Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Variational Wavefunction Monte Carlo on Two-Dimensional Lattices XINXIN DU, Wellesley College, Wellesley, Massachusetts 02481, COURTNEY LANNERT, Wellesley College, Wellesley, Massachusetts 02481 — We apply numerical methods to the study of many-electron systems, in particular the cuprates, by using variational wavefunction Monte Carlo methods to search for the groundstate wavefunction. We investigate some of the current proposed models and wavefunctions for these compounds, in particular, the t-J model and the t-J model with ring-exchange on two- dimensional square lattices. We compute the energy of the Spin Density Wave (SDW) groundstate wavefunctions for the half- filled Heisenberg antiferromagnetic using the computing algorithm outlined by Gros . This verifies the agreement of the results with the current literature on the Heisenberg model. With the addition of the ring-exchange terms, we compare the energies of the Resonating Valence Bond state, the Gutzwiller state, the superconducting state, and the SDW state. This allows us to study the relationship between the non-magnetic and antiferromagnetic phases of the system at half- filling. The introduction of holes on the lattice allows us to simulate the relationship between the superconducting and the insulating phases of the magnet.

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Date submitted: 30 Nov 2005 Electronic form version 1.4