Arindam Ghosh
IISc Bangalore

Noise as a probe to quantum states in topological materials and devices

Noise is usually not a liked phenomenon, because it comes with disturbance. It reduces our ability to measure a signal. In quantum systems, noise also causes decoherence of electronic wavefunctions, which is a major concern if we want to make a quantum computer someday. But there is another side too, where noise can be a unique physical resource in exploring novel physical processes in solids, as well as in detecting or sensing parameters such as charge, spin, electromagnetic fields etc with great sensitivity. In this talk I shall give an overview of noise in the electrical properties of some of the new low-dimensional materials, with the specific example of graphene, where I shall show how noise can reveal emergent phases in the presence of topological defects at low temperature.

1. Benchmarking Noise and Dephasing in Emerging Electrical Materials for Quantum Technologies, S. Islam, S. Shamim and A. Ghosh
Advanced Materials (2022), DOI: 10.1002/adma.202109671

2. Spontaneous time reversal symmetry breaking at individual grain boundaries in graphene, K. Hsieh et al. Physical Review Letters 126, 206803 (2021)