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Topological phases protected by point group symmetry¹ SHENG-JIE HUANG, HAO SONG, MICHAEL HERMELE, University of Colorado Boulder — There has been remarkable progress in the theoretical understanding of symmetry protected topological (SPT) phases. However, most theories focus on internal, or on-site, symmetries, even though spatial symmetries are important in solids. In this talk, we classify bosonic SPT phases protected by crystalline point group symmetry, which we dub point group SPT (pgSPT) phases. Our approach is based on a procedure to reduce a d-dimensional pgSPT phase to lower-dimensional SPT phases protected by internal symmetry. For three-dimensional pgSPT phases, this approach allows us to gain insight into non-trivial properties at symmetry preserving surfaces. In particular, we obtain toy models for the surfaces of certain pgSPT phases at which there is a symmetry preserving Z_2 topological order with anomalous symmetry fractionalization. We also discuss connections between bosonic pgSPT phases and electronic topological crystalline insulators.

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