

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Towards tunable atomic interactions in a synthetic lattice of momentum states¹ SHRADDHA AGRAWAL, SAI NAGA MANOJ PALADUGU, ERIC MEIER, FANGZHAO ALEX AN, BRYCE GADWAY, University of Illinois at Urbana-Champaign — We describe progress towards an updated experimental platform for engineering synthetic lattices based on laser-coupled atomic momentum states. Such systems offer high degrees of local and temporal control over the system parameters of artificial tight-binding models. In our new experiments involving Potassium-39 we hope to harness direct control of atomic interactions through a magnetically-controllable Feshbach resonance. Control over interactions will allow for the systematic exploration of interaction-driven phenomena in tunable synthetic lattices, which can, for example, enable studies of the interplay between interactions and band topology. Furthermore, momentum-mode-dependent interactions will enable the generation of squeezed states of linear momentum, which has promising applications in improved inertial sensing.

¹This 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.

Shraddha Agrawal
University of Illinois at Urbana-Champaign

Date submitted: 01 Feb 2019

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