**Strong light-matter interaction in 2D magnets**

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van der Waals (vdW) magnets that host excitons that show a strong correlation to underlying magnetic order present a unique opportunity to realize strong interaction between magnons, excitons and photons. Furthermore, these systems facilitate the optical control of electronic and spin degrees of freedom. In this talk, I will discuss our work on magnetic semiconductor, CrSBr where in the bulk limit, the excitons are inherently dressed by photons forming self-hybridized exciton-polaritons [1]. The signature of coherent magnon oscillations imprinted on the polaritons and the potential to modify magneto-optical response by tuning the photon fraction of the polariton states will be discussed. Following this I will present our recent work on the role of magnons on nonlinear exciton-exciton interaction in CrSBr [2]. Finally, time permitting, I will discuss confinement and propagation of magneto-exciton polaritons.

References:

[1] “Magneto-optics in a van der Waals magnet tuned by self-hybridized polaritons,” F. Dirnberger et al. *Nature* **620**, 533 (2023).

[2] “Magnon-mediated exciton-exciton interaction in a van der Waals antiferromagnet,” B. Datta et al, *Nature Materials* (2025) https://doi.org/10.1038/s41563-025-02183-0.