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Quantum criticality in AdS/CFT

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Abstract content

Many low dimensional condensed matter systems exhibit zero temperature phase transitions driven by quantum fluctuations. These are known as "quantum" phase transitions. The description of such transitions is beyond the usual Landau-Ginzburg-Wilson paradigm of a single order parameter. At criticality, such systems exhibit novel behavior including the appearance of fractional statistics, gauge symmetries and scale invariance. We study a novel type of critical points described by 2+1 non-relativistic field theories. For a special value of the "dynamical critical exponent" z= 2, such theories are known to describe the transition between ordered (confined) phases and novel topological (deconfined) phases. Moreover, they have the remarkable property that the ground state wave functional can be written as a partition function of an (euclidean) two dimensional CFT. We use the AdS/CFT correspondence to study possible duals of such theories. In particular, we begin a systematic study of the holographic RG flow in the bulk. This allow us to compute expectation values and correlation functions in the ground state of the critical theory. In this talk we will focus on the "stress tensor". Our ultimate goal is to understand the transition to a topological phase using AdS/CFT.

Summary

Primary author(s) : Dr. VAZQUEZ, Samuel (Perimeter Institute for Theoretical Physics)

Presenter(s) : Dr. VAZQUEZ, Samuel (Perimeter Institute for Theoretical Physics)

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