Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Spin-light-matter interactions in a van der Waals magnetic semiconductor

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CCNY, New York

Two-dimensional semiconductors enable rich excitonic physics, as exemplified by 2D transition metal dichalcogenides. Recently, the emergence of van der Waals magnetic semiconductors has introduced a new dimension: the coexistence and interaction of excitons with coherent spin excitations (magnons). In this talk, I will focus on the A-type antiferromagnet CrSBr, a material that hosts a magnetically tunable excitonic spectrum and GHz-range magnetic resonances. I will present experiments demonstrating that CrSBr can act as its own optical cavity, supporting self-hybridised exciton-polaritons with highly anisotropic propagation linked to the underlying magnetic order. I will then discuss how the coupling between magnons and excitons enables magnon-mediated exciton-exciton interactions, providing a unique handle for tailoring optical nonlinearities. Finally, I will show how these coherent interactions can be leveraged for microwave-to-optical transduction, a critical step toward interfacing superconducting quantum circuits with long-distance optical networks.

Monday, Feb 23rd 2026

14:30 Hrs (Tea / Coffee 13:15 Hrs)

Auditorium, TIFRH