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When Is a Bath a Bath? Relaxation Dynamics and Thermalization in a Fermionic Chain NICHOLAS SEDLMAYR, JIE REN, TU Kaiserslautern, FLORIAN GEBHARD, Marburg University, JESKO SIRKER, TU Kaiserslautern — We study thermalization in a one-dimensional quantum system consisting of a non-interacting fermionic chain with each site of the chain coupled to an additional bath site. Using a time-dependent density matrix renormalization group algorithm we investigate the time evolution of observables in the chain after a quantum quench. For a weakly interacting bath and low densities we show that the dynamics can be quantitatively described by a system of coupled equations of motion. For higher densities our numerical results show equilibration for local observables and a thermalization to the canonical ensemble independent of the initial state. In particular, we find a Fermi momentum distribution in the chain in equilibrium in spite of the seemingly oversimplified bath in our model.

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