SCGP Weekly Talk: Vivek Shende
Tuesday, November 14·1:15 – 2:15pm

Location: 102

Title: Skein relations from holomorphic curves

Abstract: The Jones polynomial of a knot can be defined and calculated in terms of the skein relations: equations that describe how the polynomial changes under certain local modifications of the knot. I will explain how the same relations appear in a rather different context: namely, when studying boundaries of moduli of holomorphic curves-with-boundary in Calabi-Yau 3-folds. This fact has the following consequence: one can define an deformation invariant count of such curves by weighting each curve by the Jones (or indeed HOMFLYPT) polynomial of the link traced out by its boundary. This is a rigorous mathematical shadow of the following assertion of Witten: in the appropriate topological string theory, 3d Lagrangian branes carry the Chern-Simons quantum field theory, and long strings which end on them effectively introduce Wilson lines. Time permitting, I will explain how this counting theory can be used to mathematically prove the following assertion of Ooguri and Vafa: the coefficients of the HOMFLYPT invariant of a knot are counts of holomorphic curves ending on a certain associated Lagrangian (roughly the conormal to the knot) in the resolved conifold.