Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Effect of collisions on the conductivity of fermions in an optical lattice RHYS ANDERSON, FUDONG WANG, PEIHANG XU, VIJIN VENU, STEFAN TROTZKY, University of Toronto, FREDERIC CHEVY, Ecole Normale Superieure, JOSEPH THYWISSEN, University of Toronto — We explore the effect of varying the interaction strength on the conductivity of fermions in an optical lattice. As described elsewhere [1], we realize the proposal of Wu et al. [2], to determine the global conductivity from in-situ imaging of the displacement of a sample subject to an external periodic forcing. Quantities extracted from such a conductivity measurement include the total spectral weight, given by the integral over the real part of the conductivity spectrum, and the transport lifetime, as determined from the width of the resonance peak. As the scattering length increases near a Feshbach resonance, we find that the conductivity spectrum broadens, as increased rates of collisions between the particles speed the decay of the induced currents. Our data is suggestive of a transport time that scales as $1/U^2$ for small U, consistent with a perturbative calculation based on Fermi's golden rule. However, the measured f-sum reveals that spectral weight is not lost: interactions merely redistribute conductivity among other frequencies in the optical conductivity spectrum.

[1]R. Anderson *et al.*, arXiv:1712.09965 (2017).
[2]Z. Wu, E. Taylor, and E. Zaremba, Europhys. Lett. **110**, 26002 (2015).

Rhys Anderson
University of Toronto

Date submitted: 26 Jan 2018 Electronic form version 1.4