Ergodicity, entanglement, and many-body localization

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Abstract

We are used to describing many-particle systems by statistical mechanics. However, the basic postulate of statistical mechanics – ergodicity – breaks down in many-body localized (MBL) systems, where disorder prevents particle transport and thermalization. I will give an overview of the recent theoretical progress in understanding ergodicity breaking, and will show that MBL systems are integrable and have simple and universal dynamical properties. I will describe signatures of MBL in quench and spin-echo-type experiments. Finally, I will discuss dynamical localization and thermalization in periodically driven many-body systems.

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