

Abstract Submitted
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Entanglement spectrum and entangled modes of random XX spin chains MOHAMMAD POURANVARI, KUN YANG, Florida State University — We study in this work the ground state entanglement properties of finite XX spin-1/2 chains in with random couplings, using Jordan-Wigner transformation. We divide system into two parts and study reduced density matrixes (RDMs) of its subsystems. Due to the free-fermion nature of the problem, the RDMs take the form of that of a free fermion thermal ensemble. Finding spectrum of the corresponding entanglement Hamiltonian and corresponding eigenvectors, and comparing them with real space renormalization group (RSRG) treatment, we establish the validity of the RSRG approach for entanglement in the limit of strong disorder, but also find its limitations when disorder is weak. In the latter case our work provides a way to visualize the effective spins that form long distance singlet pairs.

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