

# Quantum Entanglement Entropy in String Theory

*Friday, 7 June 2024 14:45 (30 minutes)*

I discuss physical motivations from black hole physics and holography for expecting finite quantum entanglement entropy in quantum gravity. I describe recent and earlier results in defining such a notion in perturbative string theory by a stringy analog of the replica method using  $Z_N$  orbifolds constructed for any odd positive integer  $N$ . The entropy so defined naturally includes a classical piece and is manifestly UV finite but has potential tachyonic IR divergences. I show that for several string compactifications as well as on black hole horizons in AdS3/CFT2 holography, the specific structure of the tachyonic spectrum allows for a re-summation and analytic continuation to the physical region  $0 < N \leq 1$  where the IR divergences are absent and the resulting entropy is finite to one-loop order.

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