

CONDENSED MATTER SCIENCES SEMINAR

Professor Claudio Chamon

Purdue University

Host

Dr Dragana Popovic

Title

Combinatorial Gauge Symmetry: A framework for engineering static one- and two-body Hamiltonians to host topologically ordered quantum phases

Friday, February 13th, 2026

1st Floor – B101

15:00-16:00

Abstract

Topological states of matter are widely regarded as promising building blocks for future quantum computing technologies. In recent years, there has been remarkable progress in dynamically creating topological states using quantum simulators and gate-based quantum processors. On the other hand, realizing static, experimentally accessible Hamiltonians that host such states remains a significant challenge. One major obstacle is that when local gauge symmetries are only emergent, the associated energy gaps are often too small compared to experimental temperatures. In this talk, I will introduce the concept of combinatorial gauge symmetry, a principle for constructing Hamiltonians with exact -- as opposed to emergent -- local Abelian and non-Abelian gauge symmetries, using only one- and two-body interactions. I will then proceed to discuss potential implementations of these Hamiltonians in superconducting circuits.