Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Many-body localization as percolation in d>1 ANUSHYA CHANDRAN, Perimeter Institute, CHRIS LAUMANN, University of Washington, DANIEL GOTTESMAN, Perimeter Institute — Statistical mechanics is the framework that connects thermodynamics to the microscopic world. It hinges on the assumption of equilibration. Isolated quantum systems need not equilibrate; this is the phenomenon of many-body localization (MBL). While a detailed understanding of MBL and the associated delocalization transition is beginning to emerge in one dimension, relatively little is known about higher dimensions. In this work, we present a minimal tractable model for MBL in all spatial dimensions. Specifically, we analyze a disordered Floquet circuit composed of Clifford gates. In one dimension, the system is always localized, while in higher dimensions, it exhibits both delocalized and localized phases. The localized phase consists of well-defined metallic puddles embedded in an insulating matrix. When the puddles percolate, the system delocalizes; this maps the dynamical transition to critical percolation. We also comment on the stability of the phases to generic perturbations away from the Clifford class.

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Date submitted: 14 Nov 2014 Electronic form version 1.4