**Local Order and the gapped phase of the Hubbard model: a
plaquette dynamical mean field investigation** EMANUEL GULL, PHILIPP
WERNER, ETH Zurich, XIN WANG, Columbia University, MATTHIAS TROYER,
ETH Zurich, ANDREW MILLIS, Columbia University — The four-site DCA
method of including intersite correlations in the dynamical mean field theory is used
to investigate the metal-insulator transition in the Hubbard model. At half filling
a gap-opening transition is found to occur as the interaction strength is increased
beyond a critical value. The gapped behavior found in the 4-site DCA approxima-
tion is shown to be associated with the onset of strong antiferromagnetic and singlet
correlations and the transition is found to be potential energy driven. It is thus
more accurately described as a Slater phenomenon (induced by strong short ranged
order) than as a Mott phenomenon. Doping the gapped phase leads to a non-Fermi-
liquid state with a Fermi surface only in the nodal regions and a pseudogap in the
antinodal regions at lower dopings $x \lesssim 0.15$ and to a Fermi liquid phase at higher
dopings.

Emanuel Gull
ETH Zurich