

# Virtual TEP Seminar

UCLA

Tuesday, December 15th @ 4PM

Via Zoom

## “Wormholes in AdS3 gravity, random matrix theory, and constrained instantons”

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Abstract: I will discuss a wormhole amplitude of pure 3d Euclidean gravity with negative cosmological constant. This amplitude is the integral over wormholes with two torus boundaries, with topology torus times interval. It is the analogue of the “double trumpet” of JT gravity, and in particular, does not vanish, so that correlations of energy and momentum do not factorize across the boundaries. This is evidence that, if 3d gravity is a consistent theory of gravity, then it is dual to an ensemble rather than a single CFT. From this amplitude we extract the leading two-point fluctuation statistics of highly spinning BTZ microstates near threshold. These statistics precisely match a random matrix ansatz.

These wormholes are never saddle points of 3d gravity. Rather they are “constrained instantons,” characterized by a size pseudomodulus, the size of the bottleneck of the wormhole. which one integrates over with the correct measure. At the end I will discuss some recent progress in finding similar configurations in ordinary  $d > 3$  Einstein gravity.