Plenary Talk

1. Katrin Becker Texas A&M University College of Science

Title: Superstring compactifications to all orders in αα'

Abstract: In the approximation corresponding to the classical Einstein equations, which is valid at large radius, string theory compactification on a manifold with G_2 or $ Spin (7) $ holonomy gives a supersymmetric vacuum solution. Beyond large radius the Einstein equations receive $\a'$ corrections. We discuss how the classical solutions become modified to compensate for these corrections. A key role in the argument is played by the massive Kaluza-Klein modes. We present the action governing these modes and report on progress in describing it in superspace.

2. Cheol-Hyun Cho Seoul National University

Title: Non-commutative homological mirror functor

Abstract: We give a constructive homological mirror formalism using formal Lagrangian Floer deformation theory.Given a symplectic manifold X and a choice of a reference Lagrangian submanifold L, our formalism provides a possibly non-commutative algebra A, together with a central element W, which provides a non-commutative Landau-Ginzburg model (A,W). The construction comes with a natural A-infinity functor from the Fukaya category to the category of matrix factorizations of the constructed Landau-Ginzburg model. In particular it recovers and strengthens several interesting results of Seidel, Etingof-Ginzburg, Bocklandt and Smith, and gives a unified understanding of their results in terms of mirror symmetry and symplectic geometry. Applying the mirror construction to an elliptic curve quotient, we also obtain a deformation quantization of an affine del Pezzo surface. This is based on joint works with Hansol Hong and Siu-Cheong Lau.

3. Ron Donagi University of Pennsylvania

Title: Super Riemann Surfaces and Supermoduli

Abstract: We will survey what's known, and what's not known, about super Riemann surfaces, their supermoduli spaces, and their relevance to string perturbation theory.

4. Charles Doran University of Alberta and University of Maryland

Title: Mirror Symmetry, Tyurin Degenerations, and Calabi-Yau Fibrations

Abstract: In 2002, at the Fano Conference, Andrey Tyurin made two insightful proposals regarding Calabi-Yau manifolds and their moduli: (1) a definition of "constructive" Calabi-Yau manifolds, i.e., those which admit degenerations to a union of two quasi-Fano varieties intersecting transversely, and (2) a question of how the mirror Calabi-Yau manifolds should be related to the mirror Landau-Ginzburg models of the component Fano varieties. We will explore these proposals, working our way up in dimension, and survey our results to date, with a special emphasis on the quintic/quintic mirror Calabi-Yau threefolds.

5. Anton Kapustin California Institute of Technology

Title: Fermionic phases of matter and spin structures

Abstract: It is generally believed that any phase of matter with an energy gap is described at low energies by a Topological Quantum Field Theory. It is also known that the classification of gapped phases of matter depends on whether the fundamental degrees of freedom are bosonic or fermionic. In theories with Lorenz invariance, statistics is correlated with spin, therefore it is natural to expect that gapped fermionic phases of matter are described by spin-TQFTs, i.e. by TQFTs which depend on a spin structure. But most models of condensed matter physics are defined on a lattice which breaks Lorenz invariance, and it is not clear when the spin-statistics relation continues to hold or even makes sense in this situation. I will discuss in some detail topological lattice models with fermions in low dimensions and argue that spin structure dependence is forced on us by locality and topological invariance. From the mathematical viewpoint, I explain a combinatorial construction of equivariant spin-cobordism invariants for low-dimensional manifolds.

6. Conan NC Leung The Chinese University of Hong Kong

Title: Witten-Morse theory, revisited

Abstract: Witten interpreted Morse theory as a limit of twisted Hodge theory. This idea leads to the developments of Chern-Simons-Floer theory for three manifolds and Lagrangian-Floer theory for symplectic manifolds. We study the limit of algebra structure on the twisted deRham complex and show that its limit is the A_infinity structure on the Morse category. If time permits, I will explain applications to mirror symmetry.

7. Jun Li Stanford University

Title: Mixed-Spin-P fields, GW theory of quintics CY, and Witten's top Chern class of spin-curves.

