Abstract Submitted
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Exploring extreme nonequilibrium phenomena with trapped atoms[1] SHANKARI RAJAGOPAL, RUWAN SENARATNE, KEVIN SINGH, ZACHARY GEIGER, KURT FUJIWARA, PETER DOTTI, DAVID WELD, University of California, Santa Barbara — Trapped ultracold atoms enable direct experimental investigation of nonequilibrium many-body quantum dynamics, including phenomena which are difficult or impossible to investigate in the solid state. We report on progress in two such experiments using ultracold strontium: exploring the excitation structure of phasonic modes in quasicrystals and simulating attosecond-scale electron dynamics. Because phason modes involve long-range rearrangement of atoms, they are typically not dynamical degrees of freedom in solid-state quasicrystals. Uniquely, the cold atom context enables spectroscopic probes of electron-phason coupling. Separately, we discuss quantum emulation of ultrafast physics, which is enabled by equilibration timescales more than ten orders of magnitude slower than those in solids.

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