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The spectral form factor in Bosonic integrable systems with local random interactions

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Abstract
The spectral form factor (SFF) is a widely used tool for diagnosing quantum chaos and information scrambling. Recent studies have shown that the SFF can also indicate scrambling behavior in integrable systems when non-local random couplings are present. In this work, we investigate integrable bosonic systems governed by quadratic Hamiltonians with local random interactions. Through numerical analysis, we demonstrate that the SFF exhibits a ramp at intermediate times, a feature absent in integrable systems without randomness. The presence of this ramp provides evidence supporting the notion of quantum information scrambling in locally coupled, yet integrable, systems.

Keywords: Quantum Information Scrambling, Spectral Form Factor, Integrability, Quantum chaos.

For full article, refer to the Persian section