East Asian Symplectic Conference 2019
Venue: R402-1, Marine Science & Technology Building (N), NPU

Date: Sep. 26, 2019

15:15–16:15	*A Proof of Mahler's Conjecture for the Volume Product of Three Dimensional Convex Bodies*	**Hiroshi Iriyeh**
16:30–17:30	*Bulk-deformed LG Mirror for Toric Fano Surfaces*	**Hansol Hong**

Date: Sep. 27, 2019

08:30–09:30	**Free discussion**	
09:45–10:45	*Formality Theorem for dg Manifolds*	**Hsuan-Yi Liao**
11:00–12:00	*Convex Hypersurface Theory in Higher-dimensional Contact Topology*	**Ko Honda**
12:00–13:45	**Lunch Break**	
13:45–14:45	*Descendant Hilb/Sym Correspondence for the Plane*	**Hsian-Hua Tseng**
14:45–15:15	**Coffee Break**	
15:15–16:15	*Recent Developments in Z/2-harmonic Spinors*	**Ryosuke Takahashi**

Date: Sep. 28, 2019

08:30–09:30	**Free discussion**	
09:45–10:45	*Feynman Rule of Gromov Witten Theory*	**Huai-Liang Chang**
11:00–12:00	*Stability Filtrations, Weakly Ample Sequences and Numerical Vectors in Categories*	**Hung-Yu Yeh**
12:00–13:45	**Lunch Break**	
13:45–14:45	*Landau-Ginzburg Model via L^2 Hodge Theory*	**Hao Wen**
14:45–15:15	**Coffee Break**	
15:15–16:15	*K-theoretial Virtual Fundamental Classes*	**Bai-Ling Wang**

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Venue: R402-1, Marine Science & Technology Building (N), NPU

Date: Sep. 29, 2019

08:30–09:30	**Free discussion**	
09:45–10:45	*A Higher-dimensional Generalization of Pseudo-Anosov Surface Automorphisms*	**Sangjin Lee**
11:00–12:00	*SO(3)-invariant G_2-manifolds*	**Ryohei Chihara**
12:00–13:45	**Lunch Break**	
13:45–14:45	*Wrapped Floer Cohomology of T_e^*G and Floer Cohomology of the Diagonal of $G/T^- \times G/T$*	**Hanwool Bae**
14:45–15:15	**Coffee Break**	
15:15–16:15	*An Epsilon Regularity Theorem for Line Bundle Mean Curvature Flow*	**Hikaru Yamamoto**
18:00	**Dinner**	

Date: Sep. 30, 2019

08:30–16:15	**Free discussion**

Date: Oct. 1, 2019

08:30–09:30	**Free discussion**	
09:45–10:45	*Denseness of Non-autonomous Hamiltonian Diffeomorphisms*	**Yoshihiro Sugimoto**
11:00–12:00	*Reconstruction of $TP2$ via Tropical Lagrangian Multi-section*	**Yat-Hin Suen**

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Wrapped Floer Cohomology of T_e^*G and Floer Cohomology of the Diagonal of $G/T^- \times G/T$

Hanwool Bae (IMS Chinese University of Hong Kong)

Abstract:

Let G be a compact simply-connected semisimple Lie group and let T be a maximal torus subgroup of G. We will discuss about the A_∞-functor associated to a Lagrangian correspondence from T^*G to $G/T^- \times G/T$. In particular, we will give a sketch of the proof that the A_∞-homomorphism from the wrapped Floer cohomology of T_e^*G to the Floer cohomology of the diagonal of $G/T^- \times G/T$ induces a ring isomorphism after a proper localization. This gives a new approach to a theorem proposed by Dale Peterson, which says that the homology of the based loop space of G and the quantum cohomology of G/T are isomorphic as rings. This is based on a work in progress with Naichung Conan Leung.

Feynman Rule of Gromov Witten Theory

Huai-Liang Chang (Hong Kong University of Science and Technology)

Abstract:

For compact Calabi Yau threefold, BCOV (1993) predicted Feynman rule that determine higher genus Gromov Witten invariants. Recently the conjecture is proved by the discovery of mixed spin p (msp) fields, using large N method. A consequence is that Fg is analytic. I shall introduce the setup and ideas.

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$SO(3)$-invariant G_2-manifolds
Ryohei Chihara (University of Tokyo)
Abstract:

A G_2-manifold is a Ricci-flat Riemannian 7-manifold whose holonomy group is contained in the Lie group G_2. It is characterized by a closed and co-closed non-degenerate 3-form similar to a symplectic form. In this talk, we discuss $SO(3)$-invariant G_2-manifolds and their reduction together with related topics.

