ACCMS-Global Research Center
SRMIST, Chennai India

Webinar #15

Dr. Mohammad Saeed Bahramy

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Title: **Unravelling emergent quantum phenomena from first-principles**

Registration link: *https://tinyurl.com/bden65vf*

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

26 April 2023,
3.00 – 4.30 pm Indian Standard Time

Short biography

Dr Mohammad Saeed Bahramy is a Lecturer in Theoretical Condensed Matter Physics at the Department of Physics and Astronomy in the University of Manchester. His research is focused on the study of exotic states of quantum matter using advanced computational techniques. He is particularly interested in studying topological phases of matter, quantum confinement phenomena at the interface of heterogeneous materials, thermopower generation and manipulation in low-dimensional systems, strongly correlated electron systems, and superconductivity. The primary goal of his research is to theoretically predict new physical phenomena in these systems and design materials with advanced electronic functionalities. He is also interested in the development of new theoretical approaches and computational techniques to extend the reach and power of the available first-principles methods.

Abstract

Quantum phenomena emerging from the interplay of charge, orbital, spin and lattice degrees of freedom of the electron have brought about a revolution in our understanding of the collective behaviour of particles in solids, forming a new paradigm in condensed matter physics, commonly known as quantum materials. Topological phase transition, quantum confinement, quasiparticle interferences and quantum coherence in transport are a few examples of phenomena in which such microscopically delicate interplays define the macroscopic fate of the host materials. In all these areas, much of our knowledge comes from first-principles studies. In this talk, I will overview our recent studies on the emergent quantum phenomena in cross-correlated materials. In particular, I will discuss the approaches that we have developed to study quantum confinement in topological materials and Fermi liquid systems. I will show how these methods enable us to study quantum oscillations in transport and quasiparticle interferences at the surface of topologically trivial and non-trivial systems. Insights gained from our studies open new routes to the rational design of quantum materials with advanced functionalities.

Panelist

Prof. Hiroshi Mizuseki

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