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Investigating Cold Atom Transport in Optical Lattices and Ratchets¹ SHAN ZHONG, ETHAN CLEMENTS, ZACH POLLOCK, ANTHONY RAPP, PRESTON ROSS, ANDREW HACHTEL, SAMIR BALI, Miami University — We experimentally investigate cold atom transport in optical lattices and ratchets in an undergraduate setting using home-built laser and imaging systems. It is well-known that the transport properties exhibited in these situations by ultracold atoms depart from the usual framework of Boltzmann-Gibbs statistical mechanics. We describe methods to quantify these departures by tracking the atomic momentum and spatial distribution, and measuring the “dwell time” and “crossover time,” respectively, in a particular well and between wells.

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