

Exciton-magnon dynamics in 2D magnetic insulators

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Abstract

Materials from the family of van der Waals magnetic insulators were recently found to support *magnetic excitons* – a rare type of optical excitation formed by spin-polarized electronic states in magnetic materials. With properties that have no analog amongst excitons in conventional band insulators, these optical quasiparticles and their coupling to magnetic order offer a new perspective on magneto-optics effects and the underlying fundamental interactions in magnetic solids. This talk will provide an overview of recent advances in understanding the coupling of excitons and magnons in the layered antiferromagnet CrSBr. Then, I will present our experimental and theoretical study of the transport of excitons in this material. Rich experimental signatures include the observation of enhanced exciton propagation at the antiferromagnet-to-paramagnet phase transition, nearly isotropic transport in a highly anisotropic electronic dispersion, and ultrafast excitonic motion. To rationalize these results, we propose a model based on the magnon-exciton drag effect (see Fig. 1). I will also discuss the unusual observations of exciton cloud contraction and superdiffusive behavior in bilayer crystals.