

Yuan-Pin Lee

Title: "Towards a quantum Lefschetz hyperplane theorem in Gromov--Witten theory "

Abstract: The classical Lefschetz hyperplane theorem gives a deep relation between the topology of an algebraic variety X and the intersection of X with a hyperplane, called a hyperplane section of X . I will explain a way to "quantize" this statement. Namely, to relate the quantum cohomology of X with its hyperplane section. This is based on a joint project with Honglu Fan (ETH Zurich)

Jun Li / Huailiang Chang, (on behalf of the original speaker Jun Li):

Title: NMSP - An algebro geometric realization of BCOV Feynman structures

Abstract: In B-side, BCOV (1993) exhibited Feynman structures among topological string potentials. Later 2004 Yamaguchi Yau (YY) obtained finite generation (polynomiality) and functional equations (YY eqns) from BCOV. Assuming mirror symmetry these determine GW potential up to finite initial conditions.

Recently, we found that the N-Mixed-Spin-P (NMSP) moduli endows GW potentials with BCOV and YY structures naturally. The Givental' s R matrices applied to NMSP give (A side) modular interpretation of notions in the BCOV theory (B side), such as propagators or ambiguities.

In this series of talks we will explain how BCOV Feynman structure comes from NMSP moduli and Givental theory, under the help of Yamaguchi Yau' s work. In the first talk the BCOV Feynman, YY, and NMSP setup will be addressed.

Emanuel Scheidegger

Title: Holomorphic anomaly equation in the B-model and mirror symmetry.

Abstract: I will review the holomorphic anomaly equation in the B-model and its description in terms of certain polynomial generators, the propagators. I will describe its explicit solution in low genus for a 2-parameter example. Using mirror symmetry this yields predictions for the Gromov-Witten invariants.

Longtin Wu and Honglu Fan

Title: Structures on relative Gromov-Witten theory I and II

Abstract: In these talks, we will review the moduli of stable maps, WDVV equation, and the construction of quantum cohomology at first. Then we change our focus to relative Gromov-Witten (GW-) theory. We will generalize the definition of relative GW-theory to include negative contact orders, and discuss some parallel structures (quantum cohomology, WDVV, etc.) on relative GW-theory. As an application, we will present some calculations on certain relative GW-invariants using the WDVV equation in relative theory. This is based on joint work with Fenglong You.

Cristina Manolache

Title: A splitting of the virtual class

Abstract: One of the main computational tools in genus zero Gromov-Witten theory is Quantum Lefschetz. Quantum Lefschetz fails for higher genus invariants.

I will show how to split the virtual class of the moduli space of genus one stable maps and discuss applications of this splitting. This is based on joint work with Tom Coates.

Weiping Li

Title: NMSP1: The geometry of NMSP moduli

Abstract: The talk will discuss geometry of NMSP fields and their special properties, including properness, irregular vanishing, torus localization from NMSP theory, and relations with GW invariants.

Huailiang Chang

Title: NMSP2: The action of R matrix and finite generation conjecture via NMSP $[0,1]$ theory

Abstract: After separating NMSP theory into $[0,1]$ and infinity sub theories, we use composed R matrices to package $[0,1]$ as a CohFT. After analyzing R matrices and obtaining $[0,1]$'s polynomial degree bound, this proves Yamaguchi-Yau finite generation conjecture for Fg.

Shuai Guo

Title: BCOV Feynman rule for the quintic threefold

Abstract: By using the polynomiality of the NMSP $[0,1]$ -theory, and the explicit

formula for the R-matrix representing the $[0,1]$ -CohFT from the quintic CohFT and N -points, we derive an A-model Feynman rule. By identifying this A-model Feynman rule and BCOV's Feynman rule, we finish the mathematical proof of BCOV's Feynman rule conjecture.

Hyenho Lho

Title : Finitely generatedness on the quasimap invariants of Calabi-Yau fibrations.

Abstract : Motivated by the conjecture of holomorphic anomaly equations for the Gromov-Witten theory of elliptic fibrations, I will study the quasimap invariants of elliptic fibrations and K3 fibrations. I will discuss the finitely generatedness of quasimap invariants of Calabi-Yau fibrations, and give a proof for several cases.

Hossein Movasati

Title: Polynomial structure of generating functions of higher genus GW invariants

Abstract: Yamaguchi-Yau (2004) and Alim-Lange (2007) have computed the polynomial structure of the generating functions of higher genus GW invariants using the B-model of mirror symmetry. In this talk I will present a purely algebraic version of such computations for Calabi-Yau varieties of arbitrary dimension. It involves a construction of the moduli space of enhanced Calabi-Yau varieties and modular vector fields on it. This will give us an algebraic BCOV anomaly equation and will eventually lead us to the theory of Calabi-Yau modular forms. The talk is partially based on my book "Gauss-Manin Connection in Disguise: Calabi-Yau Modular Forms".

Si Li

Title: BCOV theory from large N limit

Abstract: BCOV theory of Kodaira-Spencer gravity is the closed string field theory of topological B-model. In this talk I will explain the geometric meaning of BCOV theory and show how it arises from large N limit of holomorphic Chern-Simons theory.

Junwu Tu

Title: On the foundations of categorical Gromov-Witten invariants: a combinatorial approach

Abstract. We clarify some of the details in Costello's definition of Gromov-Witten type invariants associated to Calabi-Yau A-infinity categories, using Kontsevich-Soibelman's PROP-action of ribbon graphs on Hochschild chain complexes. This combinatorial approach makes the definition completely explicit and even computable in certain cases. This is a joint work in progress with Andrei Caldararu.

Jingchen Niu

Title: Desingularization of moduli of genus 2 stable maps

Abstract: We geometrically describe a canonical sequence of blowups of the relative Picard stack over the Artin stack of genus 2 weighted curves. The resulted stack locally diagonalizes certain tautological derived objects. This implies a resolution of the primary component of the moduli space of genus 2 stable maps to projective space, and also makes the entire space admit only normal crossing

singularities. Joint work with Yi Hu and Jun Li.

Zhengyu Zong

Title: Remodeling Conjecture and its applications

Abstract: Based on the work of Eynard-Orantin and Marino, the Remodeling Conjecture was proposed in the papers of Bouchard-Klemm-Marino-Pasquetti in 2007 and 2008. The Remodeling Conjecture can be viewed as an all genus mirror symmetry for toric Calabi-Yau 3-orbifolds. It relates the higher genus open Gromov-Witten potential of a toric Calabi-Yau 3-orbifold to the higher genus B-model potential which is obtained by applying the topological recursion on the mirror curve.

The Remodeling Conjecture has many nice applications. In this talk, I will first discuss the proof of the remodeling conjecture. Then I will discuss some of its applications such as the holomorphic anomaly equation, modularity, and the crepant resolution conjecture.