Seminar announcement

Tuesday, November 5, 2024
2:30 pm
WSI, Seminar room S 101
<u>Exclusively in person</u>

“Excitons, magnons, and photons in 2D antiferromagnets”

Magnetic van der Waals materials were recently found to support magnetic excitons - a rare type of optical excitation formed by spin-polarized electronic states in magnets. With properties that have no analog amongst excitons in conventional band semiconductors, these optical quasiparticles add new flavors to the list of textbook magneto-optic interactions.
In this talk, I will discuss how interactions of magnetic excitons with magnons and photons may bring together concepts from semiconductor physics, magnetism, and photonics. The elemental role of strong light-matter coupling and the emergent hybrid light-matter states known as exciton-polaritons will be analyzed specifically in the context of the optical properties of the layered magnetic semiconductor CrSBr [1,2]. In the second part, I will also present our latest experimental and theoretical advances on unraveling the impact of magnons on the propagation of excitons. Highly non-linear exciton transport features, such as propagation enhanced at the antiferromagnet-to-paramagnet phase transition, will be discussed alongside the anomalous observations of exciton cloud contraction and superdiffusive behavior.

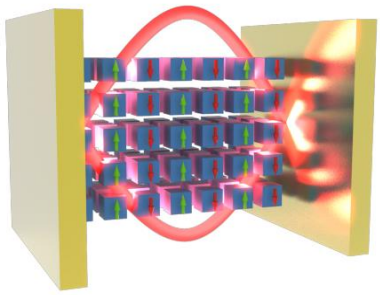

FIG. 1. Confining photons in an optical microcavity can support strong interactions with excitons and magnons in van der Waals magnets.

[1] Dirnberger, F. et al. Spin-correlated exciton-polaritons in a van der Waals magnet. *Nature Nanotechnology* **17**, 1060-1064 (2022).
[2] Dirnberger, F. et al. Magneto-optics in a van der Waals magnet tuned by self-hybridized polaritons. *Nature* **620**, 533-537 (2023).

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