

Title: Ergodicity breaking in the Thermodynamic Limit: Dynamical Freezing and Emergent Conservation Laws

Arnab Das

Indian Association for the Cultivation of Sciences, 2A & 2B Raja S. C. Mullick Road, Kolkata – 700032

Abstract: An interacting, closed quantum system, when driven periodically by changing a parameter of the Hamiltonian periodically with time, is expected to heat up without bound and to reach a locally infinite-temperature like random state – a scenario known as ‘Floquet thermalization’. This expectation is consistent with the ergodicity principle of Statistical mechanics, Fermi’s Golden-rule-type arguments for heating of a Floquet system. etc. Here we present a generic exception to this scenario under strong drive – the phenomenon of dynamical freezing. We show, strong drive gives birth to new approximate but stable conservation laws not present in the undriven system. These conservation laws prevent Floquet thermalization, and opens door to Floquet engineering of new phases of quantum matter in interacting quantum systems, which was previously believed to be impossible.