Title and Abstracts

Artan Sheshmani, Harvard/Aarhus

Title: Atiyah Class and Sheaf counting on local Calabi-Yau fourfoldsAbstract: We discuss Donaldson-Thomas (DT) invariants of torsion sheaves with 2 dimensional support on a smooth projective surface in an ambient non-compact Calabi Yau fourfold given by the total space of a rank 2 bundle on the surface. We prove that in certain cases, when the rank 2 bundle is chosen appropriately, the universal truncated Atiyah class of these codimension 2 sheaves reduces to one, defined over the moduli space of such sheaves realized as torsion codimension 1 sheaves in a noncompact divisor (threefold) embedded in the ambient fourfold. Such reduction property of universal Atiyah class enables us to relate our fourfold DT theory to a reduced DT theory of a threefold and subsequently then to the moduli spaces of sheaves on the base surface. We finally make predictions about modularity of such fourfold invariants when the base surface is an elliptic K3. This is joint work with Emanuel Diaconescu and Shing-Tung Yau.

Hiroshi Iritani, Kyoto University

Title: Gamma conjecture via tropical geometry
Abstract: Many people have observed that asymptotics of periods
near the large complex structure limit involves characteristic numbers of mirror manifolds and Riemann zeta values. This phenomenon can be formulated in terms of a certain characteristic class called the Gamma class. In this talk, I will explain how zeta values appear from tropical geometry. This is based on joint work with Mohammed Abouzaid, Sheel Ganatra and Nick Sheridan.

Hossein Movasati, IMPA

Title: B-Model of mirror symmetry for compact non-rigid Calabi-Yau manifolds
Abstract: In B-model of mirror symmetry, period manipulations play an important role for computing the Gromov-Witten invariants of the A-model. This requires computing power series of periods, finding a maximal unipotent monodromy, mirror map etc. 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 the theory of Calabi-Yau modular forms.

Johannes Walcher, Heidelberg University

Title: Flat connections for limits of Abel-Jacobi mappings
Abstract: I will give (another) update on the ongoing project with Hans Jockers and David Morrison, whose goal is to realize limiting values of normal functions as appropriate relative invariants in the A-model. I will give some details on the calculations and explain our best understanding of the algebraic significance of the eventual explanation of our results.

Kazushi Ueda, University of Tokyo, Japan

Title: Homological mirror symmetry for Milnor fibers of invertible polynomials
Abstract: We discuss the relation between the Fukaya category of the Milnor fiber of an invertible polynomial and graded matrix factorizations of the Berglund-Hubsch transpose with one term added, using the description of the Milnor fiber as a partial compactification of a cover of a pair of pants. If the time permits, we will also discuss Sebastiani-Thom formula for the Fukaya category and permutohedral skeletons for Brieskorn-Pham singularities. This is a joint work in progress with Yanki Lekili.

Min-Xin Huang, The University of Science and Technology of China

Title: Refined topological strings on compact Calabi-Yau spaces
Abstract: Refined topological string theory is motivated by Omega background in supersymmetric gauge theory. Previous works consider only non-compact Calabi-Yau spaces. In this talk we discuss a class compact elliptic Calabi-Yau spaces and compare the results with geometric calculations. The talk is based on parts of a work in progress with S. Katz and A. Klemm.

Rinat Kashaev, Université de Genève

Title: The quantum mirror curve spectral problem of local $\mathbb{P}^1\times \mathbb{P}^1$ in the strongly coupled regime.

Abstract: Motivated by the conjecture of Grassi--Hatsuda--Mari\~no for non perturbative topological strings in toric Calabi--Yau manifolds, I will talk about the spectral problem for a pair of commuting modular conjugate (in the sense of Faddeev) Harper type operators with complex values of Planck's constant. The eigenvectors are expressed in terms of a special entire function on the complex plane with the Taylor expansion coefficients given in terms of specific q-orthogonal polynomials, while the eigenvalues are solutions of transcendental Bethe type equations. This is a joint work with Sergey Sergeev.

Siu-Cheong Lau, University of Boston

Title: Noncommutative mirror construction

Abstract: In a joint work with Cho and Hong, we found that the local mirror of a general Lagrangian immersion is noncommutative. The mirror construction has nice applications in deformation quantization. In this talk, I will explain the construction for certain types of singular SYZ fibers and the applications to wall-crossing.

Thorsten Schumannek, Universität Wien

Title: Toric automorphisms and modular properties of the topological string partition function

Abstract: According to a conjecture by Katz, Klemm and Huang (KKH) the partition function of topological strings on elliptically fibered Calabi-Yau threefolds admits an expansion in terms of quotients of weak Jacobi forms.This conjecture had been formulated and checked in the context of fibrations without reducible fibers and was partly motivated by the presence of an involution that acts on the moduli space and, together with the large volume/complex structure monodromies,``almost'' generates the modular group.In the B-model this involution is induced from a toric automorphism of the ambient space that can be compensated by a change of complex structure. The A-model interpretation is that of a Fourier-Mukai transformation where the kernel is the Poincaré sheaf.

