Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

The Continuous Time Quantum Monte Carlo method as a cluster solver in the Dynamical Cluster Approximation KARLIS MIKELSONS, ALEXANDRU MACRIDIN, MARK JARRELL, University of Cincinnati, EMANUEL GULL, MATTHIAS TROYER, ETH Zuerich, Switzerland, SEBASTIAN FUCHS, THOMAS PRUSCHKE, University of Goettingen, Germany — We have investigated the application of the Continuous Time Quantum Monte Carlo (CTQMC) method, based on interaction expansion, to solve the Hubbard model within the Dynamical Cluster Approximation (DCA). We show that CTQMC reproduces results obtained with the well known Hirsch - Fye method (HFQMC), including non-perturbative phenomena. We discuss the advantages and limitations of CTQMC as a cluster solver in the DCA. Since any QMC method suffers from fermion sign problem at low temperatures and large system sizes, we present the results of a detailed study of the sign problem within CTQMC, and compare it to HFQMC. We also discuss potential extensions of (CTQMC+DCA) for treating the phases with broken symmetry.

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Date submitted: 29 Nov 2007 Electronic form version 1.4