Lax dynamics

Abstract: “A novel approach is proposed to characterize the dynamics of perturbed many-body integrable systems. Focusing on the paradigmatic case of the Toda chain under non-integrable Hamiltonian perturbations, this study introduces a method based the time evolution of the Lax eigenvalues as a proxy of the quasi-particles velocities and of the perturbed Toda actions. A set of exact equations of motion for the is derived that closely resemble those for eigenenergies of a quantum problem (also known as the Pechukas-Yukawa gas). Numerical simulations suggest that the invariant measure of such dynamics is basically the thermal density of states of the Toda lattice, regardless of the form of the perturbation.”

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