

Abstract Submitted
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Disordered Mott Insulator in heavy-light Fermi mixture in optical lattices ANZI HU, Joint Quantum Institute, National Institute of Standards and Technology and University of Maryland, MACIEJ MASKA, Department of Theoretical Physics, Institute of Physics, University of Silesia, PL-40007 Katowice, Poland, JIM FREERICKS, Department of Physics, Georgetown University, Washington, DC 20057, USA, CHARLES CLARK, Joint Quantum Institute, National Institute of Standards and Technology and University of Maryland — Ultracold mixtures of different atomic species have great promise of realizing novel many-body phenomena beyond Hubbard model. In a mixture of fermionic atoms with large mass differences, a disordered Mott insulator can be formed as the result of the repulsive interaction between two species. The disorder Mott insulator leads to an incompressible total density of the mixture while the relative density is still compressible. Based on strong-coupling expansion and Monte Carlo calculations, we show that this phase can exist for a broad parameter region for ultracold mixtures confined by a harmonic trap and a three-dimensional optical lattice. The realization of such phase can lead to new ways of quantum control in ultracold mixtures.

Anzi Hu
Joint Quantum Institute, National Institute of Standards and
Technology and University of Maryland

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