Dynamics of matter waves in tailored optical and atomic lattices JEREMY REEVES, BRYCE GADWAY, LUDWIG KRINNER, DANIEL PERTOT\textsuperscript{1}, MATTHIAS VOGT\textsuperscript{2}, DOMINIK SCHNEBLE, Department of Physics and Astronomy, Stony Brook University — We report experimental results on the dynamics of atomic matter waves in temporally and spatially modulated lattices. In a first experiment, we investigated the effects of disorder on dynamical localization in a periodically-pulsed optical lattice in the framework of a kicked-rotor model. A second experiment explored the interplay between disorder and interactions in the damping of Bloch oscillations in a tilted disordered lattice. In a third experiment, we examined the diffraction of atomic matter waves from 1D “crystal” arrays of lattice-trapped atoms with respect to the temporal dynamics of matter-wave scattering. We also demonstrated the use of matter waves to detect forced antiferromagnetic ordering in an atomic spin-mixture.

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