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Pure Mott Phases in a Trapped 2D Hubbard Model[1] DAVE CONE, Univ of California-Davis, VALY ROUSSEAU, Louisiana State University, SIMONE CHIESA, Univ of Tennessee-Knoxville, RICHARD SCALETTAR, Univ of California-Davis, GEORGE BATROUNI, Universite de Nice-Sophia Antipolis — In this talk, we report on Quantum Monte Carlo simulations of a Hubbard Hamiltonian which incorporates a proposed new method for confining ultracold atoms in an optical lattice. Termed "Off Diagonal Confinement (ODC)," this method employs an inhomogeneous array of hopping matrix elements which traps atoms by going to zero at the lattice edges. In contrast, the more conventional diagonal confinement(DC) trap uses a parabolic potential coupled to (diagonal) density operators. ODC has the advantage of producing systems which, while still being inhomogeneous, are entirely in the Mott phase. This makes the insulating behavior and associated antiferromagnetism more apparent, and also allows simulations which are free of the sign problem at low temperatures. We analyze the effects of using different ODC traps and compare results with those from DC traps, for density, spin, and pairing correlation functions, as well as entropy and temperature profiles. Finally, we will discuss the advantages and importance of this new confinement technique for modeling correlated systems, including the potential for reaching lower temperature scales by following constant entropy curves.

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