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Topological and ferromagnetic properties of iron-based van der Waals metals

In spintronics, two dimensional (2D) van der Waals (vdW) crystals constitute a most promising material class for long-distance spin transport or effective spin manipulation. To realize all-vdW-material-based spintronic devices, however, new vdW materials with itinerant ferromagnetism are needed for spin current generation and thereby serve as an effective spin-source. In this talk, I will introduce iron-based van der Waals (vdW) materials, Fe_3GeTe_2 and Fe_4GeTe_2 , where combination of magnetism, spin-orbit interaction, and topological band structures gives rise to unusual physical properties, including a large anomalous Hall effect due to the orbital-driven nodal-line band topology [1] and a nearly room temperature ferromagnetism with a tunable perpendicular magnetic anisotropy [2]. These findings demonstrate that topological and ferromagnetic iron-based vdW materials have great potential for various spin-dependent electronic functionalities.

References

- [1] K. Kim *et al.* Nat. Mater. 17, 794 (2018)
- [2] J. Seo *et al.* *submitted*.