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Fields in fluctuating hyperbolic space

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We explore holography with geometry fluctuation in the two-dimensional hyperbolic lattice. We present results on the behavior of the boundary-boundary correlation function of scalar fields propagating on discrete 2D random triangulations with the topology of a disk. We use a gravitational action that includes a curvature squared operator which favors a regular tessellation of hyperbolic space for large values of its coupling. An ensemble of such geometries is generated for different values of the coupling using Monte Carlo simulation. We show that the conformal behavior expected for a uniform hyperbolic space survives as this coupling is decreased implying that holographic predictions survive at least weak quantum gravity corrections. We investigated the dependency of the scaling exponent of the correlators on the mass as we vary the coupling of the curvature-squared-operator. Finally, we discuss the extension of this model to allow for the inclusion of matter field interactions and backreaction on the geometry.

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