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Relaxation dynamics in quasi one-dimensional cold gases DOMINIK MUTH, MICHAEL FLEISCHHAUER, Fachbereich Physik, Technische Universität Kaiserslautern, Germany — Due to the fast development of experimental techniques it now becomes possible to study the dynamics of interacting ultra-cold quantum gases. Furthermore deep optical lattices or atom chips provide access to the quasi one-dimensional regime. While one-dimensional quantum gases with local interactions are integrable even for finite interaction strength, experiments necessarily contain small distortions e.g. due to transversal excitations in the confinement or coupling between different one-dimensional cells. These destroy integrability and make the system relax into a thermal state, given by the usual canonical ensemble. We investigate theoretically the connection between the strength of the distortions and the rate of thermalization. The analytical results are complemented with numerical simulations using the Time Evolving Block Decimation algorithm, a powerful tool for one-dimensional quantum systems, that allows us to go beyond the regime covered by perturbation theory.

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