Talks' titles and abstracts

1. **Andrei Caldararu, University of Wisconsin-Madison**
   Title: Formality of derived intersections and a HKR theorem for orbifolds
   Abstract: We study when the derived intersection of two smooth subvarieties of a smooth variety is formal. As a consequence we obtain a derived base change theorem for non-transversal intersections. We also obtain applications to the study of the derived fixed locus of a finite group action and give new proofs of the HKR decomposition of orbifold Hochschild (co)homology into twisted sectors. We conclude with a discussion of the analogy between Lie theory and and derived algebraic geometry, and discuss the meaning of the Todd class for smooth spaces.

2. **Huijun Fan, Peking University**
   Title: A mathematical theory of the gauged linear sigma model
   Abstract: I will report our recent progress in studying the gauged linear sigma model. The progress including the algebraic part and the analytic part. This is the joint work with T. Jarvis and Y. Ruan.

3. **Bohan Fang, Peking University**
   Title: Remodeling conjecture for toric Calabi-Yau 3-folds
   Abstract: The BKMP remodeling conjecture predicts all genus Gromov-Witten invariants of a toric Calabi-Yau 3-fold from its mirror curve, using the Eynard-Orantin recursive algorithm. I will describe the setup of this conjecture, and outline a proof. This talk is based on the joint works with Chiu-Chu Melissa Liu and Zhengyu Zong.

4. **Sergey Galkin, HSE**
   Title: A symplectic version of Dubrovin's conjectures
   Abstract: I will tell about joint work with Vasily Golyshev and Hiroshi Iritani. Dubrovin's ICM1998 conjectures relate quantum cohomology and derived category of coherent sheaves on the same Fano manifold. This kind of relation is somewhat surprising, however one can give a naive "proof" of the conjectures using mirror symmetry. I will tell about some generalizations of these conjectures, and recent counterexamples to these generalizations.
   Finally I will formulate a version of these conjectures purely in terms of symplectic topology.
   For a symplectic manifold X decomposition of the quantum cohomology subalgebra into a direct sum of subalgebras $QH^{\cdot}(X) = \bigoplus_{i=1}^{N} R_i$ conjecturally implies the existence of a semi-orthogonal decomposition of topological K –theory into a sum of subgroups $K^{\cdot}(X) = \bigoplus_{i=1}^{N} \Lambda_i^{\cdot}$. Consinser the subspaces $V_i = Ch(\Lambda_i^{\cdot}) \cup \hat{\Gamma}_X$, obtained as the images of these subgroups

by Chern character map twisted by Gamma class. Then the solutions of the quantum connection with the initial conditions in the regular singular point lying inside Vi correspond to the asymptotic subspaces in the irregular singular point after the analytic continuation.

5. **Zheng Hua, University of Hong Kong**
   Title: sklyanin algebras and noncommutative instantons
   Abstract: I will discuss the elliptic deformations of projective planes and the moduli space of sheaves over such deformations.

6. **Masao Jinzenji, Hokkaido University**
   Title: Toward Direct Proof of Mirror Theorem of Projective Hypersurfaces
   Abstract: In this talk, we discuss direct computational proof of mirror theorem (especiallygeneralized mirror transformation) of genus 0 Gromov-Witten invariants of projective hypersurfaces. Our approach is based on geometrical construction of expansion coefficients of the mirror map as intersection numbers. Fundamentally, the proof is reduced to combinatorial identities of rational functions associated with tree graphs, but there exist some obstructions for general proof. We also discuss these points.

7. **Si Li, Tsinghua University**
   Title: Mirror Theorem between Landau-Ginzburg models
   Abstract: In this talk, I will establish the mirror theorem between Landau-Ginzburg models for general invertible singularities. The proof includes a reconstruction theorem for both the A-model (Fan-Jarvis-Ruan-Witten theory) and the B-model (Saito-Givental theory) from finite terms of genus zero data. This is joint work with Weiqiang He, Rachel Webb and Yefeng Shen.

8. **Wei-Ping Li, Hong Kong University of Science and Technology**
   Title: Master Spin Fields on the Quintic
   Abstract: An MSP field is a collection$\xi = (C, \Sigma, \mathcal{L}, \mathcal{N}, \varphi\rho, \nu)$ consisting of a twisted curve C with marked points Σ, a field$\varphi \in H^0(C, \mathcal{L}^{\oplus 5})$, a P-field$\rho \in H^0(C, \mathcal{L}^{-5} \oplus \omega_c^{log})$, and a projectivized field$\nu = (\nu_1, \nu_2) \in H^0(C, \mathcal{L} \otimes \mathcal{N} \oplus \mathcal{N})$. The motivation for the MSP field theory is to collect "maps" to the V-GIT quotient space $[\mathbb{C}^7/\mathbb{C}^*]_{(1,1,1,1,1,-5,1)}$. Since$K_{P4}$ and$[\mathbb{C}^5/\mathbb{Z}_5]$ are GIT quotients of the Artin stack $[\mathbb{C}^6/\mathbb{C}^*]_{(1,1,1,1,1,-5)}$, the moduli space of MSP fields will provide the geometric platform relating GW-invariants and FJRW-invariants. It is the on-going joint work with H.L. Chang, J. Li and C.C. Liu.

9. **Grigory Mikhalkin, University of Geneva**

Title: Immersed algebraic curves in the real plane
Abstract: According to an observation made by Arnold about 20 years ago, circles immersed into the real plane share many common properties with knots embedded into the real 3-space. We look at possible topology of generically immersed algebraic curves of low degree in RP2. In particular we review the topo-logical classi_cation of real nodal quintic curves obtained in a recent joint work with Ilia Itenberg and Johannes Rau.

