Wall Crossing Quantum Integrable Systems and TQFT Workshop Talk Schedule

Events for:
Monday, November 17th - Friday, November 21st

Monday, November 17th

9:00am **Maxim Kontsevich - SCGP 102**

Title: Geometry of cluster mutations

10:00am **Coffee**

10:15am **Cumrun Vafa - SCGP 102**

Title: tt* Geometry and Twistorial Topological String

Abstract: We define twistorial topological string as the tt* geometry of NS limit. Using Large N dualities of topological strings this is equivalent to the study of tt* geometry of LG matrix models. We show that by various reductions of the amplitudes we obtain refined KS Wall-Crossing, a quantum extension of GMN hyperKahler geometry and the refined topological strings. Furthermore by studying the tt* metric we obtain a twistorial version of AGT conjecture involving a twistorial extension of Liouville theory. (based on joint work with Sergio Cecotti and Andy Neitzke (to appear) and C. Vafa, arXiv:1402.2674.)

11:30am **Gregory Moore - SCGP 102**

Title: Web formalism and the IR limit of 1+1 N=(2,2) QFT - or - A short ride with a big machine

Abstract: I will review some aspects of a project with D. Gaiotto and E. Witten investigating the algebraic structure of the BPS sector of 1+1 N=(2,2) QFT's.

12:30pm **Lunch**

2:30pm **Vasily Pestun - SCGP 102**

Title: Gauge theory and q-characters

Abstract: A class of Seiberg-Witten integrable systems associated to N=2 quiver gauge theories of ADE or affine ADE can be described as a group or elliptic group valued Hitchin system, or as a system of ADE periodic monopoles or doubly periodic ADE instantons. In quantization of these integrable systems, using the NS correspondence with gauge theory deformed by omega-background with one epsilon parameter, we find q-characters of quantum affine or quantum toroidal ADE algebra. (After a joint work with N.Nekrasov and S.Shatashvili)

3:30pm **Tea**

4:00pm **Fabian Haiden - SCGP**

Title: Flat surfaces and stability in categories.

Abstract: I will report on recent joint work with L. Katzarkov and M. Kontsevich (arXiv:1409.8611) in which we construct Bridgeland stability conditions on partially wrapped Fukaya categories of surfaces. Stable objects in these stability conditions correspond to finite-length geodesics (with local system) with respect to some flat metric with conical singularities given by a quadratic differential. The proof relies on the fact that all objects in the derived Fukaya category of a surface are geometric, i.e. come from immersed curves with local system. Examples and some further directions will also be discussed.

Tuesday, November 18th

9:00am **Yan Soibelman - SCGP 102**

10:00am **Coffee**

10:15am **Matthew Ballard - SCGP 102**

Title: Windows, compactifications, and kernels

Abstract: I will outline how wall-crossing in moduli problems can be used to understand the derived category via windows. Then, in the specific case of wall crossing in GIT, I will provide kernels for these windows coming from compactifications - of the group and the action groupoid. This talk includes joint work with Diemer, Favero, Katzarkov, and Kontsevich.

11:30am **AST-105 - SCGP 103**

11:30am **Ludmil Katzarkov - SCGP 102**

Title: Categorical base loci

Abstract: In this talk we will introduce the notion of Cat Base loci. Some examples and applications will be discussed at the end.

12:30pm **Lunch**

1:45pm **Alexander Kasparchik**

Title: Maximally-mutable Laurent polynomials

Abstract: In this talk I will describe the new concept of maximally-mutable Laurent polynomials. These are a special class of Laurent polynomials that arise naturally in the study of Fano manifolds. In particular, I will explain why in dimension two, the rigid maximally-mutable Laurent polynomials correspond exactly, under mirror symmetry, with the 10 deformation families of smooth del Pezzo surfaces. A similar result holds in dimension 3, where the rigid maximally-mutable Laurent polynomials supported on a reflexive polytope correspond precisely with the 98 deformation families of smooth Fano 3-folds with very ample -K. Finally, I will state a conjecture about higher dimensions, and the implications this has for classifying higher-dimensional Fano varieties.

2:30pm **George Dimitrov - SCGP 102**

Title: Bridgeland stability conditions on the acyclic triangular quiver

3:30pm **Tea**

4:00pm **David Favero - SCGP**

Title: Comparing derived categories for various mirror constructions

Abstract: Given a Calabi-Yau complete intersection in a toric variety, mirror duals were proposed, for example, by Berglund and Hubsch, and independently by Batyrev and Borisov. These constructions do not always agree when one varies complex structure on the complete intersection, however, recent individual works of Kelly, Shoemaker, and Clarke illustrate that these various mirrors are in fact birational. I will discuss a theorem of myself and T. Kelly which shows that these various mirrors have equivalent derived categories.

Wednesday, November 19th

9:00am **Anton Kasputin - SCGP 102**

Title: TBA

10:00am Coffee

10:15am Pranav Pandit - SCGP 102

Title: Buildings and spectral networks

Abstract: Spectral networks are certain decorated graphs embedded in a Riemann surface. They arise naturally in the study of stability structures on Fukaya categories with coefficients in a constructible sheaf of categories, as well as in the WKB analysis of the asymptotic behavior of differential equations depending on a small parameter. I will describe a geometric framework, based on the theory of harmonic maps to buildings, for studying spectral networks and the asymptotic behavior of the Riemann-Hilbert correspondence and the non-Abelian Hodge correspondence. The key notion is that of a (uni)versal building associated with a point in the base of the Hitchin integrable system. This is joint work with L. Katzarkov, A. Noll and C. Simpson.

