Department of Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Wormholes and black hole microstates in AdS/CFT

(Zoom Seminar)

Kristan Jensen

(U Victoria)

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Zoom link shall be shared separately

It has long been known that the coarse-grained approximation to the black hole density of states can be computed using classical Euclidean gravity. In this talk I will argue for another entry in the dictionary between Euclidean gravity and black hole physics, namely that Euclidean wormholes describe a coarse-grained approximation to the energy level statistics of black hole microstates. We obtain an integral representation of wormhole amplitudes in Einstein gravity and in full-fledged AdS/CFT. These amplitudes are non-perturbative corrections to the two-boundary problem in AdS quantum gravity. The full amplitude is likely UV sensitive, dominated by small wormholes, but it admits an integral transformation with a macroscopic, weakly curved saddle-point approximation. The saddle is the "double cone" geometry of Saad, Shenker, and Stanford, with fixed moduli. In the boundary description this saddle appears to dominate a smeared version of the connected two-point function of the black hole density of states, and suggests level repulsion in the microstate spectrum. I will also discuss the stability of these wormholes to small fluctuations and to brane nucleation. Our results indicate a factorization paradox in AdS/CFT.

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