Chromium Halides: Recent Progress and Open Questions

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The discovery of 2D ferromagnetic insulators[1,2] have strongly boosted the design and engineer of new van der Waals devices through the combination of different layered materials with different electronic properties[3-5]. Although the magnetic properties of these materials have been already reported experimentally using optical[2] and transport probes[6], a miscroscopic magnetic theory for these materials is still lacking and correlation effects are far from being completely understood.

In this talk, I will show some recent progress in understanding magnetism in chromium halides from first-principles calculations. More specifically, I will describe stacking-dependent magnetism in bilayer CrI3[7] and how proximity effects in CrI3/Graphene interface may play an important role in the stacking properties of few layer CrI3.

References

[1] C. Gong et al., Nature, 546 (2017) 265
[2] B. Huang et al., Nature, 546 (2017) 270
[3] D. Zhong et al., Science Advances, 3 (2017) e1603113
[4] C. Cardoso et al., Phys. Rev. Lett., 121 (2018) 067701
[5] K. Zollner et al., New J. Phys., 20 (2018) 073007
[6] D. Klein et al., Science, 360 (2018) 1218
[7] D. Soriano et al., arXiv:1807.00357

Figures

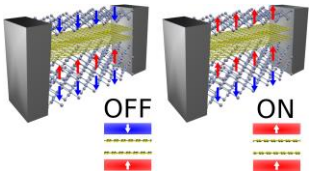

Figure 1: Spin-valve device based on CrI3/Graphene van der Waals heterostructure.

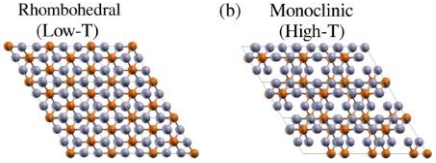

Figure 2: Low vs. High temperature stacking of bilayer CrI3.