A constructed toy model by unitary transformation of one-dimensional Ising model and the possibility of topologically ordered ground state PEJMAN JOUZDANI, Univ of South Florida — It is known that the ground state of the one-dimensional Ising model cannot be realized in a Z_2 broken-symmetry phase due to a local (single-spin) order parameter. We propose a toy model, constructed from the one-dimensional Ising Hamiltonian by a unitary transformation, that in contrast maintains a symmetry-broken phase and its ground state shows promising protection against single-spin perturbation, at least. Using perturbation theory, we argue that the protection is proportional to the system length. However, the unitary transformation used to obtain the model requires a mechanism of coupling of two spins to a tuning external field. We provide numerical evidence that supports the theoretical findings. Due to the relation between the Ising model on an open chain and the Majorana fermion model through the Jordan-Wigner transformation, our model suggests possibility of an alternative approach to experiment topological properties.

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