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Matter-wave dynamics in a periodically pulsed disordered potential BRYCE GADWAY, JEREMY REEVES, LUDWIG KRINNER, DOMINIK SCHNEBLE, Department of Physics and Astronomy, Stony Brook University — We have experimentally studied the dynamical response of weakly-interacting atomic matter waves to a periodically pulsed, disordered optical lattice potential consisting of two overlapping standing-waves of incommensurate spatial periodicity. For periodic driving with a single-lattice potential, we observe behavior consistent with the kicked-rotor model, namely delocalization in momentum space at Talbot resonances as opposed to dynamic localization otherwise. However, adding the second lattice potential can greatly modify these two effects, which rely on constructive and destructive interference, respectively. In particular, we find that disorder leads to an inversion of the behavior in each case. The added incommensurate lattice destroys localization when the driving is off-resonant and suppresses delocalization for a resonant drive.

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