

# The central dogma and entanglement in de Sitter space

*Friday 21 April 2023 10:00 (1 hour)*

The central dogma of black hole physics –which says that from the outside a black hole can be described in terms of a quantum system with  $\exp(\text{Area}/4G)$  states evolving unitarily –has recently been supported by computations indicating that the interior of the black hole is encoded in the Hawking radiation of the exterior. In this talk, we probe whether such a dogma for cosmological horizons has any support from similar computations. The fact that the de Sitter bifurcation surface is a minimax surface (instead of a maximin surface in the case of black holes) causes problems with this interpretation when trying to import calculations analogous to the AdS case. This suggests placing the holographic dual on the de Sitter horizon itself, where we formulate a two-sided extremization prescription for computing entanglement entropy in the holographic dual. We find answers consistent with general expectations for a quantum theory of de Sitter space, including a vanishing total entropy and an entropy of  $A/4G$  when restricting to a single static patch. We will also explore some other approaches to probing a microscopic foundation for the Gibbons-Hawking entropy.

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