The KKH conjecture has subsequently been generalized to geometries with reducible fibers over codimension one loci in the base, geometries that admit multiple sections and to the refined topological string partition function on non-compact elliptic fibrations. We report on ongoing work with Cesar Fierro Cota and Albrecht Klemm where we explore the relation between toric automorphisms, Fourier-Mukai transformations and the weak Jacobi structure of the topological string partition function in this more general context. Important properties can be derived in a base independent manner and equally apply to the free energies on Calabi-Yau 4-folds.

Wei Gu, Virginia Tech

Title: A proposal for nonabelian mirror symmetry
Abstract: To be updated

Bohan Fang, Beijing International Center for Mathematical Research

Title: Integral structures and Gamma II for toric varieties from HMS
Abstract: I will describe how to use known homological mirror symmetry results, including methods with microlocal sheaves and with wrapped Fukaya categories, to compute oscillatory integrals and its mirror Gromov-Witten descendants on toric varieties. This is related to the integral structures of quantum cohomology and the Gamma conjecture. This talk is based on the joint work with Peng Zhou.

Masahito Yamazaki, Kavli IPMU, University of Tokyo

Title: Partial Mirror Symmetry and Chern-Simons Theory
Abstract: Mirror symmetry exchanges the A-model and the B-model, as it well-known. We here discuss intermediate situations where we have a mixed A/B-model, in a particular context of the Chern-Simons theory embedded inside open topological string theory, and discuss its application to integrable models.

Shinobu Hosono, Gakushuin University

Title: Double cover family of K3 surfaces and mirror symmetry
Abstract: I will study a family K3 surfaces which are given as double covers of P2 branched along six lines in general position. Period integrals of this family satisfy the hypergeometric system E(3,6),i.e., Aomoto-Gel'fand hypergeometric system on Grassmannian G(3,6),which were studied in detail by Matsumoto, Sasaki and Yoshida in the'90s. In this talk, I will focus on the parameter space of the E(3,6)system described naturally by GIT or Baily-Borel-Satake compactication. I will find that the E(3,6) system is "locally trivialized" by corresponding GKZ systems. Based on this result, and making suitable resolutions of the compacti_ed parameter space, I will obtain the desired LCSLs (large complex structure limits) where we can read off mirror symmetry by applying the generalized Frobenius method formulated in the '90s. This talk is based on a recent collaboration with B. Lian, H. Takagi and S.-T. Yau (arXiv:1810.00606)

Victor Przyjalkowski, Steklov Mathematical Institute

Title: ON KATZARKOV–KONTSEVICH–PANTEV CONJECTURES
Abstract: The initial mirror symmetry conjecture claims that any Calabi–Yau threefold has a pair
Calabi–Yau threefold whose Hodge diamond is given from a Hodge diamond of the initial Calabi–Yau by rotating by 90 degrees. We discuss a generalization of this phenomenon to the Fano case. That is, following Katzarkov, Kontsevich, and Pantev, we define Hodge numbers for Landau–Ginzburg models. We discuss proofs of the conjectures in dimensions 2 and 3. A crucial ingredient for the threefold case is Harder's result that express the Hodge-type numbers in terms of geometry of Landau–Ginzburg models.

Wolfgang Lerche, CERN

Title: On Matrix Factorizations, Residue Pairings and Homological Mirror Symmetry
Abstract: We argue how boundary B-type Landau-Ginzburg models based on matrix factorizations can be used to compute exact superpotentials for intersecting D-brane configurations on compact Calabi-Yau spaces. In this paper, we consider the dependence of open-string, boundary changing correlators on bulk moduli. This determines, via mirror symmetry, non-trivial disk instanton corrections in the A-

model. As crucial ingredient we propose a differential equation that involves matrix analogs of Saitos higher residue pairings. As example, we compute from this for the elliptic curve certain quantum products m2 and m3, which reproduce genuine boundary changing, open Gromov-Witten invariants.

Yukinobu Toda, IPMU

Title: Semiorthogonal decompositions under d-critical flips
Abstract: I will give semiorthogonal decompositions of derived categories of coherent sheaves in the following cases:
(1) Pandharipande-Thomas stable pair moduli spaces on CY 3-folds
(2) relative Hilbert schemes of points on K3 surfaces
(3) Thaddeus pair moduli spaces on smooth projective curves (work in progress with Naoki Koseki)
In all the cases, the SOD are constructed via d-critical flips, which are interpreted as virtual birational maps. The resulting SOD are interpreted as d-critical analogue of Bondal-Orlov, Kawamata's D/K equivalence conjecture, and also categorifications of wall-crossing formula of Donaldson-Thomas invariants.

Daniel Pomerleano，University of Massachusetts, Boston

Title: An intrinsic Batyrev construction via symplectic topology
Abstract: I will describe an intrinsic version of Batyrev's mirror construction associated to a general maximally degenerate log Calabi-Yau pair (M;D) using an invariant known as symplectic cohomology. The symplectic cohomology ring of log Calabi-Yau varieties comes equipped with a at degeneration to the Stanley-Reisner ring of the dual intersection complex of a compactifying divisor. The deformation from the central _ber can be alternatively described using a symplectic version of log Gromov-Witten invariants, which modulo a certain technical conjecture enables us to relate our construction to recent mirror constructions of Gross-Hacking-Keel and Gross-Siebert.