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Many-Body Localization in a Quasiperiodic System SHANKAR IYER, GIL REFAEL, California Institute of Technology, VADIM OGANESYAN, College of Staten Island, City University of New York, DAVID HUSE, Princeton University — Recent theoretical and numerical evidence suggests that localization can survive the introduction of interactions in disordered many-body systems, giving rise to a so-called many-body localization transition. This dynamical phase transition is relevant to questions of thermalization in quantum systems. It separates a many-body localized phase, in which localization prevents thermalization, from an "ergodic" phase in which the usual assumptions of quantum statistical mechanics hold. Here, we present numerical evidence that many-body localization also occurs in models that omit true disorder in favor of a quasiperiodic potential. In one dimension, these systems already have a single-particle localization transition, and we show that this transition becomes a many-body localization transition upon the introduction of interactions. These issues are increasingly experimentally relevant, because quasiperiodic potentials have been used in place of true disorder in recent experiments with cold atoms and with photonic waveguides.

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