Abstract Submitted
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Phasonic spectroscopy in a tunable quasicrystalline optical lattice[1] SHANKARI RAJAGOPAL, TOSHIHIKO SHIMASAKI, PETER DOTTI, RUWAN SENARATNE[2], DAVID WELD, University of California, Santa Barbara — We describe studies of excitations in a tunable quantum quasicrystal realized using neutral strontium atoms in a bichromatic optical lattice. The phasonic degrees of freedom of solid-state quasicrystals are thought to have significant effects on thermal and electronic transport, yet are typically not dynamically accessible. Driving such a phason mode in a cold-atom context has revealed high-order multiphoton excitation processes, drawing a link to high-harmonic generation processes in solids. We study the dependence of these multiphoton processes on tunneling and modulation strength, and use the phasonic drive as a novel spectroscopic probe of the quasicrystal. Extensions to this work include realizing a phasonic Thouless pump, directly mapping out a slice of the Hofstadter butterfly spectrum, and studying effects of Anderson localization and mobility edges on interband transitions.

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