



ICTS Condensed Matter Seminar

Title : Topological structures of 'featureless' phases: unnecessary criticality, charge pumps and boundary modes

Speaker : Abhishodh Prakash (University of Oxford, UK)

Date : Wednesday, 11 September 2024

Time : 4:00 PM (IST)

Abstract : The central object of study in condensed matter physics is the phase diagram. Two of its components, phases, and transitions, receive overwhelming attention. However, the precise relationship between them is surprisingly unclear and largely based on lore. One of these is that a stable 'second order' critical surface reached by tuning a single parameter represents a transition separating distinct phases and cannot abruptly terminate. I will debunk this using explicit microscopic models exhibiting 'unnecessary criticality' [1]. Surprisingly, this system hosts stable boundary modes within a trivial phase separated by a continuous locus of bulk and boundary transitions. I will argue that these features originate from non-trivial topological structures in the family of systems, despite each of them being trivial in isolation [2]. A generalized bulk-boundary correspondence and a new class of anomalies protects the boundary phenomena. I will end with a vast generalization of settings where more such structures can be found.

[1] [Phys. Rev. Lett. 130, 256401 \(2023\)](#)

[2] [arXiv:2408.15351](#)

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/97420836308?pwd=tb2BXedGt8weRmhlAStd7fuTBxv0oE.1>

Meeting ID: 974 2083 6308

Passcode: 101101