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Strong Disorder Renormalization Group for the Many Body Localization Transition GIL REFAEL, California Institute of Technology, VADIM OGANESYAN, City University of New York, SHANKAR IYER, California Institute of Technology — The strong disorder renormalization group, originally devised by Ma and Dasgupta to study the random Heisenberg antiferromagnet, has subsequently been used to investigate the low energy physics and quantum phase transitions of a variety of strongly disordered systems. However, recent work by Basko, Aleiner, and Altshuler has focused attention on the many body localization transition, a dynamical quantum phase transition that involves the localization of highly excited eigenstates of a many body system in Fock space. Numerical results from an exact diagonalization study by Pal and Huse suggest that the many body localization transition may exhibit so-called infinite-randomness, a property that implies that a strong disorder renormalization group may be well-suited to study this transition. With the many body localization transition in mind, we therefore outline a strong disorder renormalization procedure that targets the least-localized eigenstate of a model. We then apply this procedure to study disordered quantum Ising and XXZ models. The latter model is similar to the one investigated by Pal and Huse and is expected to contain a dynamical transition between localized and ergodic phases; our principal aim is to use the strong disorder RG to characterize this transition.

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