

Quantum Information and Topological Complexity in AdS/CFT (Rene Meyer, ITP Wuerzburg)

Thursday, 5 April 2018 13:15 (30 minutes)

Recently, using the AdS/CFT correspondence exciting new relations are being established between aspects of quantum information theory and of the geometry of black holes in Anti de Sitter space-times. After a concise review of the roles of entanglement measures such as e.g. the entanglement entropy as well as of the computational complexity within the AdS/CFT correspondence, I discuss the notion of subregion complexity of a 2D critical state from three different viewpoints: the AdS₃/CFT₂ correspondence, random tensor networks, and kinematic space.

From the AdS₃/CFT₂ point of view I explain how in the discontinuity of subregion complexity as given by the volume within the Ryu-Takayanagi surface is related to the Euler characteristic of the respective bulk regions via the Gauss-Bonnet theorem. I then discuss how the volume of these sub regions can be calculated in kinematic space, which is the space of geodesics on the time-slice of AdS₃, and present a new CFT expression of subregion complexity. Finally, I present results that qualitatively reproduce the discontinuity in complexity in a tensor network approach. Based on arXiv:1710.01327 [hep-th].

Summary