

Physics Seminar: Scott Collier  
Wednesday, October 16 · 2:00 – 3:00pm

Location: 313

Title: The complex Liouville string

Abstract: I will introduce the complex Liouville string, a novel and controllable model of two-dimensional quantum gravity that is defined by coupling two copies of Liouville CFT with complex conjugate central charges on the worldsheet. I will describe how by harnessing the exact solution of the worldsheet CFT we can bootstrap the string amplitudes and reveal a rich holographic duality with a double-scaled two-matrix model. Topological recursion of the matrix model leads to a recursion relation for the string amplitudes which solves the theory at the level of string perturbation theory, while non-perturbative aspects of the duality are probed by ZZ instantons. The model moreover captures aspects of de Sitter quantum gravity in two and three dimensions. The worldsheet theory may be recast semiclassically in terms of a theory of 2d dilaton gravity with a sine potential for the dilaton. Intriguingly, this model admits classical solutions with both signs of the cosmological constant. Finally, I will describe how the string amplitudes may be interpreted as cosmological correlators of massive particles in three-dimensional de Sitter space, integrated over the metric of future infinity. The duality with the matrix integral then establishes a novel holographic scenario for  $dS_3$  quantum gravity. Based on work in collaboration with Lorenz Eberhardt, Beatrix Mühlmann and Victor Rodriguez.