10. **Kaoru Ono, Kyoto University**
    Title: Non-displaceable Lagrangian sub manifolds, partial symplectic quasi-states and generation criterion for Fukaya category
    Abstract: I would like to discuss non-displaceablity of Lagrangian submanifolds using Lagrangian Floer theory and Entov-Polterovich's partial symplectic quasi-states and a generation criterion of Fukaya category (Abouzaid and FOOO). I also present some examples of them.
    This talk is based on joint works with K. Fukaya, Y.-G. Oh and H. Ohta.

11. Y**ong-Geun Oh, IBS Center for Geometry and Physics, POSTECH**
    Title: *Nondisplaceable Lagrangian tori in* $S^2 \times S^2$
    Abstract: In this talk, using the idea of toric degeneration and bulk deformation of Lagrangian Floer homology, we produce a continuum of Lagrangian tori in $S^2 \times S^2$ which are nondisplaceable by Hamiltonian isotopy. This is based on the joint works with Fukaya, Ohta and Ono.

12. **Hiroshi Ohta, Nagoya University**
    Title: Open-closed map in Lagrangian Floer theory and its applications
    Abstract: I will talk about the open-closed map p and the closed-open map q inLagrangian Floer theory which we introduced in our book "Lagrangian intersection Floer theory" (AMS/IP), and discuss some applications, for example, generation criteria for Fukaya category and other related topics. This is based on a joint work with Abouzaid, Fukaya, Oh, Ono.

13. **Yan Soibelman, Kansas State University**
    Title: Hitchin systems from the point of view of Mirror Symmetry and Donaldson-Thomas theory
    Abstract: TBA

14. **Constantin Teleman, University of California, Berkeley**
    Title: Loop groups, Dirac families and Matrix factorizations
    Abstract: We identify the category of integrable lowest-weight representations of the loop group LG of a compact Lie group G with the linear category of twisted, conjugation-equivariant curved Fredholm complexes on the group G: namely, the twisted, equivariant matrix factorizations of a super-potential built from the loop rotation action on LG. This lifts the isomorphism between K-

groups of representations and twisted vector bundles, constructed in joint work with Freed and Hopkins, to an equivalence of categories. The construction uses families of Dirac operators. This is joint work with Dan Freed.

15. **Kazushi Ueda, Osaka University**

Title: Potential functions on Grassmannians of planes and cluster transformations

Abstract: This is a joint work with Yanki Lekili and Yuichi Nohara.

Quantum cohomology of Grassmannians is a fascinating subject, which is related to many branch of mathematics. A powerful tool to study quantum cohomologies is provided by mirror symmetry. Rietsch introduced Landau-Ginzburg mirrors of Grassmannians (and more general flag varieties), which contains earlier mirrors as open subspaces.

Landau-Ginzburg mirrors of toric manifolds can be identified with the potential functions, which are Floer-theoretic invariants obtained as the generating functions of numbers of pseudo-holomorphic disks bounded by Lagrangian submanifolds.

In contrast to the toric case where the moment map with respect to the torus action gives a canonical Lagrangian torus fibration, there are a priori no preferred Lagrangian torus fibrations on Grassmannians. In the case of the Grassmannian Gr(2, n) of 2-planes in an n-space, one can find as many as $C_{n-2} = \frac{1}{n-1}\binom{2n-4}{n-2}$ structures of integrable systems, one for each triangulation of an n-gon. Potential functions W_Γ and $W_{\Gamma'}$ for Lagrangian torus fibers of integrable systems associated with neighboring triangulations Γ and Γ' are related as

$$W_\Gamma(\dots, y, y_1, y_2, y_3, y_4, \dots) = W_{\Gamma'}(\dots, y', y_1, y_2, y_3, y_4, \dots)$$

by a subtraction-free birational changes of variables of the form

$$y' = y \cdot \frac{y_1 y_4 + y_2 y_3}{y_1 y_2 + y_3 y_4}$$

By a suitable choice of coordinate, this change of variables can be identified with the cluster transformation associated with the structure of a cluster algebra on the homogeneous coordinate ring of Grassmannians. We expect that this cluster transformation comes from the wall-crossing formula for the potential function of Lagrangian torus fibers of the integrable system associated with the degeneration of Gr(2,n) into the union of C_(n-2) projective spaces.

16. **Siye Wu, University of Hong Kong**

Title: Hitchin's moduli space for non-orientable manifolds and deformation

Abstract: We study Hitchin's equations on a non-orientable manifold and relate the moduli space of the solutions to that for the orientable double cover. We also establish a Donaldson-Corlette type correspondence to the moduli space of flat connection and study the deofrmation theory.

This is a joint work with N.-K. Ho and G. Wilkin.

17. **Jian Zhou, Tsinghua University**
    Title: Emergent geometry, quantum deformation theory, and mirror
    Abstract: We show in topological 1D and 2D gravity, by studying the free energy with all gravitational descendants included, a plane curve and its special deformation naturally emerge. Furthermore, after quantization, one can obtain Virasoro constraints and W-constraints that determine the partition function in all genera. These provide examples of a framework in which one can study mirror symmetry by emergent geometry and quantum deformation theory.

Titles for Contributed Talks

1. Yalong Cao: Donaldson-Thomas theory for Calabi-Yau 4-folds
2. Shun-Wai Chung: On the Hodge-theoretic formulation of mirror symmetry
3. Hansol Hong: TBA
4. Qingyuan Jiang: The Pfaffian-Grassmannian correspondence
5. Qin Li: Perturbative Rozansky-Witten theory
6. Yin Li: Twin Lagrangian fibrations and mirror symmetry for functors
7. Yat-Hin Suen: Deformations of pairs and applications
8. Kaiwen Sun: On the elliptic genus of three E-strings and Heterotic strings