Abstracts

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Lecture 1: Hodge structures and Calabi-Yau manifolds

We will review the notions of Hodge structures, mixed Hodge structures, varation of Hodge structures and limiting mixed Hodge structure in the context of Calabi-Yau threefolds.

Lecture 2: Special Kaehler geometry of the moduli space of Calabi-Yau threefolds and BCOV propagators

We review special Kaehler geometry of the moduli space of Calabi-Yau threefolds, and introduce the BCOV propagators in the B-model language.

Lecture 3: Hodge structures from modular forms

We will review the basics of modular forms and explain how to obtain Hodge structures from modular forms in a very elementary way.

Lecture 4,5: In these lectures, we will give an overview of FJRW theory, named after Fan, Jarvis, Ruan and Witten. The starting point is a Landau-Ginzburg orbifold theory, i.e. an isolated singularity given by a quasihomogeneous polynomial W in n variables, together with a group action by a finite abelian group G. We will explain how to associate to these data a (closed) cohomological field theory known as FJRW theory. This is the analog of Gromov-Witten theory for projective varieties. We will mainly focus on the Calabi–Yau case. In fact, by the Calabi-Yau/Landau-Ginzburg correspondence, the Gromov-Witten theory for a Calabi-Yau threefold X admitting a Landau-Ginzburg point in its Kaehler moduli space is expected to be equivalent to the FJRW theory for the corresponding Landau-Ginzburg orbifold. Time permitting, we will review Givental's formalism to compute the genus 0 correlation functions.