Abstract: We will introduce the notion of of MSP fields which is a field theory that provides a geometric model for the wall crossing of the GW theory of quintic CY and the FJRW theory of the Fermat quintic,

envisioned by Witten. This theory provides a class of vanishing, which coupled with virtual localization formulas, gives a class of polynomial relations among the GW and FJRW invariants of quintics.

This is a joint work with H.-L. Chang, W.-P. Li and C.-C. Liu.

8. Si Li Tsinghua University

Title: Mirror symmetry between Landau-Ginzburg models

Abstract: For a Landau-Ginzburg model with the superpotential a quasi-homogenous polynomial, there are two mathematical theories with very different geometric flavor. The A-model is the FJRW theory as the moduli problem of solving the associated Witten equation on Riemann surfaces. The B-model is the Saito-Givental theory, whose genus zero part comes from the period maps of Saito's primitive forms. I will talk about a mirror theorem between these two Landau-Ginzburg models at all genera, i.e., the FJRW theory of an invertible quasi-homogenous polynomial is equivalent to the Saito-Givental theory of the mirror polynomial. This work is joint with Weiqiang He, Yefeng Shen and Rachel Webb.

9. Bong Lian Brandeis University

Title: Periods, residues and mirror symmetry
Abstract: Some recent progress on periods of Calabi-Yau manifolds is reviewed. Applications to large complex structure limit problems, generalized hypergeometric functions, periods of general type and Fano varieties are discussed. The talk is based on a series of joint works, some of which in progress, with S. Bloch, J. Chen, A. Huang, D. Srinivas, S.-T. Yau, and X. Zhu.

10. Alina Marian Northeastern Unversity

Title: Segre classes and tautological relations on the moduli space of polarized K3 surfaces.

Abstract: I will discuss the notion of tautological Chow ring of the moduli space of polarized K3 surfaces, and will derive relations in the tautological ring from the geometry of a relative Quot scheme over the K3 moduli. This parallels a geometric setup used successfully in the context of the moduli space of curves to generate relations among the kappa classes. In a different direction, the Quot scheme geometry leads to the proof in the K3 case of a conjecture of M. Lehn predicting the top Segre classes of universal vector bundles over Hilbert schemes of points on surfaces. The talk is based on joint work with Dragos Oprea and Rahul Pandharipande.

11. Shiraz Minwalla Tata institute for fundamental research, India

Title: A `Membrane Paradigm' at large D

Abstract: We demonstrate that the dynamics of black holes reduces, at large D, to the dynamics of an effective non graviatational membrane (roughly the black hole event horizon) propagating in flat space. In this talk we compute the effective equations of motion of this membrane at leading and first subleading order in 1/D and discuss the conserved charges carried by this membrane. We also present present several solutions of the membrane equations of motion, and discuss their dual interpretation as black hole solutions.

12. Nikita Nekrasov Institut des Hautes Etudes Scientifiques

Title: Geometry and physics of BPS/CFT correspondence

Abstract: The BPS/CFT correspondence states that the correlation functions of the BPS operators in the theories with eight supercharges are the conformal blocks (formfactors, matrix elements) of two dimensional conformal theories (massive integrable theories, representations of vertex operator algebras and their q-deformations). I will describe the geometric counterpart of this correspondence: the moduli spaces of crossed and spiked instantons and their orbifold versions. These moduli spaces act as correspondences between ordinary moduli spaces of instantons. Their relative compactness is responsible for various identities obeyed by the equivariant integrals over the instanton moduli. These identities map to the Virasoro and W-algebra Ward identities on the CFT side.

13. Hirosi Ooguri California Institute of Technology

Title: Delineating the Swampland

Abstract: I will report on the following two results on the AdS/CFT correspondence.

(1) For asymptotically AdS solutions to the Einstein equations coupled to a matter energy-momentum tensor, we define a notion of quasi-local energy for a bulk region bounded by a minimum surface ending on the boundary of AdS. The positivity of this quasi-local energy is implied by the positivity of the relative entropy for CFT on the boundary of AdS and, therefore, is a condition for consistent UV completion of the gravity theory.

