北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Fixed-point tensor network construction and generalized symmetry for conformal field theory

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Time: 3:00 pm, May.28, 2025 (Wednesday)

时间：2025年5月28日（周三）下午3:00

Venue: Room w563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

The novel concept of entanglement renormalization and its corresponding tensor network renormalization technique have been highly successful in developing a controlled real space renormalization group (RG) scheme. In this talk, I will present an explicit analytical construction of the fixed point(FP) tensor for 2D rational CFT. We define it as a correlation function between the "boundary-changing operators" on triangles. Our construction fully captures all the real-space RG conditions. We also provide a concrete example using the several models to compute the scaling dimensions explicitly. Interestingly, our construction of FP tensors is closely related to a strange correlator, where the holographic picture and generalize symmetries naturally emerge. If time permits, I will also discuss some unpublished results on irrational CFT and even complex CFT. Our results open a new door towards understanding CFT in higher dimensions.

About the speaker

Prof. Gu is an internationally recognized leading expert on topological phases of quantum matter. In recent years, he and his collaborator had established a new paradigm for topological phases based on the concept of long-range entanglement. They further used this concept to classify topological phases of quantum matter in strongly correlated electron systems and developed new mathematical framework such as super tensor category theory and group super-cohomology theory. In particular, he and his collaborator proposed a new class of topological phases protected by global symmetry – the so-called symmetry protected topological phase (SPT), which made significant contribution to 2016 physical Nobel Prize. Prof. Gu and his collaborator further pointed that long-range entanglement can be locally encoded in a special class of wavefunctions, the tensor network states (TNS). They also developed an accurate and efficient way to simulate TNS. This new method has the potential to resolve a large class of long standing hardcore problems.