1108-81-492 **John Z. Imbrie*** (imbrie@virginia.edu), Department of Mathematics, University of Virginia, P. O. Box 400137, Charlottesville, VA 22904-4137. *On many-body localization for quantum spin chains.*

We consider random matrices that arise in the physics of disordered systems. These represent quantum mechanical Hamiltonians for systems of interacting particles or spins. For strong disorder, the matrices are on average diagonally dominant, so one might conjecture that the eigenvectors resemble the initial basis vectors, in an appropriate sense. This is the phenomenon of many-body localization; it leads to a lack of transport and a lack of ergodicity in the quantum system.

We show that a particular one-dimensional spin chain with random local interactions exhibits many-body localization. The proof depends on a physically reasonable assumption that limits the amount of level attraction in the system. The construction uses a sequence of local unitary transformations to diagonalize the Hamiltonian and connect the exact many-body eigenfunctions to the original basis vectors. (Received January 19, 2015)