11:30am Alexander Noll - SCGP 102

Title: The universal building in an example

Abstract: This talk is a continuation of P. Pandit's talk. I will describe the construction of the universal building in a concrete example and discuss possible relations with stability structures and BPS states.

12:30pm Lunch

2:30pm Denis Auroux - SCGP 102

Title: Lagrangian tori in conic bundles and mirror symmetry for affine hypersurfaces.

Abstract: We will discuss Lagrangian torus fibrations on conic bundles over $(C^*)^n$ and the wall-crossing phenomena in their Lagrangian Floer homology. Two applications will be given, to the construction of monotone Lagrangian tori in R^6 on one hand, and to mirror symmetry for hypersurfaces in $(C^*)^n$ on the other hand. (The latter result is joint work with M. Abouzaid and L. Katzarkov.)

3:30pm Tea

4:00pm Gabe Kerr - SCGP

Title: Homological mirror symmetry for the punctured plane. Abstract : Mirror symmetry for proper and affine toric varieties has been studied from several different perspectives. Using constructible sheaves on a mirror skeleton yields one approach and partially generalizes to the case of quasi-affine varieties. The study of a Fukaya category mirror in this setting has only recently been explored. In this talk, I will describe a partially wrapped Fukaya category mirror which utilizes the mirror skeleton and outline a proof that it is equivalent to the derived category of equivariant coherent sheaves on the quasi-affine toric. The case of a punctured plane will serve as an illustrative example. This equivalence factors through GIT quotients and yields a new proof of mirror symmetry for toric stacks.

6:00pm   **Workshop Banquet**

Thursday, November 20th

9:00am   **Kenji Fukaya - SCGP 102**

Title: Wall crossing and family Floer homology

Abstract: I will explain how wall crossing phenomenon is related to find a correct analytic structure (complex analytic or rigid analytic) on the family Floer homology

10:00am **Coffee**

10:15am **Tony Pantev - SCGP 102**

Title: Deformations of Calabi-Yau integrable systems

Abstract: I will describe a general construction of Calabi-Yau integrable systems arising from algebraic curves. I will give a universal construction of versal deformations of such integrable systems starting from effective divisors on the curves and will show how the deformed integrable systems can be identified with symplectic leaves in the meromorphic Hitchin systems. This is a joint work with E.Diaconescu and R.Donagi.

11:30am **AST-105 - SCGP 103**

11:30am **Mohammed Abouzaid - SCGP 102**

Title: TBA

12:30pm **Lunch**

1:30pm **Vadim Vologodsky - SCGP 102**

Title: Noncommutative Local Monodromy Theorem

Abstract: Let X \to D^* be a smooth projective variety over the formal punctured disk D^*=spec K= spec \bC((t)). The Griffiths-Landman-Grothendieck ``Local Monodromy Theorem'' asserts that the Gauss-Manin connection on the de Rham cohomology H^*_{DR}(X/D^*) has a regular singularity at the origin and that the monodromy of this connection is quasi-unipotent. I will explain a noncommutative generalization of this result, where the de Rham cohomology is replaced by the periodic cyclic homology of a (smooth proper) DG category over K equipped with the Gauss-Manin-Getzler connection. The proof of the Noncommutative Local Monodromy Theorem is based on the reduction modulo p technique and some ideas of N.Katz and D. Kaledin. Namely, I will prove that for any smooth proper DG category over F_p((t)) the p-curvature of the Gauss-Manin-Getzler connection on its periodic cyclic homology is nilpotent. If time allows I will also explain a noncommutative generalization of the Katz p-curvature formula relating the p-curvature of the Gauss-Manin-Getzler connection with the Kodaira-Spencer class (which is, in the noncommutative setting, a canonical element of the second Hochschild cohomology group of the DG category) This talk is based on a joint work with Dmitry Vaintrob.

2:30pm **Paul Horja - SCGP**

Title: TBA

3:30pm **Tea**

4:00pm **Math Colloquium by John Milnor - 103**

Title: Topology through the Centuries: Low Dimensional Manifolds

5:00pm **Closing Reception - Tracking the Cosmos**

Friday, November 21st

9:00am **Andrew Harder - SCGP 102**

Title: TBA

10:00am **Coffee**

10:15am **Nikita Nekrasov - SCGP 102**

Title: Gauge theory and qq-characters

11:30am Dmitri Orlov - SCGP 102

Title: Gluing of Geometric Noncommutative Schemes and Finite-dimensional Algebras

12:30pm Lunch

2:30pm Hiroshi Iritani - SCGP 102

Title: The crepant transformation conjecture in the toric case

Abstract: The crepant transformation conjecture of Yongbin Ruan says that the Gromov-Witten potentials of K-equivalent manifolds/orbifolds should be related to each other via analytic continuation. I will discuss this conjecture for toric Deligne-Mumford stacks using mirror symmetry, and relate it to an equivalence of derived categories. It follows that the Gromov-Witten potentials of toric Deligne-Mumford stacks are "modular" with respect to a certain group of autoequivalences of the derived category. This is based on joint work with Alessio Corti, Tom Coates, Yunfeng Jiang, Ed Segal and Hsian-Hua Tseng.

3:30pm Tea

4:00pm Colin Diemer

Title: Kernels for GIT

Abstract: Motivated by problems in homological mirror symmetry, we will discuss extensions of the grade restriction windows of Herbst-Hori-Page (as implemented by Ballard-Favero-Katzarkov and Halpern-Leistner) which describe the derived category of a GIT quotient. To this end, we will discuss explicit Fourier-Mukai functors and discuss the advantages this perspective brings. This is work in progress with Ballard, Favero, Katzarkov, and Kontsevich.