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Thermalization threshold in models of 1D fermions SUBROTO MUKERJEE, RANJAN MODAK, Department of Physics, Indian Institute of Science, Bangalore, SRIRAM RAMSWAMY, TIFR Centre for Interdisciplinary Sciences, Hyderabad — The question of how isolated quantum systems thermalize is an interesting and open one. In this study we equate thermalization with non-integrability to try to answer this question. In particular, we study the effect of system size on the integrability of 1D systems of interacting fermions on a lattice. We find that for a finite-sized system, a non-zero value of an integrability breaking parameter is required to make an integrable system appear non-integrable. Using exact diagonalization and diagnostics such as energy level statistics and the Drude weight, we find that the threshold value of the integrability breaking parameter scales to zero as a power law with system size. We find the exponent to be the same for different models with its value depending on the random matrix ensemble describing the non-integrable system. We also study a simple analytical model of a non-integrable system with an integrable limit to better understand how a power law emerges.

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