

ICTS Statistical Physics & Condensed Matter Seminar

- Title** : Correlated and topological phases in twisted graphene layers
- Speaker** : Anushree Datta (Laboratoire Matériaux et Phénomènes Quantiques, Paris, and Laboratoire de physique des Solides, Orsay)
- Date** : Thursday, 8th August 2024
- Time** : 3:30 PM (IST)
- Abstract** : Twisted layers of graphene provide a unique platform for exploring correlated electronic phases which are not obtained in single graphene layers. Among different phases, the cascade phenomena in twisted bilayer graphene, as observed in the spectroscopic properties and electronic compressibility stand out [1]. The cascades extend up to much higher temperatures and a wider range of twist angles than other correlated states, suggesting that the former constitutes the parent state for the latter. These cascades have earlier been described in terms of symmetry broken states. In this talk, I will show that the spectral weight reorganization associated with the formation of local moments and heavy quasiparticles are responsible for the cascade phenomena [2]. Using dynamical mean field theory + Hartree calculations, and without relying on any symmetry broken order, we reproduce the cascade flow of spectral weight and asymmetric jumps of inverse compressibility, observed in experiments.

In the second part, I will discuss our recent results on helical trilayer graphene in a magnetic field [3].

- [1] D. Wong et al, Nature 582, 198 (2020), U. Zondiner et al, Nature 582, 203 (2020)
[2] A. Datta, M.J. Calderón, A. Camjayi, and E. Bascones, Nature Communications 14, 5036 (2023)
[3] A. Datta, D. Guerci, M. O. Goerbig, C. Mora, arXiv:2404.15452 (PRB 2024, in press, editors' suggestion)

- Venue** : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/94037261436?pwd=W8fGiZzqV1X4rP7HWMvRST7q530eTG.1>

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