Contribution ID: **29** Type: **Research Talk**

Towards a gravity dual for spread complexity

Monday 24 April 2023 14:45 (45 minutes)

The notion of computational complexity has recently attracted attention in several fields, in part due to its conjectured holographic connection to the volume of black hole interiors. In the context of classical or quantum computers it arises as a natural quantity that counts the smallest number of gates needed to produce a desired output state from a circuit. With this analogy it can be readily computed for many physical systems upon an appropriate identification of input and output state, the gates and their associated cost. This identification is, however, far from unique. Specifically, the choice of gates and their cost is highly ambiguous. A natural question is whether all these choices have some holographic interpretation.

In this talk I will discuss the notion of spread complexity and how it succeeds in providing a less ambiguous approach to complexity than, for example, the Nielsen approach. Particular attention will be given to the physical features of a quantum system it encodes and its relation to symmetries of the manifold of accessible target states. Finally, I will discuss ways spread complexity is related to the Fubini-Study metric and how one of these hints at a possible gravitational dual.

Presenter: VAN ZYL, Jaco

Session Classification: Research Talk 2: QIT/ML/Neutrinos/Astrophysics/Cosmology

Track Classification: Quantum Information