East Asian Symplectic Conference 2025 in Sapporo

Date: 2025 Sep. 25th (Thu) - Sep. 29th (Mon)
Venue: Room 310, 3rd floor, Building 7 (Faculty of Science), Hokkaido University

Time	25th (Thu)	26th (Fri)	27th (Sat)	28th (Sun)	29th (Mon)
09:30 - 10:30	Tomohiro Asano	Y.P. Lee	Michael McBreen	Yan-Lung Leon Li	Masato Tanabe
11:00 - 12:00	You-Cheng Chou	Azuna Nishida	Xin Wang	Chin Hang Eddie Lam	Sungho Kim
14:00 - 15:00	Shuo Zhang	Yingchun Zhang		Kui-Yo Chen	Yat-Hin Marco Suen
15:30 - 16:30	Sukjoo Lee	Ki-Fung Chan		Joontae Kim	Shuhei Maruyama

Tomohiro Asano (Kyoto University)
Title: Microlocal sheaf theory and the rectangular peg problem
Abstract: The square peg problem asks whether every simple closed curve in the plane contains four points that form the vertices of a square. This problem was proposed by Toeplitz in 1911 and it remains open at present. It can be generalized to the rectangular peg problem, which asks about the existence of a rectangle with a given aspect ratio. In recent years, Greene and Lobb discovered that symplectic geometry can be effectively applied to this problem and obtained new results. In this talk, I will explain how microlocal sheaf theory allows us to further extend their approach and affirmatively solve the problem for a large class of curves, including all curves of finite length. This talk is based on joint work with Yuichi Ike.

You-Cheng Chou (KIAS)
Title: Genus zero quantum K-invariants and Gopakumar-Vafa invariants on semi-positive varieties.
Abstract: In this talk, I will discuss a proof of the conjectural formula proposed by Jockers-Mayr and Garoufalidis-Scheidegger, which establishes a fundamental relationship between genus zero quantum K-invariants and Gopakumar-Vafa invariants on Calabi-Yau 3-folds. The main technique in the proof is the adelic characterization developed by Givental and Tonita, which also generalizes to semi-positive varieties (including CY and Fano varieties). This is a joint work with Y.-P. Lee.

Shuo Zhang (Chinese Academy of Science)
Title: Composed Dehn twist exact sequence through A_∞ multi-modules.
Abstract: We prove the quilted Floer cochain complexes form A_∞ multi-modules over the Fukaya category of Lagrangian correspondences. Then we prove that when we restrict the input to mapping cones from product Lagrangians to graphs, the resulting cochain complex can be identified with certain Hochschild complex from ordinary Floer theory. As an application we use a family version of quilt unfolding argument to prove a long exact sequence conjectured by Seidel that relates the Lagrangian Floer cohomology of a collection of (possibly intersecting) Lagrangian spheres and the fixed point Floer cohomology of composition of Dehn twists along them.

Sukjoo Lee (IBS-CGP)
Title: Mirror P=W conjecture
Abstract: In the context of mirror symmetry for log Calabi–Yau manifolds, Harder–Katzarkov–Przyjalkowski proposed an interesting mirror phenomenon: Deligne's weight filtration corresponds to the perverse Leray filtration of the proper affinization map. This correspondence is called the mirror P=W conjecture. In this talk, I will explain a tropical incarnation of this phenomenon, which leads to a generalization of the conjecture beyond the log Calabi–Yau case, and outline the proof. This is joint work with Andrew Harder.

Y.P. Lee (Academia Sinica)
Title: Linked Gromov-Witten invariants, a proposal
Abstract: The standard definition of Gromov-Witten invariants on a symplectic (or Kähler) manifold X of real

dimension $2n$, requires fixing a curve (homology) class. These invariants virtually count the number of Riemann surfaces C in X, with C representing the given homology class.

Now, consider an additional scenario: we are given a finite collection of $(2n-3)$-dimensional spheres in X. Assuming that C and the spheres are in general position, in particular no intersection, their specific configuration defines a set of "linking numbers." As C moves within its homology class, it will inevitably intersect the spheres. This intersection occurs on a real codimension-1 locus within the moduli space.

