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Symmetry-protected topological phases and orbifolds: Generalized Laughlin's argument OLABODE SULE, XIAO CHEN, SHINSEI RYU, University of Illinois at Urbana-Champaign — We consider non-chiral symmetry-protected topological phases of matter in two spatial dimensions protected by a discrete symmetry such as Z_K or $Z_K \times Z_K$ symmetry. We argue that modular invariance/noninvariance of the partition function of the one-dimensional edge theory can be used to diagnose whether, by adding a suitable potential, the edge theory can be gapped or not without breaking the symmetry. By taking bosonic phases described by Chern-Simons K-matrix theories and fermionic phases relevant to topological superconductors as an example, we demonstrate explicitly that when the modular invariance is achieved, we can construct an interaction potential that is consistent with the symmetry and can completely gap out the edge.

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