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Detecting two dimensional symmetry protected topological order in a ground state wave function MICHAEL ZALETEL, University of California, Berkeley — Symmetry protected topological states cannot be deformed to a trivial state so long as the symmetry is preserved, yet there is no local order parameter that can distinguish them from a trivial state. We demonstrate how to detect whether a two dimensional ground state has symmetry protected topological order; the measurement play a similar role as the topological entanglement entropy does for detecting anyons. For finite abelian symmetries the measurement gives a complete characterization of the 3rd cohomology class that describes the order. The proposed measurement is validated numerically for a model with Z_2 symmetry protected order.

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