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**Cluster Dynamical Mean Field Methods and the Momentum-selective Mott transition<sup>1</sup>**

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Innovations in methodology and computational power have enabled cluster dynamical mean field calculations of the Hubbard model with interaction strengths and band structures representative of high temperature copper oxide superconductors, for clusters large enough that the thermodynamic limit behavior may be determined. We present the methods and show how extrapolations to the thermodynamic limit work in practice. We show that the Hubbard model with next-nearest neighbor hopping at intermediate interaction strength captures much of the exotic behavior characteristic of the high temperature superconductors. An important feature of the results is a pseudogap for hole doping but not for electron doping. The pseudogap regime is characterized by a gap for momenta near Brillouin zone face and gapless behavior near the zone diagonal. for dopings outside of the pseudogap regime we find scattering rates which vary around the fermi surface in a way consistent with recent transport measurements. Using the maximum entropy method we calculate spectra, self-energies, and response functions for Raman spectroscopy and optical conductivities, finding results also in good agreement with experiment.

<sup>1</sup>Olivier Parcollet, Philipp Werner, Nan Lin, Michel Ferrero, Antoine Georges, Andrew J. Millis; NSF-DMR-0705847