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Holographic Complexity of Rotation

Friday 12 June 2020 13:00 (15 minutes)

Complexity is a measure of the resources required to perform certain computations. Quantum complexity is an important concept with applications spanning quantum information, condensed matter systems, and quantum field theories. It is defined as the minimum number of fundamental gates in a circuit required to construct a given quantum state. Surprisingly, it was found also to be connected to gravity within the context of AdS/CFT correspondence, with the connection more specifically defined in the complexity=volume (CV) and complexity=action (CA) conjectures. In the CV prescription, the quantum complexity of the boundary state is given by the volume of the Einstein-Rosen bridge behind the horizon of the dual black hole. In the CA prescription, it is given by the gravitational action of the Wheeler-de-Witt patch dual to the boundary state. From purely gravity calculations, these prescriptions were shown to reproduce properties of quantum complexity, such as: linear growth at early-times, exponential scaling with the system size, and growth under perturbations.

I will discuss the quantum complexity of rotation through gravity calculations on rotating spacetimes of arbitrary dimensions with anti-de-Sitter boundaries, and compare the results with known properties of non-spinning black holes.

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