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Diagnosing gapless edge theory of symmetry protected topological phases via twist operators GIL CHO, SHINSEI RYU, University of Illinois at Urbana-Champaign — A symmetry protected topological (SPT) phase is a new phase of matter which has been actively studied recently. The bulk of a SPT phase is gapped and disordered, and thus it is featureless and difficult to be distinguished from a trivially disordered phase. Remarkably there are gapless edge modes emerging at the boundary between the vacuum and the SPT phase. The gapless edge state is protected by the symmetries of the SPT phase and is a only measurable signature of the SPT phase, and thus we can learn about the SPT phase by studying only its edge modes. One can write down a conformal field theory describing the edge modes, and we consider twist operators of the theory to diagnose the stability of the conformal field theory against symmetry-respecting perturbations. When acted on a state, a twist operator changes the boundary condition for the quantum fields in the conformal field theories. It manifests in the mode expansion of the fields and changes only the behavior of the "zero" mode of the fields. At the edge of the SPT phase, we consider only the twist operators consistent with symmetries. Then we investigate the algebra between the twist operators and their symmetry quantum numbers in various methods to study the stability of the edge theory.

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