Quantum phase diagram of fermion mixtures with population imbalance in one-dimensional optical lattices[1] BIN WANG, HAN-DONG CHEN, SANKAR DAS SARMA, Condensed Matter Theory Center and Center for Nanophysics and Advanced Materials, Department of Physics, University of Maryland, College Park — With a recently developed time evolving block decimation (TEBD) algorithm, we numerically study the ground state quantum phase diagram of fermi mixtures with attractive inter-species interactions loaded in one-dimensional optical lattices. For our study, we adopt a general asymmetric Hubbard model (AHM) with species-dependent tunneling rates to incorporate the possibility of mass imbalance in the mixtures. We find clear signatures for the existence of a Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase in this model in the presence of population imbalance. Our simulation also reveals that in the presence of mass imbalance, the parameter space for FFLO states shrinks or even completely vanishes depending on the strength of the attractive interaction and the degree of mass imbalance.

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Bin Wang
CMTC, Department of Physics, University of Maryland-College Park