“Dualities” from non-invertible topological defects

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1. Abstract

Recent work has revealed a host of “dualities” between strongly interacting models. As apparent from the canonical example of Kramers and Wannier, such dualities are much subtler than a one-to-one mapping of energy levels, but rather are non-invertible. I describe an algebraic structure in the XXZ spin chain and three other Hamiltonian that yields non-invertible maps between them and also guarantees all are integrable. Several of these models also possess useful non-invertible symmetries, with the spontaneous breaking of one resulting in an unusual ground-state degeneracy. The maps are found expicitly using topological defects coming from fusion categories and the lattice analog of the orbifold construction.