Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Effect of the pseudogap on T_c in the cuprates and implications for its origin[1] MICHAEL NORMAN, VIVEK MISHRA, Materials Science Division, Argonne National Laboratory, UTPAL CHATTERJEE, Dept. of Physics, University of Virginia, JUAN CARLOS CAMPUZANO, Materials Science Division, Argonne National Laboratory and Dept. of Physics, University of Illinois, Chicago
— One of the most intriguing aspects of cuprates is a large pseudogap coexisting with a high superconducting transition temperature. Here, we study pairing in the cuprates from electron-electron interactions by constructing the pair vertex using spectral functions derived from angle resolved photoemission data for a near optimal doped $Bi_2Sr_2CaCu_2O_{8+\delta}$ sample that has a pronounced pseudogap. Assuming that that the pseudogap is not due to pairing, we find that the superconducting instability is strongly suppressed, in stark contrast to what is actually observed. Using an analytic approximation for the spectral functions, we can trace this suppression to the destruction of the BCS logarithmic singularity from a combination of the pseudogap and lifetime broadening. Our findings strongly support those theories of the cuprates where the pseudogap is instead due to pairing.

[1]Work supported by the Center for Emergent Superconductivity, an Energy Frontier Research Center funded by the US DOE, Basic Energy Sciences

Michael Norman
Argonne National Laboratory

Date submitted: 11 Nov 2013 Electronic form version 1.4