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# Complexity Functionals and Complexity Growth Limits in Tensor Network Circuits

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Using a derivation from first principles of the path integral associated to a cMERA tensor network, we provide an operational definition for the complexity of a cMERA circuit/state which is relevant to investigate the complexity of states in quantum field theory. In this framework, it is possible to explicitly establish the correspondence (Minimal) Complexity = (Least) Action. Remarkably, it is also shown how the cMERA complexity optimizer action functional can be seen as the action of a Liouville field theory, thus showing connections with two dimensional quantum gravity. The rate of complexity growth along the cMERA renormalization group flow is obtained and shown to saturate limits which are in close resemblance to the fundamental bounds for the speed of evolution in unitary quantum dynamics, known as quantum speed limits. Finally, we show that the complexity of a cMERA circuit measured through this complexity functionals, can be casted in terms of the variationally-optimized amount of left-right entanglement created along the cMERA renormalization flow. Our results suggest that the patterns of entanglement in states of a QFT could determine their dual gravitational descriptions through a principle of least complexity.

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