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Eigenstate distribution of observables in an integrable quantum system after a quench AMY CASSIDY, CHARLES W. CLARK, Joint Quantum Institute, National Institute of Standards and Technology and University of Maryland, MARCOS RIGOL, Georgetown University — A generic, non-integrable quantum system is expected to follow the eigenstate thermalization hypothesis (ETH): the expectation value of a few-body observable in an individual eigenstate which has energy close to the mean value is equal to the thermal expectation value of the the observable. For a system that follows the ETH, all eigenstates with significant weight in the diagonal distribution give identical values. We explore the conditions under which similar phenomena is expected to hold in integrable systems. We investigate quantum quenches in hard-core bosons in one-dimensional optical lattices. These systems can be efficiently simulated using the Jordan- Wigner mapping to free fermions and exact diagonalization of the single-particle states. We calculate the full energy spectrum as well as the density and momentum distribution functions in individual many- body eigenstates after the quench. The results of the diagonal ensemble are compared with thermal expectation values.

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