Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

Fermi Arcs or Fermi Pockets

PETER JOHNSON, CMPMSD, Brookhaven National Laboratory, Upton, NY 11973

In the pseudogap phase of the cuprate superconductors, a significant portion of the Fermi surface is still gapped at temperatures above the transition temperature Tc. Instead of a closed Fermi surface, the low-energy electronic excitations appear to form unconnected Fermi arcs separated by gapped regions. It is generally assumed that the spectral function is particle-hole symmetric (at low energies) in both regions - with a peak at the Fermi level on the Fermi arcs centered around the nodes and a local minimum at the Fermi level in the gapped regions away from the arcs. Using high resolution angle-resolved photoemission and new methods of analysis, we show that on a sizable portion of the Fermi surface, including the Fermi arcs, the electronic structure in the immediate vicinity of the Fermi level is not particle-hole symmetric in the pseudogap phase. This is clear evidence that superconducting pairing does not originate from the Fermi arcs. The observations are also consistent with the possibility that the Fermi arcs are in fact the inner surface of the predicted Fermi pockets. This work was carried out in collaboration with Hongbo Yang, Jon Rameau, Tonica Valla, Alexei Tsvelik and Genda Gu and was supported by the Department of Energy.