Convex Hypersurface Theory in Higher-dimensional Contact Topology
Ko Honda (UCLA)
Abstract:

Convex surface theory and bypasses are extremely powerful tools for analyzing contact 3-manifolds. In particular they have been successfully applied to many classification problems. After reviewing convex surface theory in dimension three, we explain how to generalize many of their properties to higher dimensions. This is joint work with Yang Huang.

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Bulk-deformed LG Mirror for Toric Fano Surfaces
Hansol Hong (Yonsei University)

Abstract:
I will present an inductive algorithm to compute the bulk-deformed potentials for toric Fano surfaces via wall-crossing techniques and a tropical-holomorphic correspondence for holomorphic discs. As an application, we find an explicit relation between the oscillatory integrals of the bulk-deformed potentials and log descendant Gromov-Witten invariants, which recovers the previous result of Gross for P^2. This is a joint work with Yu-Shen Lin and Jingyu Zhao.

A Proof of Mahler's Conjecture for the Volume Product of Three Dimensional Convex Bodies
Hiroshi Iriyeh (Ibaraki University)

Abstract:
Mahler's conjecture is one of the classical open problems in the area of convex geometry. It states that for a centrally symmetric convex body K in the n-dimensional Euclidean space, the product of the volume of K and that of the polar body is greater than or equal to $4^n/n!$. By a recent work by Artstein-Avidan, Karasev and Ostrover, this conjecture is closely related with Viterbo's isoperimetric-type conjecture for symplectic capacities. The two dimensional case of Mahler's conjecture was solved by Mahler in 1939. In this talk, we give a sketch of the proof of the three dimensional case. The conjecture is still open for $n > 3$. The talk is based on a joint work with Masataka Shibata.

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A Higher-dimensional Generalization of Pseudo-Anosov Surface Automorphisms
Sangjin Lee (IBS Center for Geometry and Physics)
Abstract:

In 80's, Thurston classified the mapping class group of orientable surfaces. A generic element of the mapping class group is of the pseudo-Anosov type. In 2014, from pseudo-Anosov surface automorphisms, Dimitrov, Haiden, Katzarkov and Kontsevich constructed Bridgeland stability conditions on the Fukaya category of the surface. They also gave a question asking the existence of higher-dimensional generalization of pseudo-Anosov automorphisms on symplectic manifolds. To answer their question, we found a construction of symplectomorphisms which preserve a stable Lagrangian lamination. In this talk, we will discuss the construction and some following questions.

Formality Theorem for Dg manifolds
Hsuan-Yi Liao (KIAS)
Abstract:

In late 90's, Kontsevich proved a formality theorem which solved the major problem in deformation quantization and led to many new developments in mathematics. Inspired by Kontsevich's formulas and Shoikhet's conjecture, we establish a formality theorem for differential graded manifolds (a.k.a. Q-manifolds) which are a useful geometric notion unifying many important structures such as curved $L - \infty$ algebras, derived intersections, complex manifolds and regular foliations. As an application, we prove a Duflo-type theorem for finite-dimensional dg manifolds. The talk is mainly based on joint works with Mathieu Stienon and Ping Xu.

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Reconstruction of $TP2$ via Tropical Lagrangian Multi-section
Yat-Hin Suen (IBS Center for Geometry and Physics)

Abstract:

In this talk, I am going to talk about the reconstruction problem of the holomorphic tangent bundle $TP2$ of the complex projective plane. I will introduce the notion of tropical Lagrangian multi-section and cook up one by using the Fubini-Study metric. Then I will perform the reconstruction from this tropical Lagrangian multi-section. Walling-crossing phenomenon will occur in the reconstruction process.

Denseness of Non-autonomous Hamiltonian Diffeomorphisms
Yoshihiro Sugimoto (NCTS)

Abstract:

The Hamiltonian diffeomorphism group $Ham(M, \omega)$ is the set of time 1 flows of time-dependent Hamiltonian vector fields. $Ham(M, \omega)$ contains "autonomous" subset $Aut(M, \omega)$ whose elements are time 1 flows of autonomous (=time-independent) Hamiltonian vector fields. One might expect that $Aut(M, \omega)$ is a very small subset of $Ham(M, \omega)$. In this talk, I will explain the denseness of the complement of $Aut(M, \omega)$.

