

CTCP SEMINAR

Deep Boundary Perturbations at a Quantum Critical Point

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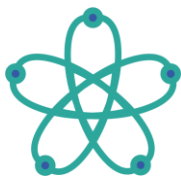
Wednesday, March 19, 2025, 3:30pm
KKLG101, LG1/F, K.K. Leung Building, Main Campus,
The University of Hong Kong

Abstract:

We explore an unconventional class of problems in the study of (quantum) critical phenomena, termed "deep boundary criticality". Traditionally, critical systems are analyzed with two types of perturbations: those uniformly distributed throughout the bulk, which can significantly alter the bulk criticality by triggering a nontrivial bulk renormalization group flow, and those confined to a boundary or subdimensional defect, which affect only the boundary or defect condition. Here, we go beyond this paradigm by studying quantum critical systems with boundary perturbations that decay algebraically (following a power law) into the bulk. By continuously varying the decay exponent, such perturbations can transition between having no effect on the bulk and strongly influencing bulk behavior. We investigate this regime using two prototypical models based on (1+1)D massless Dirac fermions. Through a combination of analytical and numerical approaches, we uncover exotic scaling laws in simple observables and observe qualitative changes in model behavior as the decay exponent varies.

ANYONE INTERESTED IS WELCOME TO ATTEND!

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