



Contribution ID: 205

Type: **Oral presentation**

Complexity in quantum field theory and gravity

Thursday 12 July 2018 15:00 (30 minutes)

Holographic duality shows increasing evidence of a deep relation between quantum entanglement in quantum field theory (QFT) and gravity. While the ‘entanglement entropy’ captures spacetime physics outside a black hole horizon, the ‘complexity’ is proposed to be dual to the inside of the horizon. Contrary to much progress on the ‘holographic complexity’, complexity in QFT is not defined well. In this talk, we propose a definition of complexity in QFT based on three axioms for complexity and general symmetry properties of QFT. We show our proposal can unify other field theoretic approaches and agrees with the holographic (gravity) results.

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Session Classification: Workshop on Quantum Foundations and Quantum Information