This leads to the central question of this proposal: can we find a suitable compactification that allows us to define an invariant for a fixed set of linking numbers? If so, what conditions should be imposed on X and the spheres in X? Can we replace the spheres by other real $(2n-3)$-dimensional submanifolds?

This proposal / question originated from a joint project with Hui-Wen Lin and Chin-Lung Wang (National Taiwan University), in which a specific case of this phenomenon arose. That project will serve as a guiding example.

Azuna Nishida (Chiba University)
Title: Homological mirror symmetry for weighted projective spaces and Morse homotopy
Abstract: Kontsevich and Soibelman discussed homological mirror symmetry (HMS) in terms of SYZ fibrations, where they introduced the weighted version of the Fukaya-Oh category or the category of Morse homotopy on the base manifold of the SYZ fibration. Recently, Futaki and Kajiura extended this setting to discuss HMS for smooth compact toric manifolds by considering the category of weighted Morse homotopy on the moment polytope as a generalization to the case where the base manifold has boundaries. In this talk, we discuss a toric orbifold analogue of this setting and show a version of HMS for weighted projective spaces.

Yingchun Zhang (Shanghai Jiaotong University)
Title: quantum cohomology and cluster algebra
Abstract: In this talk, I will present our recent progress in the relation between the cluster algebra and the quantum cohomology ring. For a given quiver with potential function, there is an associated cluster algebra. At the same time, one can consider the associated varieties which is defined as the critical locus of the potential function and its "quantum cohomology ring". We claim that the quantum cohomology ring naturally admits a cluster algebra structure, and this holds for general quivers with potential functions in some sense.

Ki-Fung Chan (Chinese University of Hong Kong)
Title: 3d Mirror Symmetry is Mirror Symmetry
Abstract: 3d mirror symmetry is a mysterious duality for certian pairs of hyperkähler manifolds, or more generally complex symplectic manifolds/stacks. In this talk, we will describe its relationships with 2d mirror symmetry. Joint work with Conan Leung.

Michael McBreen (Chinese University of Hong Kong)
Title: The Hamiltonian reduction of hypertoric mirror symmetry
Abstract: I will describe recent work with Vivek Shende and Peng Zhou, which relates the Fukaya category of a multiplicative abelian Coulomb branch (also known as a multiplicative hypertoric variety) to the Fukaya category of its associated toroidal hyperplane arrangement. I will say a little about how this relates to mirror symmetry for multiplicative Coulomb branches, and how this picture fits into wider conjectures on Fukaya categories of spaces with group actions.

Xin Wang (Shandong University)
Title: Universal constraints for Hodge integrals with target varieties and their applications
Abstract: Motivated by Virasoro conjecture for Gromov-Witten invariants, we propose two conjectures for Hodge integrals with target varieties: Virasoro conjecture and λ_g conjecture. Then we discuss the recent results on these conjectures. As applications, we show how to use these universal constraints to derive new Dubrovin-Zhang type loop equations, which give new algorithms for computing Hodge integrals.

Yan Lung Leon Li (IBS-CGP)

Title: Equivariant Lagrangian correspondence and Seidel representation
Abstract: In this talk, we first review a joint work (with Siu-Cheong Lau and Conan Leung) on Floer theory for equivariant Lagrangian correspondences, applying to resolve of a conjecture of Teleman on the mirror constructions of Hamiltonian G-spaces Y and their symplectic quotients X using moment level correspondences. Then, we discuss an ongoing joint work (with the same authors) on another application to Seidel representation, which counts sections of Seidel spaces E associated to Hamiltonian S^1 spaces X, by realising X as a symplectic quotient of E. In particular, we generalise a result of Chan-Lau-Leung-Tseng on the images of Seidel elements of toric semi-Fano manifolds X under Kodaira-Spencer map introduced by Fukaya-Oh-Ohta-Ono.

