



Bethe Colloquium

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Late Time Quantum Chaos in Two-Dimensional Gravity

Quantum chaotic systems exhibit universal correlations in their spectra and wave functions, which have been described using various approaches such as random matrix theory, semiclassical analysis, and quantum field theory. While these concepts were initially developed in fields like condensed matter and many-body physics, recent work aims to extend the idea of quantum chaotic universality to gravity. These ideas find their most concrete manifestation in constructing a two-dimensional holographic correspondence and observing chaotic correlations in its gravitational path integral. In this talk, we will review these developments (for non-experts) and argue that the completion of the holographic principle to encompass the full chaotic structure of the gravitational spectrum requires the extension of semiclassical gravity by elements of string theory. We will demonstrate that the generalized theoretical framework enables a high-precision description of the gravitational bulk, with an accuracy that can resolve individual chaotic wave functions. Furthermore, we will explore the implications of these findings within the context of the holographic principle.

BCTP, Room W 2.019 - Wegelerstr. 10 - 53115 Bonn
Thursday, May 15, 2025 at 4:15 p.m.

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