Week 1 Abstracts

Diego Liska

Title: A universal sum over topologies in 3d gravity

Abstract: A careful analysis of the sum over topologies in 2d gravity led to an averaged form of the holographic correspondence: pure 2d gravity is dual to random matrix theory rather than to a single Hamiltonian. In this talk, I go one dimension higher and study the sum over topologies in 3d gravity and its relation to the statistical interpretation of the boundary theory. I formulate a statistical version of the conformal bootstrap that organizes universal properties of CFT data, namely typicality and crossing symmetry. I then identify a set of surgery moves on bulk manifolds that directly reflect these properties. These moves generate non-handlebodies, produce only hyperbolic manifolds, and do not generate all hyperbolic manifolds. This indicates a large range of possible choices for which manifolds may be included in the gravitational path integral, reflecting a broad class of ensembles consistent with crossing symmetry and typicality. Based on work with Alexandre Belin, Scott Collier, Lorenz Eberhardt and Boris Post (arXiv:2601.07906).

Soumyadeep Chaudhuri

Title: Semiclassical analysis of finite cut-off JT gravity on a disk

Abstract: In this talk I will present the computation of the partition function of finite cut-off JT gravity (with positive, zero or negative curvature) defined on a disk and coupled to conformal matter with central charge c. The analysis is done in a regime where c is a large negative number, while the magnitude of the cosmological constant scales linearly with |c| and the length of the boundary of the disk is kept finite. In this regime, the gravitational path integral is dominated by a smooth geometry corresponding to a saddle point of the action. By systematically taking into account the quantum fluctuations about this saddle point, one can obtain a perturbative expansion of the partition function in powers of 1/|c|. I will present the results for the leading and the first subleading terms in this expansion.

Wayne W. Weng

Title: A single geometry from an all-genus expansion in quantum gravity

Abstract: In this talk, I will discuss an instance in quantum gravity where a topological expansion resums into an effective description on a single geometry. The original theory whose gravitational path integral we study is JT quantum gravity with one asymptotic boundary at nonperturbatively low temperatures. The effective theory we derive is a deformation of JT gravity by a highly quantum and nonlocal interaction for the dilaton, evaluated only on a disk topology. This emergent description addresses a strongly quantum gravitational regime where all genera contribute at the same order, successfully capturing the doubly nonperturbative physics of the original theory.