

Webinar #25



Dr. Biplab Sanyal

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

Registration link: <https://tinyurl.com/rnn6cuuj>

*Zoom details will be shared with the registered participants

Short biography

Dr. Biplab Sanyal is currently a senior lecturer/ associate professor at Department of Physics and Astronomy, Materials Theory. He received Ph.D. in Physics (condensed matter theory) in 1999 from Jadavpur University, Kolkata. After that he joined as Post Doctoral fellow with Prof . S.K. Bose in Physics Department, Brock University (1999-2000), Canada and then Dept. of Physics, Uppsala University (2000-2003) with Prof. Olle Eriksson, Dr. Susanne Mirbt and Dr. Lars Nordström. His research interest mainly focuses on Graphene & 2D materials, multiferroics, random alloys, organometallics, clusters, time-dependent electron dynamics, spin-phonon coupling. He is an author of more than 300 papers with Google citations of 10880, h-index 50 and i10-index 200.

He has received many awards and scholarships including Fellowship for short-term visit to University of Belem, Short term CNR fellowship to visit CNR-INFM lab. in L'Aquila, Italy, NSERC postdoctoral fellowship from Brock University, Canada etc.

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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