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Intertwined spin-orbit coupled surface states of a nonsymmorphic semimetal

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Time: 13:30 -14:30

Abstract:

Stabilising the intersection point of topologically trivial and non-trivial states of matter against spin-orbit coupling has standing issue in the field of bulk topological semimetals. Young and Kane [1] have offered a solution to this problem in the form of band-crossings protected by nonsymmorphic crystalline symmetries.

Such protected crossings have indeed recently been found experimentally. Using angle-resolved photoemission spectroscopy, bulk Dirac line nodes protected against spin-orbit coupling have been found in ZrSiS [2] and the family of related compounds. These materials also host surface states closely related to the nonsymmorphic symmetries of their structure, which seem to be very sensitive to the amount of spin-orbit coupling in the system [3].

Employing spin- and angle-resolved photoemission spectroscopy, we study the isostructural and isoelectric Dirac line node material with strong spin-orbit coupling, NbGeSb. We observe an array of intertwined spin-polarised surface states, similar to those in the ZrSiS family, which create intricate spin- and orbital-textures in the electronic band structure. By understanding the details of the band structure of NbGeSb, this project aims to shed light on the interplay of nonsymmorphic symmetries and spin-orbit coupling and thus further our understanding of the ways to stabilise and manipulate Dirac semimetals.

References:

[1] Young, Kane, PRL **115**, 126803 (2015)
[2] Schoop, *et al.*, Nat Comm **7**, 11696 (2016)
[3] Topp, *et al.*, arXiv:1709.00319 (2017)

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