

Webinar #25



Dr. Biplab Sanyal

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Uppsala University, SWEDEN*

Title: Fascinating aspects of magnetism in atomically thin two-dimensional materials

Registration link: <https://tinyurl.com/rnn6cuju>

***Zoom details will be shared with the registered participants**

Short biography

Dr. Biplab Sanyal is an Associate Professor at the Department of Physics and Astronomy of Uppsala University, Sweden. He is also the head of the Materials theory division and the Director of the International Master program in Materials science. After completing Ph.D. studies in S.N. Bose National Center, India in 1999, he joined Brock University, Canada as a post-doctoral fellow followed by another postdoctoral fellowship at Uppsala University from 2000-2003. Then he became an Assistant Professor in 2003 and an Associate Professor in 2011. He has supervised 18 Ph.D. students and 8 postdoctoral fellows.

His research interests lie in 2D materials, magnetism, biomolecules, electron correlation, amorphous materials, electronic transport, Monte-Carlo simulations, lattice and magnetization dynamics. He has published nearly 300 papers including Nature Materials, Nature Communications, Reviews of Modern Physics and Phys. Rev. Lett. with **10885 citations, h-index 50, i10-index 200** (ref.: Google Scholar), 10 book chapters, 2 volume editor (Elsevier, Springer).

Abstract

In recent years, the realization of magnetic long-range order in atomically thin 2D materials has shown a big potential in spintronic applications in ultrathin magnets due to the possibility of manipulation of magnetism by external fields, strain or proximity effects in van der Waals heterostructures. Specifically, the family of metallic magnets Fe_nGeTe_2 ($n=3, 4, 5$) has attracted a huge attention due to their high Curie temperatures and intriguing properties. In this talk, I will review the status of this research field, highlighting our own research by ab initio density functional theory, calculations of interatomic exchange interaction parameters and Monte Carlo simulations. A particular emphasis will be given on the systematic study of the electronic structure and magnetism of Fe_nGeTe_2 magnets along with some critical discussions on the importance of electron correlation with the aid of dynamical mean field theory, spin-orbit coupling and effects of transition metal doping. Finally, some results on the spin-polarized quantum transport will be shown for $\text{PtTe}_2/\text{Fe}_4\text{GeTe}_2/\text{PtTe}_2$ van der Waals heterostructures.

[1] S. Ghosh, S. Ershadrad, V. Borisov, B. Sanyal, npj comp. mat. 2023, 9, 86-101.

[2] S. Ershadrad, S. Ghosh, D. Wang, Y. Kvashnin, B. Sanyal, J. Phys. Chem. Lett. 2022, 13, 4877-4883.

[3] S. Ghosh, S. Ershadrad, B. Sanyal, arXiv:2305.04366

[4] M. Davoudiniya, B. Sanyal (revision in Phys. Rev. B)

Panelist



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**March 26th 2024,
12.30 – 2.00 pm
Indian Standard
Time**