(2) We will enumerate and classify inequalities satisfied by the entanglement entropies of CFT that can be described by a gravity theory in AdS. In contrast to entropies for generic quantum systems, there are only finitely many independent inequalities for a fixed number of entanglement regions. In particular, for less than five regions, the strong subadditivity and the monogamy of mutual information give the complete set of inequalities. We also find a new class of holographic entropy inequalities for five and more regions.

14. Vasily Pestun Institut des Hautes Etudes Scientifiques

Title: Quiver W-algebras

Abstract: In this talk I will present geometric realization of quiver W-algebra in terms of the geometry of the moduli space of equivariant quiver sheaves on a complex surface

15. Boris Pioline CERN, Geneva and LPTHE, Paris

Title: A string theorist view point on the genus-two Kawazumi-Zhang invariant

Abstract: The genus-two Kawazumi-Zhang (KZ) invariant is a real-analytic modular func- tion on the Siegel upper half-plane of degree two, which plays an important role in arithmetic geometry. In String theory, it appears as part of the integrand in two-loop four-graviton scattering amplitudes. With hindsight from String the- ory, I will show that the KZ invariant can be obtained as a Theta lift from the unique weak Jacobi form of index 1 and weight 2. This gives complete control on the asymptotic expansion in all possible degeneration limits, and provides an efficient way of evaluating the KZ invariant (as well as the Faltings, to which it is closely related) numerically. It also reveals a mock-type holomorphic Siegel modular form underlying the KZ invariant. String theory amplitudes involves modular integrals of the KZ invariant (times lattice partition functions) on the Siegel upper half-plane, which provide new examples of automorphic objects on orthogonal Grassmannians, beyond the usual Langlands-Eisenstein series.

Based on arXiv:1504.04182

16. Ashoke Sen Harish-Chandra Research Institute in Allahabad

Title: Do All BPS Black Hole Microstates Carry Zero Angular Momentum?
Abstract: From the analysis of the near horizon geometry and supersymmetry algebra it has been argued that all the microstates of single centered BPS black holes with four unbroken supersymmetries carry zero angular momentum in the region of the moduli space where the black hole description is valid. A stronger form of the conjecture would be that the result holds for any sufficiently generic point in the moduli space. In this paper we set out to test this conjecture for a class of black hole microstates in type II string theory on T^6, represented by four stacks of D-branes wrapped on various cycles of T^6. For this system the above conjecture translates to the statement that the moduli space of classical vacua must be a collection of points. Explicit analysis of systems carrying a low number of D-branes supports this conjecture.

17. Bernd Siebert University of Hamburg

Title: Intrinsic mirror symmetry

Abstract: More than 20 years after its discovery, most mathematicians still view mirror symmetry as a "phenomenon" rather than a well-defined piece of mathematics. This view reflects both the multi-faceted nature of mirror symmetry and the lack of a sufficiently general framework to describe all of its mathematical incarnations known to date. In the talk I want to explain recent progress from various perspectives that suggest to eventually overcome this unsatisfactory state of affairs. A new ingredient are so-called punctured Gromov-Witten invariants. They provide an algebraic-geometric way of counting discs with boundaries on Lagrangian torus fibres. The point of view reconciles the symplectic, rigid-analytic and toric degeneration approaches to mirror symmetry, while making contact to the minimal model program of birational geometry and to geometric quantization. This is joint work with Mark Gross and partly with Paul Hacking and Sean Keel, with contributions by many others.

18. Jake Solomon Hebrew University

Title: Point-like bounding chains in open Gromov-Witten theory

Abstract: Over a decade ago, Welschinger defined real enumerative invariants in dimensions 2 and 3. It has remained an open problem to extend these invariants to higher dimensions. I will discuss a solution to this problem in the language of open Gromov-Witten theory. The key idea is that boundary point constraints should be replaced with canonical gauge equivalence classes of Maurer-Cartan elements (bounding chains) in the relevant Fukaya A-infinity algebra. The resulting invariants satisfy a version of the open WDVV equation, which determines all invariants for projective spaces. To formulate the open WDVV equation, we construct a canonical lift of the quantum product to comology relative to a Lagrangian submanifold. Conjugation symmetry does not place an essential role in our arguments.

