Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Non-Equilibrium Mass Transport in the 1D Fermi-Hubbard Model SEBASTIAN SCHERG, THOMAS KOHLERT, HENRIK LSCHEN, PRANJAL BORDIA, Ludwig-Maximilians Universitt Mnchen, Max-Planck-Institut fr Quantenoptik, JAN STOLPP, Ludwig-Maximilians Universitt Mnchen, JACEK HERBRYCH, University of Tennessee, Oak Ridge National Laboratory, FABIAN HEIDRICH-MEISNER, Ludwig-Maximilians Universitt Mnchen, ULRICH SCHNEIDER, University of Cambridge, MONIKA AIDELSBURGER, IMMANUEL BLOCH, Ludwig-Maximilians Universitt Mnchen, Max-Planck-Institut fr Quantenoptik — We experimentally and numerically investigate the sudden expansion of interacting Fermions in a homogeneous one-dimensional lattice. Focusing on initial states with more than half filling, we observe a phase separation of singlons (quickly expanding particles on singly occupied lattice sites) and doublons (slow particles on doubly occupied lattice sites). We discuss evidence of quantum distillation in the limit of large interactions, which occurs if singlons distill out of the doublon cloud, leading to a contraction of the doublon region in the center of the cloud. For initial states with less than half filling, we find a phase of singlons expanding nearly independently of the interaction strength, which is in stark contrast to the behavior of Bosons. We attribute the weak effect of interactions to a less efficient generation of dynamical doublons due to the Pauli principle and discuss the role of the integrability of the 1D Fermi-Hubbard model.

Sebastian Scherg
Ludwig-Maximilians Universitt Mnchen

Date submitted: 26 Jan 2018 Electronic form version 1.4