Physics Seminar: Anatoly Dymarsky

Wednesday, February 4 · 2:00 – 3:00pm

Title: Mass formula for topological boundary conditions from TQFT gravity.

Abstract: TQFT gravity is a model of topological quantum gravity defined by summing a given TQFT over all possible spacetime topologies. When formulated on manifolds with boundary, the theory admits a holographic description as a weighted ensemble of boundary CFTs corresponding to all possible topological boundary conditions. On closed manifolds, the partition function instead computes a "mass": a weighted count of such boundary conditions. This construction generalizes mass formulae that appear in several mathematical contexts, including those related to codes and lattices. In particular, for Abelian bosonic three-dimensional TQFTs, topological boundary conditions are classified by even self-dual codes, and the resulting masses provide a novel representation of a variety of known formulae. In this talk, I will explain how topological boundary conditions for Abelian bosonic Chern–Simons theories are related to codes, and how their total number can be obtained by summing over three-dimensional topologies. Time permitting, I will also comment on the five-dimensional case and on a non-Abelian example involving multiple copies of the 3d Ising modular tensor category.