Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Pairing in the presence of a pseudogap[1] DOUGLAS SCALAPINO, Univ of California - Santa Barbara , THOMAS MAIER, ORNL, PETER STAAR, IBM Research (Zurich), VIVEK MISHRA, ORNL — After 30 years, the quest to experimentally identify the mechanism responsible for pairing in the high Tc superconductors continues. Here we discuss an approach in which angle resolved photoemission (ARPES)data for BSCCO 2212(Tc=89K) is used to extract the single particle spectral weight A(k,w). This spectral weight is then used to calculate the BCS kernel and estimate the RPA spin-fluctuation d-wave pairing strength. Previously A(k,w) results at T=140K, extrapolated to lower temperatures, found that the BSCCO pseudo gap suppressed the logarithmic singularity of the BCS kernel and the spin-fluctuation interaction was too weak to produce superconductivity [V.Mishra et al.,Nat.Phys.10,357]. Here using results for A(k,w) at T=40K for this same system, we find that while the BCS kernel is suppressed, there is a significant increase in the d-wave pairing strength for the spin-fluctuation interaction when the temperature drops from T=140K and 40K. These results are shown to be consistent with DCA calculations for a 2D Hubbard model of a BSCCO like system which has a pseudo gap. We conclude that in spite of the suppression of the usual BCS logarithmic instability by the pseudo gap, the increase in strength of the spin-fluctuation interaction is sufficient to lead to superconductivity.

[1]Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

Douglas Scalapino
Univ of California - Santa Barbara

Date submitted: 04 Nov 2015 Electronic form version 1.4