

Categorical and analytic invariants in algebraic, symplectic and complex geometry

3rd February - 7th February

Lecture Hall, Kavli IPMU

Program

3rd February (Monday)

10:00-11:00 Osamu Iyama

TBA

11:30-12:30 Shinnosuke Okawa

TBA

14:00-15:00 Lutz Hille

TBA

16:00-17:00 Ryo Takahashi

Finiteness of Orlov spectra of singularity categories

4th February (Tuesday)

10:00-11:00 Kyoji Saito

Semi-infinite Hodge structure associated with hyperbolic root systems

11:30-12:30 Atsushi Takahashi

TBA

14:00-15:00 Huijun Fan

Fukaya category of Landau-Ginzburg model via Witten equation

16:00-17:00 Todor Milanov

Genus-0 permutation-equivariant KGW invariants of the point

5th February (Wednesday)

10:00-11:00 Sofia Tirabassi

Effective characterizations of semi-abelian varieties

11:30-12:30 Wahei Hara

Derived equivalence for the simple flop of type G_2^\dagger

Free afternoon

6th February (Thursday)

10:00-11:00 Mikhail Kapranov
TBA

11:30-12:30 Yukinobu Toda
Dolbeault Geometric Langlands conjecture via quasi-BPS categories

14:00-15:00 Rina Anno
TBA

16:00-17:00 Timothy Logvinenko
TBA

7th February (Friday)

10:00-11:00 Katherine Maxwell
TBA

11:30-12:30 Alexei Lvov
TBA

14:00-15:00 Dogancan Karabas
Wrapped and compact Fukaya categories of plumbings

16:00-17:00 Tatsuki Kuwagaki
Hodge microsheaves on cotangent bundles and plumbings

Abstracts

Ryo Takahashi, Nagoya University

Title: **Finiteness of Orlov spectra of singularity categories**

The Orlov spectrum of a triangulated category is the set of generation times of strong generators. Ballard, Favero and Katzarkov proved that the singularity category of a hypersurface isolated singularity has finite Orlov spectrum. In this talk, we will introduce the new notion of uniformly dominant local rings. We will show that the singularity category of a uniformly dominant isolated singularity has finite Orlov spectrum, and consider when a given local ring is uniformly dominant.

Kyoji Saito, RIMS

Title: **Semi-infinite Hodge structure associated with hyperbolic root systems**

It is well-known that there exist semi-infinite Hodge structure associated to finite or elliptic root systems (which describes the lattice of vanishing cycles for either simple or elliptic root systems). Recently, we found that the semi-infinite Hodge structure exist for hyperbolic root systems of rank 2. This is a surprise, since the hyperbolic root systems do not have geometric origin so they behaves quite differently than the above classical cases (e.g. some eigenvalues of monodromy are not root of unity but real). In the present talk, we will describe the construction down to the earth.

Huijun Fan, Wuhan University

Title: **Fukaya category of Landau-Ginzburg model via Witten equation**

Landau-Ginzburg model has become a cornerstone theory of global mirror symmetry. The closed string A-theory of a LG model has already been built, and is well-known as the quantum singularity theory (or FJRW theory). An open string theory of a LG model has also been treated in the paper “Fukaya Category of Landau-Ginzburg model, arXiv:18012.11748v1”, but with not much attention. In this talk, I will recall the construction in this paper, which is related to the boundary value problem of the Witten equations arising from Landau-Ginzburg model, and mention the Maurer-Cartan element conjecture proposed by Gaiotto-Moore-Witten (or Kapranov-Kontsevich-Soibelman).

Todor Milanov, Kavli IPMU

Title: **Genus-0 permutation-equivariant KGW invariants of the point**

K-theoretic Gromov-Witten (KGW) theory was introduced by Givental and Y.P. Lee as a generalization of Gromov-Witten theory. Recently, Givental realised that if we want to compute KGW invariants via fixed-point localization

methods, we have to consider a more general theory, i.e., the permutation equivariant version of KGW theory. I would like to give an introduction to this topic and to explain how to compute the invariants in genus-0 for the simplest possible target – the point.

Sofia Tirabassi, Stockholm University

Title: **Effective characterizations of semi-abelian varieties**

I will show how three logarithmic plurigenera and the logarithmic irregularity are enough to characterize semi-abelian surfaces among the quasi-projective surfaces. I will also present some results for higher dimensional varieties in a very special case. This is joint work with Mendes Lopes and Pardini and a work in progress with J. Baudin.

Wahei Hara, Kavli IPMU

Title: **Derived equivalence for the simple flop of type G_2^\dagger**

In this talk we discuss an example of a simple flop that was found by Kanemitsu, from the point of view of derived categories. A simple flop is a flop between two smooth varieties that is connected by one smooth blow-up and one smooth blow-down, and those flops were partially classified by Kanemitsu, using Dynkin data. The exceptional divisor of the blow-ups has two projective bundle structures of the same rank, and is called a roof. The simple flop of type G_2^\dagger , which we discuss in this talk, is the only known example of a simple flop that has the non-homogeneous roof. The main theorem of the talk is that the simple flop of type G_2^\dagger gives a derived equivalence. The proof is done by using tilting bundles, and hence it also produces a noncommutative crepant resolution that is derived equivalent to both sides of the flop. Despite its Dynkin label, the construction of the tilting bundles is related to rational homogeneous manifolds of Dynkin type B_3 and D_4 .

Yukinobu Toda, Kavli IPMU

Title: **Dolbeault Geometric Langlands conjecture via quasi-BPS categories**

In this talk, I will introduce the notion of ‘limit category’ for cotangents of smooth stacks, which is expected to give a categorical degeneration of the category of D-modules on them. I show that the limit category for the moduli stack of Higgs bundles admits a semiorthogonal decomposition into products of quasi-BPS categories, which are categorifications of BPS invariants of some non-compact Calabi-Yau 3-folds. I propose the formulation of Dolbeault Geometric Langlands conjecture using the limit category, which is regarded as a classical limit of Geometric Langlands correspondence. I also show that the limit category admits Hecke operators. This is a joint work in progress with Tudor Padurariu.

Dogancan Karabas, Kavli IPMU

Title: **Wrapped and compact Fukaya categories of plumbings**

Given any finite quiver Q , where each vertex corresponds to a fixed Lagrangian L_v , I will describe an associated symplectic manifold known as the plumbing of T^*L_v 's along Q . Using a local-to-global approach, I will explain how their wrapped Fukaya category can be expressed as a Ginzburg dg algebra with based loop space coefficients or a derived multiplicative preprojective algebra. In the second part of my talk, I will demonstrate that microlocal sheaves on the union of L_v 's recover the compact Fukaya category of the plumbing, generalising the Nadler-Zaslow correspondence for cotangent bundles. The first part is joint work with Sangjin Lee (arXiv:2405.10783), and the second part is ongoing work with Sangjin Lee and Wonbo Jeong.

Tatsuki Kuwagaki, Kyoto University

Title: **Hodge microsheaves on cotangent bundles and plumbings**

The theory of Hodge microsheaves aims at generalizing the theory of mixed Hodge modules in twofold: (1) "infinite-dimensional" like wrapped sheaves of Nadler, (2) "microlocal" in the style of Bezrukavnikov-Kapranov. In this talk, I'll explain some background philosophy and some nontrivial computational results in the theory, based on joint work with Takahiro Saito.