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Fast scrambling in the Sachdev-Ye-Kitaev model: a numerical test[1] CHRISTOPHER OLUND, NORMAN YAO, JOEL MOORE, Univ of California - Berkeley — Understanding the approach toward thermalization in isolated quantum systems is challenging. This approach is thought to be characterized by the delocalization, or scrambling, of quantum information over all of a systems degrees of freedom. Recently, connections have been made between black holes, conjectured to be the fastest scramblers in nature, and model spin and fermionic hamiltonians. These models typically live on fully connected graphs, naturally motivating the question: are all-to-all interactions necessary for fast scrambling? Here, we numerically probe the scrambling rate of the Sachdev-Ye-Kitaev model for intermediate system sizes and vary the range of the underlying interactions. By fitting out of time ordered correlation functions to a known analytic expression, we extract the scrambling rate and perform a detailed finite size scaling analysis. Extrapolating to the thermodynamic limit, we find reasonable agreement with a recently conjectured bound for low to intermediate temperatures.

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