

Condensed Matter Theory Center Seminar
Wednesday, March 12 at 11:00am
2205 Physics Building

Speaker: Maissam Barkeshli (Microsoft Station Q)

Title: Defects: A New Window Into Topological Order

Abstract:

Topologically ordered states, such as the fractional quantum Hall (FQH) states, are quantum states of matter with various exotic properties, including quasiparticles with fractional quantum numbers and fractional statistics, and robust topology-dependent ground state degeneracies. In this talk, I will describe a new aspect of topological states: their extrinsic defects. These include extrinsically imposed point-like or line-like defects that couple to the topological properties of the state in non-trivial ways. The extrinsic point defects localize topologically protected "parafermion" zero modes, which generalize the notion of Majorana fermion zero modes, and provide a new direction for realizing non-Abelian quantum statistics and topological quantum computation. The line defects allow direct quantum mechanical coupling between electrons and fractionalized anyons, leading to new ways to probe fractionalization. After describing the conceptual framework, I will focus on a specific set of experimental proposals, using conventional bilayer FQH states, to detect parafermion zero modes and to directly observe the long-predicted topological ground state degeneracy of FQH states

Host: Jay Deep Sau

<http://www.physics.umd.edu/cmtc/seminars.html>