Magnetism in 2D van der Waals Materials

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Two-dimensional (2D) van der Waals (vdW) materials are atomically thin layers of crystals, in which the in-plane interatomic interactions are much stronger than the out-of-plane vdW interactions. They have been a subject of intense study in condensed matter physics and materials science for nearly two decades because of their unique and useful properties not present in bulk materials. One of the recent discoveries in 2D materials is the intrinsic long-range magnetic order in atomically thin crystals, which has triggered a renaissance in the study of 2D magnetism.

In this talk, I will discuss our recent work on chromium chalcogenides, a family of 2D magnets which possess a wide range of intriguing magnetic properties, including high temperature ferromagnetism, topological spin textures, and giant anomalous Hall conductivity. I will focus on the bottom-up synthesis of these 2D magnetic materials, the correlation between their structural phases and emergent magnetism, as well as the new opportunities that they may offer and the challenges that they currently have for spintronic applications.