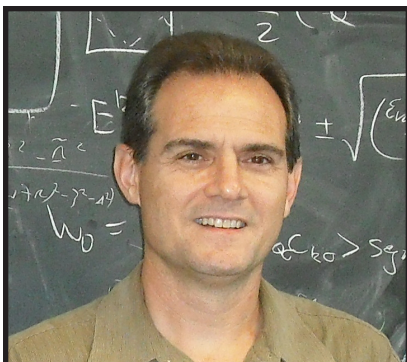
Friday, February 25, 2011 • 4:00 P.M. • 2241 Chamberlin Hall

Coffee & Cookies Served at 3:30 p.m

## Peter Hirschfeld

University of Florida

Host: Chubokov



# Led by the Nodes

## Forging an Understanding of Fe-Based Superconductors

Department of Physics Colloquium

The new Fe-based superconductors have occasioned considerable excitement because transition temperatures are high, and it is hoped that comparisons to cuprates will lead to new insights into the essential ingredients for high temperature superconductivity. I will briefly review some similarities and differences to the cuprates, focussing first on normal state magnetic and transport properties. In this respect some of the remarkable properties of these systems can be understood by consideration of the multiorbital character of the multisheeted Fermi surface. Next, I will review what is known about the superconducting state, explaining the basis for the near-consensus that all pnictide materials display spin singlet, orbital s-wave symmetry. Somewhat more controversial are differing reports on gap structure suggested by different experimental probes on different materials, including varying claims of gap nodes or fully gapped behavior. I will argue that such a diversity of gap structures, unexpected based on cuprate intuition, is characteristic of systems with s-symmetry and the unusual band structure of the Fe-based superconductors. They should, and do, display an “intrinsic sensitivity” to small perturbations of electronic structure. I review what is to be expected in this regard from spin fluctuation theories, where multiorbital effects are found again to play a crucial role. Finally, I will discuss how 3-dimensionality influences superconducting order.

