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Transport induced dynamical flat-band phases in optical kagome lattices[1] CHIH-CHUN CHIEN[2], University of California, Merced, GIA-WEI CHERN[3], Los Alamos National Laboratory, MASSIMILIANO DI VENTRA[4], University of California, San Diego — We consider quantum transport of ultracold fermions in an optical kagome lattice with a barrier keeping part of the lattice initially empty. The kagome lattice has two dispersive bands at low energy and one flat band at higher energy. When the barrier is removed, mobile atoms in the dispersive bands flow to the empty region. With atoms excited and removed by photons in the initially empty region, mobile atoms are depleted and a flat-band insulating phase emerges. Since the flat band of the kagome lattice is a high-energy one compared to the dispersive bands, this dynamically generated flat-band insulator is a population-inversion phase with no pumping required for maintaining it after its formation. In a similar setup a dynamical stripe phase emerges in the flat band when two-component fermions with weakly repulsive onsite interactions evolve in a static kagome lattice or even in the absence of interactions when the optical lattice is modulated. By considering nearest-neighbor repulsion, the system supports topologically non-trivial phases and their dynamics can be monitored at the mean-field level.

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