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Recent Developments in $Z/2$-harmonic Spinors
Ryosuke Takahashi (National Cheng Kung University)
Abstract:

$Z/2$-harmonic spinors are the codimension two subsets of a manifold which is determined by the zero loci of non-extendable harmonic spinors. It was initially a byproduct of the generalized Uhlenbeck's compactness theorem. Later on, the structure of $Z/2$-harmonic spinors appeared in the proof of compactness theorem for many gauge-theoretic equations such as $G2$-instantons, Kapustin-Witten equation, and Vafa-Witten equation. In this talk, we will review the recent development of $Z/2$-harmonic spinors and explain the difficulty we faced so far.

Descendant Hilb/Sym Correspondence for the Plane
Hsian-Hua Tseng (Ohio State University)
Abstract:

Let S be a nonsingular surface. A version of the crepant resolution conjecture predicts that the descendant Gromov-Witten theory of $Hilb^n(S)$, the Hilbert scheme of n points on S, is equivalent to the descendant Gromov-Witten theory of $Sym^n(S)$, the n-fold symmetric product of S. In this talk we discuss how this works when S is C^2. We explicitly identify a symplectic transformation equating the two descendant Gromov-Witten theories. We also establish a relationship between this symplectic transformation and the Fourier-Mukai transformation which identifies the (torus-equivariant) K-groups of $Hilb^n(C^2)$ and $Sym^n(C^2)$. This is based on joint work with R. Pandharipande.

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K-theoretial Virtual Fundamental Classes
Bai-Ling Wang (Australian National University)
Abstract:
I will reprot joint work with Bohui Chen and Jianxun Hu on K-theoretical Gromov-Witten and Hamiltonian Gromov-Witten invariants. The key ingredient in the definition of these invariants is the construction of K-theoretial virtual fundamental classes. As an application, we consider a Hamiltonian G-manifold X, and establish a K-theoretical relation between the Gromov-Witten invariants and the L^2-Hamiltonian Gromov-Witten invariants for the symplectic quotient orbifold $[X//G]$.

Landau-Ginzburg Model via L^2 Hodge Theory
Hao Wen (Yau Mathematical Sciences Center)
Abstract:
Let X be a non-compact Calabi-Yau manifold and f be a holomorphic function on X such that the critical set of f is compact. Under the assumption that f satisfies some strongly elliptic condition, I will describe an L^2 theoretic approach towards the deformation theory of the pair (X, f), including the Hodge to de Rham degeneration property and the construction of the corresponding Frobenius manifold structure.

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An Epsilon Regularity Theorem for Line Bundle Mean Curvature Flow

Hikaru Yamamoto (Tokyo University of Science)

Abstract:

The line bundle mean curvature flow was defined by A. Jacob and S.-T. Yau to obtain deformed Hermitian Yang-Mills metrics on a line bundle over a Kahler manifold. In the context of mirror symmetry, a deformed Hermitian Yang-Mills metric in A-side corresponds to a special Lagrangian submanifold in B-side. In this talk, I would like to introduce an epsilon regularity theorem for the line bundle mean curvature flow and a general framework to get an epsilon regularity theorem. To explain the outline of the proof, I would like to introduce a scale-invariant monotone quantity, a notion of self-shrinkers and the Liouville type theorem for self-shrinkers. This is joint work with X. Han at Tsinghua University.

Stability Filtrations, Weakly Ample Sequences and Numerical Vectors in Categories

Hung-Yu Yeh (Academia Sinica)

Abstract:

Stability, first introduced by Mumford in the 1960's, is used as a tool to construct moduli space of sheaves on algebraic varieties and later generalized to objects in arbitrary abelian category. On the other hand, motivated by homological mirror symmetry conjecture and Douglas' Pi stability on the category of B-branes Bridgeland introduces stability conditions on triangulated categories which depends on the existence of Harder-Narasimhan (HN) filtration and central charges on the relevant K group of associated triangulated categories. In this talk, I would like to present main ideas in my current work and introduce a notion of stability filtration in arbitrary categories which is equivalent to the existence of HN filtration on objects. Indeed it is equivalent to existences of a zero morphism, a partial order on objects, and a collection of some universal sequences. One may give a suitable addition with this zero morphism on the Hom space which makes this category an additive category. Then with weakly ample sequences in the additive category embedded in an ambient triangulated category under suitable conditions, we could obtain a numerical polynomial or central charge of objects by calculating the Euler characteristic of weakly ample sequences and objects, inducing a partial order and HN filtration. At the end, I would give some easy examples in algebraic curves and surfaces.