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The strong index classification of reflection symmetric topological insulators and superconductors CHING-KAI CHIU, University of Illinois at Urbana-Champaign, HONG YAO, Institute for Advanced Study, Tsinghua University, SHINSEI RYU, University of Illinois at Urbana-Champaign — We discuss the topological invariants of topological insulators and superconductors protected by spatial reflection symmetry in any spatial dimensions. In the presence of both (non-spatial) discrete symmetries in the Altland-Zirnbauer classification and reflection symmetry, we introduce two new topological invariants: a mirror integral number and a binary integral number, which is determined by the larger one of the Z number and mirror integral number. We claim that the topological states are characterized by one of '0', Z_2 , Z , and the two new topological invariants. Furthermore, those topological invariants are also determined by commutation or anticommutation relations between the discrete non-spatial symmetry operators and the reflection symmetry operator. By using the construction of bulk Dirac Hamiltonians, we provide the complete classification, which still has the same dimensional periodicities with the original Altland-Zirnbauer classification. When a boundary is introduced, which is reflected into itself, these non-trivial topological insulators and superconductors support gapless modes localized at the boundary.

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