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Irreversibility in Quantum Many-Body Systems MARKUS SCHMITT, STEFAN KEHREIN, Univ Goettingen — The question of thermalization in closed quantum many-body systems has received a lot of attention in the past few years. An intimately related question is whether a closed quantum system shows irreversible dynamics. However, irreversibility and what we actually mean by this in a quantum many-body system with unitary dynamics has been explored very little. In our work we investigate the irreversibility of dynamics in quantum many-body systems by studying echo dynamics. In order to quantify the (ir)reversibility we study the time evolution involving an imperfect effective time reversal. Our measure for the recovery of the initial state are the echo peaks occurring in the time evolution of observables. Specifically, we investigate non-interacting and interacting one-dimensional spin chains. We study the characteristics of the echo peak decay and especially focus on whether this depends on the (non-)integrability of the model.

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