Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Hole motion in the Hubbard model B. MORITZ, SLAC National Accelerator Laboratory, Y. WANG, C.J. JIA, Stanford University and SLAC National Accelerator Laboratory, C.-C. CHEN, Argonne National Laboratory, M. VAN VEENENDAAL, Argonne National Laboratory and Northern Illinois University, T. P. DEVEREAUX, Stanford University and SLAC National Accelerator Laboratory, K. WOHLFELD, University of Warsaw and SLAC National Accelerator Laboratory — The motion of a single hole in the half-filled two-dimensional Hubbard model is not fully understood, despite the fact that it constitutes a crucial first step in unravelling the doping evolution of the electronic properties. Here we unambiguously show, using analytical and numerical approaches applied to the various versions of the Hubbard and t-J models, that the hole dynamics is determined by a complex interplay between (i) the strong coupling of a hole to magnons *and* (ii) the strongly renormalized, but effectively free, next-nearest neighbor hopping resulting from additional delocalization pathways. By studying the changes in the hole dynamics in the one-to-two-dimensional crossover regime we comment on applicability of the spin-charge separation ansatz and the spin density wave dispersion picture in the single-particle dynamics of the two-dimensional Hubbard model.

Brian Moritz
SLAC National Accelerator Laboratory

Date submitted: 13 Nov 2014 Electronic form version 1.4