Abstract Submitted
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Noncentrosymmetric Line-Node Dirac semimetal CaAgX (X=P, As) AI YAMAKAGE, Department of Applied Physics, Nagoya University, YOUICHI YAMAKAWA, Department of Physics, Nagoya University, YUKIO TANAKA, YOSHIHIKO OKAMOTO, Department of Applied Physics, Nagoya University — Noncentrosymmetric ternary pnictide CaAgX (X =P, As) is shown to be a topological line-node semimetal protected solely by mirror-reflection symmetry. The band gap vanishes on a circle in momentum space and surface states emerge within the circle. The Z_2 topological invariant ν related to the surface states is defined from the Berry phase and mirror-reflection symmetry. Extending this study to spin-orbit coupled systems reveals that, compared with CaAgP, a substantial band gap is induced in CaAgAs by large spin-orbit interaction. The resulting states are a topological insulator, in which the Z_2 topological invariant is given by 1;000. We have found that the Z_2 topological invariants ν_0, ν_1, ν_2, and ν_3 for time-reversal-invariant insulators without spatial-inversion symmetry and with mirror-reflection symmetry are calculated from the Z_2 invariant ν for a line node in the absence of spin-orbit interaction. Namely, line-node Dirac semimetals protected by mirror-reflection symmetry turn into strong topological insulators owing to spin-orbit interaction. [AY, Y. Yamakawa, Y. Tanaka, and Y. Okamoto, arXiv:1510.00202]

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