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Microscopic origin of the entropy of black holes in general relativity

Wednesday 11 January 2023 09:00 (1 hour)

We present a construction in which the origin of black hole entropy gets clarified. We start by building an infinite family of geometric microstates for black holes in general relativity. This construction naively overcounts the Bekenstein-Hawking entropy. We then describe how wormholes in the Euclidean path integral for gravity cause these states to have exponentially small, but universal, overlaps. These overlaps recontextualize the Gibbons-Hawking thermal partition function. We finally show how these results imply that the microstates span a Hilbert space of log dimension equal to the Bekenstein-Hawking entropy.

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Session Classification: Invited Contribution