Routes to Detect Band Topology in Quantum Materials

Snehasish Nandy
Department of Physics
National Institute of Technology Silchar

Topology, a branch of mathematics, dealing with the shapes of objects, has recently become a popular and truly transdisciplinary topic encompassing condensed matter physics, solid state chemistry, biology, soft matter and material science. In condensed matter systems, the non-trivial band topology offers new insights into fundamental questions of quantum phenomena like quantum anomalies, and quantized response, and shows great promise in the development of next-generation information technologies. However, despite vigorous efforts to discover, understand, and control the wavefunction topology in materials, direct experimental observations of the quantum anomalies remain a challenge. In this talk, I will shed light on how to detect the band topology-induced quantum phenomena in quantum materials. Specifically, I will discuss theoretical protocols to identify the celebrated chiral anomaly in condensed matter platforms. Additionally, I will present a new way to observe elusive chiral magnetic effect in non-centrosymmetric Weyl semimetal. Finally, I will discuss my future research plans in these directions.