

Excitons coupled to topological spin textures in van der Waals ferromagnets

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The preservation of ferromagnetism in monolayer films of van der Waals magnets was demonstrated recently. It enabled us to explore the effects of spin dimensionality on the magnetic states in materials through a diverse repertoire of experimental methods enabled by van der Waals technology [1, 2]. A rapidly growing body of work inspecting magnetic, optoelectronic, structural [3], or vibrational [4] properties of heterostructures and devices inspires us to search for novel physical phenomena, excitations, and magnetic/topological states originating from or coupled to the two-dimensional magnetic order. I will present our recent results on exciton-magnetization coupling [5], where the type of magnetic interaction between the photoexcited electrons/holes and magnetization depends on the material (CrBr₃ or CrI₃) and the excitonic levels (ground or excited states). The type of magnetization textures is highly tunable by temperature and magnetic field, including the formation of a skyrmion crystal via a field cooling procedure [6]. The coupling with excitons can be utilized to determine the magnetic state of the sample via optical methods.

References

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