

Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Many Body Localization without disorder SAYAN CHOUDHURY, QI ZHOU, Purdue University — Motivated by the question of whether disorder is necessary for many-body localization (MBL), we study the quantum dynamics of a frustrated one-dimensional spin chain without disorder. When the system is prepared at an initial state with one domain wall, a frustration-induced destructive interference suppresses the propagation of excitations. As a result, for a wide parameter regime, this spin chain exhibits many characteristic signatures of MBL including initial state memory retention and the logarithmic growth of entanglement entropy. The lifetime of such quasi-MBL grows exponentially with increasing the size of the system. We further show how an appropriate out-of-time-ordered correlator is correlated to the entanglement entropy. Our findings suggest a new route to access quasi-MBL in a broad class of systems with frustration.

Sayan Choudhury
Purdue University

Date submitted: 26 Jan 2018

Electronic form version 1.4