

Abstract Submitted
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Hubbard Model study of Off Diagonally Confined fermions in a 2D Optical Lattice DAVE CONE, SIMONE CHIESA, RICHARD SCALETTAR, Physics Dept, University of California, 1 Shields Avenue, Davis, CA, 95616,USA, GEORGE BATROUNI, INLN, Université de Nice-Sophia Antipolis, CNRS; 1361 route des Lucioles, 06560 Valbonne, France — We report Quantum Monte Carlo simulations of a Hubbard Hamiltonian which incorporates a proposed new method for confining atoms in an optical lattice employing an inhomogeneous array of hopping matrix elements which trap atoms by going to zero at the lattice edges. This has been termed “Off Diagonal Confinement (ODC)” [1] to distinguish it from the more conventional use of a parabolic trap coupling to (diagonal) density operators. It has the advantage of producing systems which, while still being inhomogeneous, are entirely in the Mott phase, and allow simulations which are free of the sign problem at low temperatures. We analyze the effects of using ODC traps on the local density, density fluctuation, spin, and pairing correlation functions. Finally, we will discuss the advantages and importance of this new confinement technique for modeling correlated systems. Research supported by the Department of Energy, Office of Science SCIDAC program, DOE-DE-FC0206ER25793. [1] V.G. Rousseau *et al.*, arXiv:0909.3543

Dave Cone
Physics Dept, University of California,
1 Shields Avenue, Davis, CA, 95616,USA

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