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Title: Non-symmorphic route to nodal semimetals

Nodal semimetals are materials in which the conduction and the valence bands touch at points or lines in the Brillouin zone. Such nodal band structures manifest themselves in unusual transport phenomena as well as in topologically protected surface states. The examples include the chiral Landau levels and negative magnetoresistance for the first, and surface Fermi arcs and surface flat bands for the latter. In spite of these anticipated properties, the number of actual material examples remains still limited.

In this talk, we point out the significant role played by non-symmorphic symmetries, i.e. point symmetries followed by a fractional translation, in imposing various types of nodes. This method has been successfully used to identify new type of Dirac semimetals [1], hourglass fermions [2] and further new fermions in solids [3]. In our work [4], we use this strategy to predict new types of three-dimensional semimetals with nodal rings and nodal chains (i.e. multiple interconnected nodal rings). Based on first-principle calculations, we predict that an existing material, IrF_4 , is likely to exhibit the nodal chain at the Fermi level. We predict this feature to result in several unusual transport properties, including anomalous surface Hall effect and direction-selective negative magnetoresistance.

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[3] B. Bradlyn, J. Cano, Z. Wang, M. G. Vergniory, C. Felser, R. J. Cava, B. A. Bernevig, *Science* **353**, aaf5037 (2016)

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