

Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Bilayer Fermi-Hubbard systems via Quantum Gas Microscope¹
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BLOCH, CHRISTIAN GROSS, Max-Planck-Institut für Quantenoptik — Ultracold
atoms in optical lattices offer a unique route for the quantum simulation of the Hub-
bard model. Quantum gas microscopy with a single-site resolution has enabled the
study of the interplay between spin and charge in both one- and two-dimensional
strongly correlated systems. Here, we report on the experimental study of the bi-
layer Fermi-Hubbard (BFH) systems where the phase diagram of the BFH model at
half filling is explored. To realize the coupled-bilayer systems, we implement a fully-
controllable bichromatic vertical superlattice in our ⁶Li quantum gas microscope.
We perform geometric charge pumping to increase the separation between the layers
and therefore achieve the single-site resolution images of both layers. Furthermore,
we integrate the Stern-Gerlach splitting and the bilayer readout techniques which
allows for spin-resolved two-dimensional Fermi-Hubbard systems in larger sizes.

¹Bilayer Fermi-Hubbard systems via Quantum Gas Microscope

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Date submitted: 31 Jan 2020

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