Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Finite-temperature properties of strongly correlated fermions in the honeycomb lattice BAOMING TANG, The Pennsylvania State University, THEREZA PAIVA, Universidade Federal do Rio de Janeiro, EHSAN KHATAMI, University of California, Santa Cruz, MARCOS RIGOL, The Pennsylvania State University — We study finite-temperature properties of the Hubbard model in the honeycomb lattice using numerical linked-cluster expansions and determinantal quantum Monte Carlo simulations. Specifically, we calculate experimentally relevant quantities, such as the entropy, the specific heat, uniform and staggered spin susceptibilities, nearest-neighbor spin correlations, and the double occupancy at and away from half filling. We show that in homogeneous systems adiabatic cooling is more efficient at finite doping than at half filling, and that this can be used in trapped geometries to create a Mott insulating phase with exponentially long antiferromagnetic correlations at relatively high entropies. Those entropies are found to be higher in the honeycomb lattice than in the square one suggesting that the experimental realization of an antiferromagnetic Mott insulator may be easier in the former geometry.

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Date submitted: 29 Jan 2014 Electronic form version 1.4