



Department of  
Theoretical Physics

# THE QUANTUM SPACETIME SEMINAR SERIES

## Bulk Locality and Asymptotic Causal Diamonds

**Chethan Krishnan**

(IISc, Bangalore)

**Date:** Feb 11, 2019

**Time:** 11.30 am

**Venue:** A-304, TIFR



In AdS/CFT, the non-uniqueness of the reconstructed bulk from boundary subregions has motivated the notion of code subspaces. We present some closely related structures that arise in flat space. A useful organizing idea is that of an *asymptotic* causal diamond (ACD): a causal diamond attached to the conformal boundary of Minkowski space. The space of ACDs is defined by pairs of points, one each on the future and past null boundaries,  $\mathcal{I}^{\pm}$ . We observe that for flat space with an IR cut-off, this space (a) encodes a preferred class of boundary subregions, (b) is a plausible way to capture holographic data for local bulk reconstruction, (c) has a natural interpretation as the kinematic space for holography, (d) leads to a holographic entanglement entropy in flat space that matches previous definitions and satisfies strong sub-additivity, and (e) has a bulk union/intersection structure identical to the one that motivated the introduction of quantum error correction in AdS/CFT. Even though our discussion is centered around flat space, we note that there are notions of ACDs in other spacetimes as well. They could provide a covariant way to abstractly characterize tensor sub-factors of Hilbert spaces of holographic theories.