This is joint work with S. Tukachinsky.

19. James Sparks Oxford

Title: Exact results in AdS/CFT

Abstract: I will give an overview of recent exact results in AdS/CFT. These involve the use of geometric methods to understand general properties of solutions to Einstein's equations on the one hand, and localization techniques in supersymmetric quantum fields theories and large N matrix model computations on the other.

20. Meng-Chwan Tan National University of Singapore

Title: M-Theoretic Derivations of 4d-2d Dualities: From a Geometric Langlands Duality for Surfaces, to the AGT Correspondence, to Integrable Systems

Abstract: I show that a mathematically conjectured geometric Langlands duality for complex surfaces -- which relates some cohomology of the moduli space of G-instantons to the integrable representations of the Langlands dual affine G-algebra, where G is any compact Lie group -- can be derived, purely physically, from the principle that the spacetime BPS spectra of string-dual M-theory compactifications ought to be equivalent. By introducing Omega-deformation via fluxbranes and adding half-BPS boundary defects via M9-branes, I will also show that the celebrated AGT correspondence -- which essentially relates, among other things, some equivariant cohomology of the moduli space of G-instantons to the integrable representations of the Langlands dual affine W-algebra -- can likewise be derived from the same physical principle. By inserting appropriate defects and considering certain limits, I will also make contact with quantum integrable systems and the ``ramified'' geometric Langlands correspondence for curves.

21. Washington Taylor MIT

Title: Elliptic Calabi-Yau fourfolds and "typical" F-theory vacua

Abstract: This talk will report on recent explorations of the space of elliptic Calabi-Yau fourfolds through classification of threefold bases. The structure of these spaces has close parallels with the better-understood set of elliptic Calabi-Yau threefolds. A Monte Carlo exploration of an enormous family of toric threefold bases, and identification of the elliptic fourfold that apparently admits the most F-theory flux vacua give insights into how the standard model of particle physics may be realized in a typical F-theory vacuum.

22. Yukinobu Toda IPMU of Japan

Title: S-duality conjecture and Donaldson-Thomas invariants
Abstract: In 1994, Vafa-Witten proposed the conjecture that the generating series of Euler numbers of moduli spaces of stable sheaves on algebraic surfaces are related to modular forms. We can ask the similar question for Donaldson-Thomas invariants counting two dimensional torsion sheaves on Calabi-Yau 3-folds. I will explain the recent progress on it using the Hall algebras and the derived category. If time permits, I will also talk about a work in progress with Davesh Maulik on the construction of DT type invariants on algebraic surfaces using the gerby deformations of the category of coherent sheaves on their canonical line bundles.

23. Chin-Lung Wang National Taiwan University

Title: Quantum cohomology under binational maps and transitions
Abstract: I will discuss relations on quantum cohomology for some special smooth flips and blowups in higher dimensions, with emphasize on the functoriality issues. I will also discuss quantum cohomology for 3-folds under conifold transitions via blowup of Weil divisors. This talk is based on joint works with Hui-Wen Lin and Yuan-Pin Lee.

24. Edward Witten Princeton

Title: Branes And Topological Phases Of Matter
Abstract: I will describe D3-NS5 and D4-NS5 brane constructions with an orientifold plane that lead to behavior that is qualitatively similar to what is studied by condensed matter physicists in the field of ``topological insulators.'' I will describe how to understand the effective action of the brane constructions and/or the topological insulator, using the Atiyah-Patodi-Singer index theorem on a manifold with boundary and an analog for the mod 2 index.

25. Noriko Yui Queen's University

Title: Modularity / Automorphy of Calabi-Yau Varieties of CM type

Abstract: We consider Calabi-Yau varieties of dimension defined over Q, and address the modularity / automorphy question of such Calabi-Yau varieties. When the dimension of the associated Galois representations is large, e.g., >2, the problem poses a serious challenge and is out of reach in the general situations.

