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Topological crystalline semimetals in non-symmorphic lattices without time-reversal symmetry YIGE CHEN, HEUNG-SIK KIM, HAE-YOUNG KEE, University of Toronto — Numerous efforts have been devoted to reveal exotic semimetallic phases with topologically non-trivial bulk and surface states in materials with strong spin-orbit coupling. Recent theoretical works on orthorhombic perovskite iridates SrIrO3 have indicated that non-symmorphic symmetry is crucial to protect a nodal line Fermi surface (FS) in addition to space-time inversion symmetry [C. Fang *et.al*, PRB **92**, 081201(R) (2015), Y. Chen *et.al*, Nat. Commu. **6**, (2015)]. In this work, we investigate possible topological semimetals in the absence of time-reversal symmetry. In principle, an anti-unitary operator, defined as a product of time-reversal and glide operators, can protect a four-fold or two-fold degenerate nodal FS. Indeed this happens in SrIrO3 with the magnetic field along a particular direction. A trivial gapped insulator can also occur due to a lack of such anti-unitary operation. This study shows that non-symmorphic crystals with multiple fractional lattice translations exhibit rich topological properties.

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