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Role of the Initial State in the Nonequilibrium Quantum Dynamics of Many-Body Systems[1] LEA F. SANTOS, EDUARDO J. TORRES-HERRERA, Yeshiva University — We show that the dynamics of isolated many-body quantum systems after a quench depends on the interplay between the initial state and the Hamiltonian dictating the evolution. The systems considered are in the nonperturbative regime. The relaxation process is controlled by the width of the energy distribution of the initial state and may be very similar for both chaotic and integrable Hamiltonians. Our analytical expression for the fidelity decay displays excellent agreement with our numerical results. This decay is Gaussian and may persist until saturation. We also provide analytical expressions that describe very well the initial evolution of the Shannon entropy and of few-body observables. The analyses are developed for deterministic one-dimensional systems and initial states of interest to current experiments with cold atoms in optical lattices.

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