Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

**Band and correlated insulators of cold fermions in a mesoscopic lattice** MARTIN LEBRAT, ETH Zurich, PJOTRS GRIŠINS, University of Geneva, DOMINIK HUSMANN, SAMUEL HÄUSLER, LAURA CORMAN, ETH Zurich, THIERRY GIAMARCHI, University of Geneva, JEAN-PHILIPPE BRANTUT, EPFL, TILMAN ESSLINGER, ETH Zurich — Conductance is one of the simplest measurable quantities revealing the conducting or insulating nature of a physical system, and yet an intricate non-local property sensitive to quantum interferences and interactions at a microscopic level. In our cold-atom setup, such a conductance measurement can be performed by connecting two macroscopic reservoirs of ultracold fermions to a smaller structure engineered by light potentials, and probing the current created by a atom number difference between the reservoirs. We report on the transport of degenerate Lithium-6 atoms through a structure tailored in a bottom-up approach: Using a Digital Micromirror Device to project up to nine consecutive scatterers inside a one-dimensional constriction, a lattice can be formed one site at a time. We observe the emergence of a band gap, originating from interferences among the scatterers. The coherent character of transport can be investigated by independently changing the lattice length and the temperature. The presence of a gap is robust against strongly attractive interparticle interactions and hints at the existence of a Luther-Emery liquid, a novel phase distinctive of the one-dimensional character of the underlying wire.

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Date submitted: 24 Jan 2018 Electronic form version 1.4