Many-body effects in momentum-space lattices$^1$ FANGZHAO AN, ERIC MEIER, BRYCE GADWAY, University of Illinois at Urbana-Champaign — Nonlinear interactions, when added to a tight-binding lattice system, can result in many interesting phenomena. The physics of such a lattice model can be described in terms of a bosonic Josephson junction array, allowing for the study of phenomena similar to those found in tunnel-coupled superconductors. Using a lattice made of coupled momentum states, we show measurements progressing towards the full Josephson array. By tuning the effective interaction strength, we observe the onset of self-trapping in a one-dimensional lattice, and further show collective Bloch oscillations on a tilted array.

$^1$This study is funded by the National Science Foundation under Grant No. 1707731 and by the Air Force Office of Scientific Research under Grant No. FA9550-18-1-0082.