Chin Hang Eddie Lam (Chinese University of Hong Kong)
Title: Quantum cohomology, shift operators, and Coulomb branches
Abstract: In this talk, we discuss a recent joint work with Kwokwai Chan and Ki Fung Chan. Given a complex reductive group G and a G-representation $\mathbf{N}$, there is an associated Coulomb branch algebra. For any smooth semiprojective variety X, with an equivariant proper map from X to $\mathbf{N}$, via the construction of shift operators, we show that the big equivariant quantum cohomology of X defines a quasicoherent sheaf of algebras on the Coulomb branch with coisotropic support. As applications, we recover Teleman's gluing construction for Coulomb branches and derive different generalizations of the Peterson isomorphism.

Kui-Yo Chen (National Cheng Kung University)
Title: On the Coordinate Ring of SL(3, $\mathbb{C}$)-Character Varieties under Poisson Reduction
Abstract: This talk is about the character varieties associated with the group SL(3,$\mathbb{C}$), focusing on its maximal compact subgroup SU(3). Specifically, we examine the structure and properties of these varieties over a once-punctured torus.

Joontae Kim (Sogang University)
Title: Lagrangian split tori in $S^2 \times S^2$ and billiards
Abstract: We classify Lagrangian tori that split as a product of circles in non-monotone $S^2 \times S^2$. It turns out that this classification is equivalent to a problem of mathematical billiards in rectangles. We then discuss its applications, including the ball-embeddability of Lagrangian tori. This is joint work with Joé Brendel.

Masato Tanabe (Hokkaido University)
Title: Immersions associated with links of complex surface singularities and their topology
Abstract: In this talk, we study isolated surface singularities in $\mathbb{C}^3$ from the viewpoint of immersion. First, for each such singularity, we determine the regular homotopy class of the inclusion map of its link into the 5-sphere. Second, for each of Arnol'd's simple singularities, we also determine the regular homotopy class of the immersion associated with the corresponding Dynkin diagram, which is constructed by Kinjo. These results generalize and refine independent works of Némethi–Pintér and Kinjo.

Sungho Kim (University of Science and Technology of China, Institute of Geometry and Physics)
Title: Legendrian lifts in prequantization bundles and Rabinowitz Floer theory
Abstract: A prequantization bundle is a principal circle bundle over a symplectic manifold equipped with a natural contact form. For certain monotone Lagrangian submanifolds in the base, one can construct Legendrian lifts inside the prequantization bundle. We study the Rabinowitz Floer homology of such Legendrian lifts and show that its equivariant version is isomorphic to the Floer homology of the underlying Lagrangian. As applications, we obtain torsion and vanishing results in Floer homology and obstructions to exact Lagrangian fillings of certain Legendrian lifts. This is joint work in progress with Hanwool Bae and Jungsoo Kang.

Yat-Hin Marco Suen (National Cheng Kung University)
Title: Toric vector bundles, spectral networks, and clusters
Abstract: In this talk, I will present to you a relation between toric vector bundles on toric surfaces and spectral networks. As a result, we discover the cluster structure on the moduli space of rank 2 toric vector bundles over toric surfaces.

Shuhei Maruyama (Kanazawa University)

Title: Non-triviality of Reznikov's characteristic class and non-extendability of Shelukhin's quasimorphism

Abstract: A foliated symplectic fiber bundle is a fiber bundle whose fiber is a symplectic manifold and whose structure group is reduced to the group of symplectomorphisms equipped with the discrete topology. Reznikov defined a characteristic class of such bundles. In this talk, I will discuss the non-triviality of these classes. The main tool is a quasimorphism constructed by Shelukhin on the group of Hamiltonian diffeomorphisms. I will explain how the non-triviality of Reznikov's class arises from the non-extendability of this quasimorphism, and how such non-extendability indeed occurs for certain symplectic manifolds. This talk is based on joint work with Morimichi Kawasaki, Mitsuaki Kimura, Takahiro Matsushita, and Masato Mimura.