Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Fluctuating spin stripes in the normal state of high-Tc cuprate superconductors EDWIN HUANG, CHRISTIAN MENDL, SHENXIU LIU, SLAC National Accelerator Laboratory and Stanford University, STEVE JOHNSTON, University of Tennessee, Knoxville, HONG-CHEN JIANG, BRIAN MORITZ, THOMAS DEVEREAUX, SLAC National Accelerator Laboratory and Stanford University — Recent experiments have established charge stripes as universal in underdoped cuprate superconductors. In contrast, spin stripes, which are intimately tied to charge stripes in many doped Mott insulators, are seemingly absent in the majority of cuprates, at least in the static long-ranged form. Whether spin stripes exist in a subtle fluctuating form in these cuprates is controversial, with proponents suggesting a link between fluctuating stripes and the mechanism of high-T_c superconductivity. Here, we use numerically exact determinant quantum Monte Carlo calculations to demonstrate dynamical spin stripe correlations in the three-band Hubbard model, which represents the local electronic structure of a Cu-O plane in a cuprate superconductor. Unlike existing ground state studies, our simulations are conducted at temperatures approaching the pseudogap regime, indicated by a decrease in the Knight shift upon cooling, and hence reflect properties of the normal, non-superconducting state. Calculations of the dynamic spin susceptibility strongly support the interpretation of a variety of experimental observations in terms of the physics of fluctuating stripes, including the ubiquitous hourglass magnetic dispersion and the Yamada plot of incommensurability vs. doping.

Edwin Huang
SLAC National Accelerator Laboratory and Stanford University

Date submitted: 11 Nov 2016 Electronic form version 1.4