In this talk, I will concentrate on Calabi-Yau varieties of CM type, and establish their (motivic) modularity / automorphy. The presentation is focused on the two examples: K3 surfaces with non-symplectic automorphisms, and Calabi-Yau threefolds of Borcea-Voisin type. If time permits, we will discuss arithmetic mirror symmetry for mirror pairs of Calabi-Yau varieties.

26. Eric Zaslow Northwestern University

Title: Knots, Graphs and Clusters
Abstract: I will describe the construction of a category based on a Legendrian knot in the co-circle bundle of a surface. It is equivalent to the Fukaya category of the cotangent bundle, with asymptotic conditions defined by the knot. The category is an invariant: Legendrian isotopies induce equivalences. The space of objects in this category is a cluster variety: exact Lagrangian "fillings" of the knot give rise to cluster charts. Given a bipartite graph on a surface, its zig-zag paths determine a Legendrian knot, and one can construct a canonical filling. "Square moves" on the graph correspond to cluster

transformations. Many well-known cluster varieties can be constructed in this way, including wild character varieties and positroid strata of the Grassmannian. I will give simple examples to illustrate these constructions.

This talk is based on joint work with David Treumann, Vivek Shende and Harold Williams.

Parallel Session

1. Francesco Benini Princeton University

Title: Black hole microstates in AdS from gauge theory

Abstract: One of the great successes of string theory, as a theory of quantum gravity, is the explanation of the entropy of asymptotically-flat black holes, and a huge literature has been written on them. I will present, instead, a counting of the microstates of certain black holes in AdS4. The black holes have an holographic description as RG flows from a 3D CFT to superconformal quantum mechanics, and the counting of microstates proceeds via supersymmetric localization. Along the way, we will define and compute an index for topologically twisted theories, and propose an extremization principle to determine the superconformal R-symmetry in quantum mechanics.

2. Clay Cordova IAS

Title: Applications of Superconformal Representation Theory

Abstract: We survey various results about superconformal field theories that may be obtained from a detailed knowledge of superconformal representation theory. These include classifications of all possible relevant, irrelevant, and marginal deformations of SCFTs, and related non-renormalization theorems as well as new non-perturbative proofs of Weinberg-Witten like theorems constraining the maximal number of super symmetries in a local quantum field theory.

3. Stefan Mendez-Diez Utah State University

Title: Spin Curves from Supersymmetry Algebras

Abstract: The problem of classifying off-shell representations of the N -extended one-dimensional super Poincaré algebra is closely related to the study of a class of decorated graphs known as Adinkras. We will discuss how these combinatorial objects can be equated to super Riemann surfaces. The underlying Riemann surface associated to an Adinkra is found using Grothendieck's theory of "dessins d'enfants." We will show that these surfaces have a naturally defined spin structure and how a Dirac operator can be determined.

4. Bohan Fang Peking University

Title: Global mirror curve of a toric Calabi-Yau 3-fold

Abstract: I will describe the construction of a "global mirror curve" of a toric Calabi-Yau 3-fold. It is a family of spectral curves over the secondary toric variety of such toric CY 3-fold. Near the large radius limit, each fiber in this family is the mirror curve of the toric CY 3-fold. The recent progress of all genus mirror symmetry (BKMP remodeling conjecture) allows us to interpret A-model open-closed Gromov-Witten invariants in terms of the Eynard-Orantin topological recursion on the mirror curve. Thus the global mirror curve construction automatically implies the modularity of GW invariants and all genus crepant resolution conjecture.

This talk is based on the joint works of Chiu-Chu Melissa Liu and Zhengyu Zong.

5. Babak Haghighat Harvard University

Title: Modular Forms from Elliptic Fibrations: physical interpretations and mathematical proofs

Abstract: We show how solutions of the topological string on elliptically fibred Calabi-Yau three- and four-folds give rise to various modular forms in the fibre modulus. In the case of three-folds these are meromorphic Jacobi-forms and connect to elliptic genera of solitonic strings in 6d SCFTs for non-compact Calabi-Yau spaces and to elliptic genera of black strings in supergrav- ity in the compact case. In the case of fourfolds we derive new modular forms in the fibre limit. Finally, we present a mathematical theorem which proofs these modularity properties for generic Calabi-Yau n-folds.

