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Reflection symmetric-order topological insulators and superconductors

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Second-order topological insulators are crystalline insulators with a gapped bulk and gapped crystalline boundaries, but topologically protected gapless states at the intersection of two boundaries. Without further spatial symmetries, five of the ten Altland-Zirnbauer symmetry classes allow for the existence of such second-order topological insulators in two and three dimensions. We show that reflection symmetry can be employed to systematically generate examples of second-order topological insulators and superconductors, although the topologically protected states at corners (in two dimensions) or at crystal edges (in three dimensions) continue to exist if reflection symmetry is broken. A three-dimensional second-order topological insulator with broken time-reversal symmetry shows a quantized Hall conductance.