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Effective Theory for Domain Wall Melting RYAN CADIGAN, DEEPAK IYER, Bucknell University — A variety of recent studies have shed light on the far from equilibrium behavior of quantum systems. Research suggests that this field of study may produce unfamiliar dynamical realizations of quantum states. It has been shown that in some cases a time evolving quantum state is equivalent to the ground state of an effective Hamiltonian where the time enters as a parameter. Here, we study the dynamical behavior of noninteracting fermions in a one-dimensional lattice starting from a domain wall initial state. As the system equilibrates, we look at the distribution of particles as well as correlations between particles in the system. We then compare the actual time evolving state of the system to the ground state of the effective Hamiltonian to study how long this description is valid, and when and where it breaks down using the trace distance between the full density matrices of the two systems. We generally expect that the description is valid in a given region as long as the boundary effects do not propagate into the region.

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