

FRONTIERS OF QUANTUM MATTER

Conference Hall 104
Science Building
Tsinghua University

TASTU SUMMER LECTURE SERIES

JUNE 25-JULY 1 2023

June 25&June 27 16:00-18:00

Zhen Bi (毕震)

Title: Eccentricity in Quantum Phase Transitions through the Lens of 3+1d Gauge Theories

Abstract: In these lectures, we will present results on novel quantum critical points which describe phase transitions between symmetry protected topological phases in 3+1d. The critical theories can be formulated as non-abelian gauge theories either in their Infra-Red free regime, or in the so-called conformal window. Through these constructions, we explicitly demonstrate several unusual quantum critical phenomena, including 1. multiple universality classes, 2. unnecessary quantum critical points, and 3. Landau ordering phase transitions beyond the Landau paradigm.

June 29&July 1 16:00-18:00

Biao Lian (廉翥)

Title: Topology and Interaction in Twisted Bilayer Graphene

Abstract: In the two lectures, I will talk about the derivation of the model of twisted bilayer graphene (TBG) and its generalizations, the fragile topology of the TBG flat bands, the spin-valley $U(4)$ symmetry of the TBG flat bands with Coulomb interactions, correlated insulator states in the exact and perturbative solvable limit, and the charge excitations of the insulator states.