Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Scrambling and onset of chaos in quantum many-body systems DEBANJAN CHOWDHURY, Massachusetts Institute of Technology, BRIAN SWINGLE, Harvard University — The growth of commutators of initially commuting local operators diagnoses the onset of chaos in quantum many-body systems. We have studied the onset of scrambling in two broad classes of systems: for interacting systems with static disorder, and, for the (2 + 1)-dimensional O(N) non-linear sigma-model. We find generically that in the first class of systems we considered, disorder slows the onset of scrambling [1], and, in the case of a many-body localized (MBL) state, partially halts it. We also conjecture on the growth of commutators in a weakly interacting diffusive metal. In the second class of systems, we considered the O(N) model in thermal equilibrium at a temperature T above the zero temperature quantum critical point. The relevant commutators grow exponentially in time with a rate denoted λ_L. We find $\lambda_L = cT/N$ to leading order in 1/N, where c is a universal constant [2]. We also comment on the growth of commutators in space as measured by the butterfly velocity. [1] B. Swingle D. Chowdhury, arXiv:1608.03280 [2] D. Chowdhury B. Swingle, to appear

Debanjan Chowdhury
Massachusetts Institute of Technology

Date submitted: 10 Nov 2016 Electronic form version 1.4