Department of Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Semi-classical Access of the Entanglement Wedge with Connes Cocycle Flow

(Zoom Seminar)

Ronak M. Soni

(Stanford University)

Date: August 18, 2020

Time: 09:00 am IST

Zoom link shall be shared separately

One of the many mysteries of the AdS/CFT duality is entanglement wedge reconstruction. For a boundary subregion, the entanglement wedge (EW) is a region of the bulk that is naturally associated to a boundary subregion that generically contains a causally inaccessible region. Despite this, every bulk operator in the EW is encoded in the boundary subregion. This seeming stark departure from causality is not a contradiction, because of entanglement, but the exact nature of this resolution remains somewhat mysterious. In cases where the inaccessible region is perturbatively small, we demonstrate the existence of a causal operation that brings all of the inaccessible region into causal contact with the boundary subregion, via gravitational backreaction. The causal operation is the Connes cocycle (CC) flow within the causally accessible region; CC flow is a version of one-sided modular flow without any UV divergences. Further, we show that the causal CC flow along with its backreaction has the same effect as CC flow in the boundary subregion, which is an ingredient in a known entanglement wedge reconstruction protocol.

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