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Partition function for a volume of space

Tuesday 17 January 2023 18:00 (1 hour)

We consider the quantum gravity partition function that counts the dimension of the Hilbert space of a spatial region with topology of a ball and fixed proper volume, and evaluate it in the leading order saddle point approximation. The result is the exponential of the Bekenstein-Hawking entropy associated with the area of the saddle ball boundary. This generalizes the classic Gibbons- Hawking computation which corresponds to the special case when the fixed volume is that of the static patch of de Sitter spacetime, and exhibits the holographic nature of nonperturbative quantum gravity in finite volumes of space.

Presenter: VISSER, Manus (DAMTP Cambridge)