6. Masashi Hamanaka Nagoya University

Title: Noncommutative Instantons and Reciprocity

Author：Masashi Hamanaka (Nagoya University) and Toshio Nakatsu (Setsunan University)

Abstract: In this talk, we discuss U(N) instantons in noncommutative (NC) spaces. Noncommutative space is a space which coordinate ring is noncommutative. Let x^m be the spacial coordinates. The noncommutativity is expressed by the following commutation relations: $[x^m, x^n] = iq^{mn}$. Where q^{mn} is a real antisymmetric tensor and called noncommutative parameters. When q^{mn} vanishes identically, the coordinate ring is commutative and the underlying space reduces to a commutative one. The commutation relations, like the canonical commutation relations in quantum mechanics, lead to “space-space uncertainty relation.” Singularities in commutative space could resolve in noncommutative space thereby. This is one of the prominent features of field theories on noncommutative space and yields various new physical objects such as U(1) instantons. There are two formalism to describe noncommutative gauge theories: the star-product formalism and the operator formalism. Anti-self-dual (ASD) Yang-Mills equation and the solutions have been studied from the several viewpoints of mathematical physics, particularly, integrable systems, geometry and field theories. Instantons are finite-action solutions of the ASD Yang-Mills equation and become exact solutions of classical Yang-Mills

theories. They can reveal non-perturbative aspects of the quantum theories. Actually, the path-integrations, formulating the quantum theories, could reduce to finitedimensional integrations over the instanton moduli spaces. The Atiyah-DrinfeldHitchin-Manin (ADHM) construction is a powerful method to obtain the instantons. Furthermore, via the construction, the instanton moduli space is mapped to the set of quadruple matrices which are solutions of the ADHM equation and called the ADHM data. The aforementioned integration, being thereby an integration over the matrices, becomes tractable. To evaluate the integration the use of noncommutative instantons is relevant so that a localization formula can be applied to the integration. In the procedures, various formulas and relations of the ADHM construction are required. Hence it is worthwhile to elucidate the one-to-one correspondence (reciprocity) between moduli spaces of the noncommutative instantons and the ADHM data and to present all the ingredients in the construction explicitly.

We prove the reciprocity in both the star-product formalism and the operator formalism. We reconsider origin of the instanton number by applying an idea of Atiyah and Hori to the noncommutative situation even for the U(1) case.

7. Muxin Han Florida Atlantic University

Title: SL(2,C) Chern-Simons theory, flat connection, and 4d quantum geometry

Author： This talk explains the relation between a class of SL(2,C) flat connections on a 3-manifold and the constant curvature simplicial geometries in 4-dimensions. The quantization of 4d simplicial geometry can be carried out via the quantization of flat connection on 3-manifold. It reduces to the quantization of a Lagrangian submanifold in the phase space of SL(2,C) flat connections. It also relates to a certain class of superconformal field theories in 3-dimensions.

8. Andreas Malmendier Utah State University

Title: Special function identities from Calabi-Yau geometry (or the identity that Kummer missed).

Abstract: We prove that the factorization of Appell's generalized hypergeometric series satisfying the so-called quadric property into a product of two Gauss' hypergeometric functions has a geometric origin: we first construct a generalized Kummer variety as minimal nonsingular model for a product-quotient surface with only rational double points from a pair of superelliptic curves of odd genus 2r-1. We then show that this generalized Kummer variety is equipped with two fibrations with fibers of genus 2r−1. When periods of a holomorphic two-form over carefully crafted transcendental two-cycles on the generalized Kummer variety are evaluated using either of the two fibrations, the answer must be independent of the fibration and the aforementioned family of special function identities is obtained. This family of identities can be seen as a multivariate generalization of Clausen's Formula. Interestingly, this finding bridges Ernst Kummer's two independent lines of research, algebraic transformations for the

Gauss' hypergeometric function and nodal surfaces of degree four in P^3. It is joint work wit Adrian Clingher and Chuck Doran.

