

# De Sitter horizon entropy from a simplicial Lorentzian path integral

*Monday 6 May 2024 17:45 (15 minutes)*

Can one compute thermodynamic quantities, such as entropy, with a Lorentzian path integral? Using a regularization of the path integral via Regge calculus, we will see that the answer is affirmative.

Irregularities in the light cone structure, e.g. configurations with contractible closed timelike curves, play an essential role for this conclusion. Such light cone irregularities contribute imaginary terms to the gravitational action, which can lead to an enhancing effect and explain how one can obtain a positive entropy from a real-time path integral.

We will discuss how Regge calculus deals with these singularities and allows for an explicit treatment of the path integral for the partition function computing the dimension of the Hilbert space of a 3-ball, from which one can extract the de Sitter entropy.

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**Session Classification:** Covariant LQG