Contribution ID : **138** Type : **not specified**

Fundamental string from 3D gravity , entanglement and quantum thermodynamics

Sunday, 1 December 2024 14:20 (30)

I will discuss how the Nambu-Goto equation emerges from pure three dimensional gravity with or without a cosmological constant. This does not generalize to co-dimension one branes in higher dimensions. In the context of AdS3/CFT2, a junction with a fundamental string is dual to an interface, and the corresponding solution of the Nambu-Goto equation can be decoded from the time-reparametrization across the interface. I will discuss general constructions of such junctions which realize quantum engines and elementary quantum processors. Furthermore, I will discuss how the junctions realize different types of entanglement, and study the quantum thermodynamics of the corresponding quantum channels via the quantum null energy condition. The latter tells us which junctions cannot be realized physically from the locality and unitarity of the dual field theory.
Based on: JHEP 09 (2024) 013, Phys.Rev.Lett. 129 (2022) 19, 19, Phys.Rev.Lett. 128 (2022) 19, 191602, and upcoming papers

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Session Classification : Day 2: Parallel session II