

Nodal p - and f -wave magnets

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Nonrelativistic magnetic spin splitting can be classified by its momentum-space angular structure. Even-parity d-, g-, and i-wave splitting characterizes altermagnets. The simplest odd-parity analogues are p-wave magnets, which have recently been predicted [1] and observed in certain noncollinear magnets [2]. However, for noncollinear magnets, nodes of band splitting and sign changes of spin polarization do not need to coincide, thus weakening the analogy to altermagnets.

We derive spin-space-symmetry criteria that link the band-splitting and spin-polarization textures to enforce nodal p- and f-wave splitting. A minimal itinerant-electron model on a honeycomb bilayer fulfills these criteria and permits additional radial reversals of spin polarization (Fig. 1) [3]. While the threefold rotation of f-wave magnets forbids an in-plane bulk linear Edelstein response, selected terminations host p-wave surface bands and thus a surface Edelstein response with f-wave anisotropy. We further predict canting-induced linear spin conductivity tied to the nodal splitting.

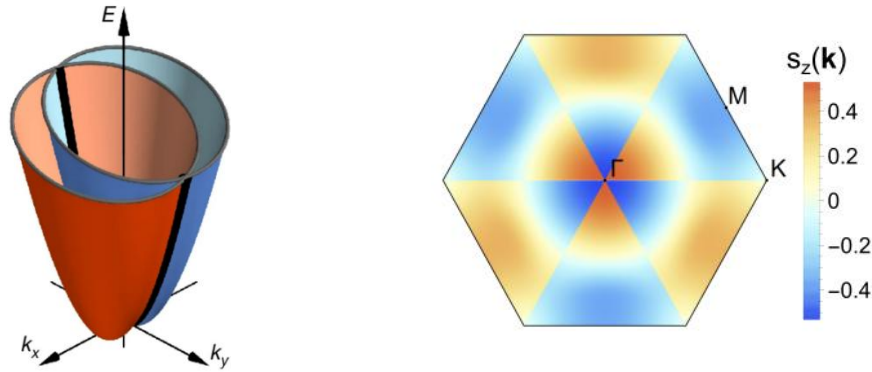


Figure 1. Left: P-wave splitting of a parabolic band structure. Red (blue) indicates a positive (negative) spin polarization. Right: f-wave spin polarization in a hexagonal Brillouin zone, where symmetries enforce an f-wave angular dependence.

- [1] A. B. Hellenes *et al.*, *P-wave magnets*, arXiv:2309.01607 (2023).
- [2] R. Yamada *et al.*, *A metallic p-wave magnet with commensurate spin helix*, Nature **646**, 837-842 (2025).
- [3] M. M. Hirschmann *et al.*, *Symmetry-Enforced Nodal f-Wave Magnets*, arXiv:2603.17406 (2026).