

March 23, 2022

Speaker: Meng Cheng

Title: Defect and disorder operator in $(2+1)d$ quantum phases

Abstract: Defects have been playing an increasingly important role in our understanding of quantum phases of matter and quantum field theories in general. In this talk I will discuss properties of disorder operators associated with a (0-form) global symmetry in $(2+1)d$, which create symmetry defect lines. The expectation value of the disorder operator defined over a spatial region in a symmetry-preserving ground state generally shows a perimeter scaling, but with scale-invariant sub-leading corrections. I will argue that in a symmetric gapped phase, the sub-leading correction is a universal invariant related to quantum dimensions of defects, which will be proven assuming conformally invariant entanglement spectra. When the system is gapless described by a conformal field theory (CFT), the sub-leading correction scales logarithmically with the perimeter, whose coefficient is a universal function of opening angles of sharp corners of the region. I will discuss analytically-tractable limits of the universal function, as well as numerical simulations in lattice models of $O(n)$ CFTs and deconfined quantum critical point.