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Prethermalization and exponentially slow energy absorption in periodically driven many-body systems DMITRY ABANIN, WEN WEI HO, University of Geneva, Switzerland, WOJCIECH DE ROECK , KU Leuven, Belgium, FRANCOIS HUVENEERS , Universit Paris-Dauphine, France — We establish some general dynamical properties of lattice many-body systems that are subject to a high-frequency periodic driving. We prove that such systems have a quasi-conserved extensive quantity H_*, which plays the role of an effective static Hamiltonian. The dynamics of the system (e.g., evolution of any local observable) is well-approximated by the evolution with the Hamiltonian H_* up to time τ_*, which is exponentially long in the driving frequency. We further show that the energy absorption rate is exponentially small in the driving frequency. In cases where H_* is ergodic, the driven system prethermalizes to a thermal state described by H_* at intermediate times $t < \tau_*$, eventually heating up to an infinite-temperature state at times $t \sim \tau_*$. Our results indicate that rapidly driven many-body systems generically exhibit prethermalization and very slow heating. We briefly discuss implications for cold atoms experiments which realize topological states by periodic driving.

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