9. Andrew B. Royston Texas A&M University

Title: L2 kernels of Dirac-type operators on monopole moduli space

Abstract: We state some mathematical predictions concerning the kernels of Dirac- type operators on moduli spaces of (singular) monopoles in R3. These pre- dictions follow from the semiclassical interpretation of physical results on spaces of (framed) BPS states in d = 4, N = 2 gauge theories.

Andrew B. Royston, in collaboration with G. Moore and D. Van den Bleeken

10. Vivek Shende UC Berkeley

Title: Symplectic structures on locally arboreal spaces

Abstract: It is expected that the Fukaya category of a Weinstein manifold admits a representation as microlocal sheaves on a singular Lagrangian skeleton. One thus expects many moduli spaces of interest in mathematics and physics to arise as moduli of such sheaves; examples include cluster varieties and the augmentation variety of Legendrian contact homology. In this talk, I will explain how to construct a (shifted) symplectic structure on such moduli spaces.

11. Dan Xie Harvard University

Title: K stability and stability of chiral ring

Abstract: I will discuss a notion of stability on chiral ring of four dimensional N=1 theory. This notion is important in finding the chiral ring of superconformal field theory living at maximal singular point of the moduli space of a N=1 theory. I will discuss some examples derived from D3 branes probing three-fold singularity, and show that this stability notion is the same as the K stability condition on the existence of Ricci-flat conic metric on the three-fold singularity.

12. Yuguang Zhang Tsinghua University

Title: Collapsing of negative Kahler-Einstein metrics

Abstract: In this talk, we study the collapsing behaviour of negative Kahler-Einstein metrics along degenerations of canonical polarized manifolds. We prove that for a toroidal degeneration of canonical polarized manifolds with the total space QQ-factorial, the Kahler-Einstein metrics on fibers collapse to a

lower dimensional complete Riemannian manifold in the pointed Gromov-Hausdorff sense by suitably choosing the base points.

13. Amitai Zernik Hebrew University

Title: Fixed-point expressions for algebras and open Gromov-Witten invariants

Abstract: The Atiyah-Bott localization formula has become a valuable tool for computation of symplectic invariants given in terms of integrals on the moduli spaces of closed stable maps. In contrast, the moduli spaces of open stable maps have boundary which must be taken into account in order to apply fixed point localization.

Homological perturbation for twisted algebras allows one to write down an integral sum which effectively eliminates the boundary. For genus zero maps to we show how one can define equivariant invariants using this idea, and then flow to a fixed point limit which can be computed explicitly as a sum over certain even-odd diagrams.

These invariants specialize to open Gromov-Witten invariants, and in particular produce new expressions for Welschinger's signed counts of real rational plane curves. Time permitting, we'll also discuss the two-sided information flow with the intersection theory of Riemann surfaces with boundary, which provides evidence to a conjectural generalization of the localization formula to higher genus.

Joint work with Jake Solomon.

14. Minxian Zhu Tsinghua University

Title: On the hyperplane conjecture for periods of Calabi-Yau hypersurfaces in P^n

Abstract: Hosono, Lian, and Yau made a conjecture in the 90s describing the solutions to the Gelfand-Kapranov-Zelevinsky hypergeometric equations which arise as periods of CY hypersurfaces in a Gorenstein Fano toric variety. We will prove this conjecture for projective spaces.

This is joint work with Bong Lian.

15. Michele del Zotto Harvard

Title: Recent developments on representation theory and 4d N=2 QFTs

Abstract: The spectrum of BPS states of a very large class of 4d N=2 QFTs is encoded in the representation theory of certain basic algebras, defined using quivers with relations encoded in the jacobian ideal of a potential. In this talk we are going to discuss some recent progress about this

correspondence, focusing on tame/wild dichotomy, Galois symmetries, and an application to the classification of 4d N=2 SCFTs. Based on joint works with Sergio Cecotti.