

Contemporary Trends in Hamiltonian Geometry

September 28 – October 2, 2026

Monday, September 28

Leonid Polterovich (Tel Aviv University)

Time: 09:00 – 09:45

Title: *Big fiber theorems, ideal-valued measures, and symplectic topology*

Abstract: I will discuss an adaptation of Gromov’s ideal-valued measures to symplectic topology. It leads to a unified viewpoint on three ‘big fiber theorems’: the Centerpoint Theorem in combinatorial geometry, the Maximal Fiber Inequality in topology, and the Non-displaceable Fiber Theorem in symplectic topology—and yields applications to symplectic rigidity. The method is based on Varolgunes’ local to global principle for Poisson commuting subsets on symplectic manifolds. Joint work with Adi Dickstein, Yaniv Ganor, and Frol Zapolsky.

Joé Brendel (ETH Zürich)

Time: 10:15 – 11:00

Title: *Lagrangian needle’s eyes and almost toric geometry*

Abstract: In this talk we discuss triples (N, L, L') of Lagrangian submanifolds of a symplectic manifold (X, ω) which have the following property: L and L' are Hamiltonian isotopic in X , but they are not Hamiltonian isotopic when considered in $X \setminus N$. In that case, we call N Lagrangian needle’s eye, because every Hamiltonian isotopy between L and L' needs to intersect N . We emphasize how this relates to certain structural results in almost toric geometry.

Margaret Symington (Mercer University)

Time: 11:10 – 11:55

Title: *Polyhedral Integral Affine Surfaces*

Abstract: A Lagrangian fibration of a K3 surface induces an integral affine structure with nodes on the two-sphere that is the base of the almost toric fibration. In turn, an integral affine two-sphere with nodes can be used to build a Lagrangian-fibered K3 surface. Following Gross and Siebert’s approach to constructing integral affine varieties suitable for mirror symmetry, we identify necessary and sufficient constraints on a 3D polytope for its boundary to support an integral affine structure that agrees on facets with the integral affine structure induced from the ambient space. I will explain the result purely in terms of the geometry of the polytopes and their fans, highlight the Delzant case, and provide a translation into the language of algebraic geometry.

I will also indicate generalizations in which the boundary of a polytope is replaced by a noncompact or nonconvex polyhedral complex.

Jonathan Weitsman (Northeastern University)

Time: 15:30 – 16:15 (online talk)

Title: *The Dual DG Category to Weinstein’s symplectic “category” and applications to Geometric Quantization*

Abstract: In Weinstein’s symplectic “category”, objects are symplectic manifolds and morphisms are canonical relations, which may not be composable; it is therefore only morally a category. We construct a true differential graded category which is morally dual to Weinstein’s “category”. The objects in this category are prequantum systems, associated to integral symplectic manifolds. The morphisms are a complex of differential forms twisted by a prequantum line bundle. We also consider the cohomology category, which turns out to be an (ordinary) linear category. In each case, Weinstein’s morphisms are associated with currents dual to the forms. For the differential graded category, these are isotropic, or if preferred Lagrangian, currents, twisted by a section of the prequantum line bundle; in the case of cohomology, these currents are supported on *integral* Lagrangian submanifolds, equipped with a global covariant constant section of the prequantum line bundle. We then apply our methods to quantization, and show that for Kähler manifolds, a quantization in this category is related to holomorphic quantization. Along the way we show that in the case of prequantum systems, the Lefschetz action of $\mathfrak{sl}(2, \mathbb{R})$ on differential forms, studied by Brylinski, Mathieu, Guillemin, and Tseng-Yau in the symplectic case, is promoted to an action of the superalgebra $\mathfrak{osp}(1|2)$ on twisted differential forms, with $\mathfrak{sl}(2, \mathbb{R})$ as the even subalgebra. A first application of this superalgebra action is the vanishing theorem which shows the cohomology category is supported in middle dimension.

Short Talks

Jean-Philippe Chassé (Max Planck Institute for Mathematics)

Time: 17:00 – 17:03

Title: *On loops of Lagrangian tori*

Pranav Chakravarthy (Lancaster University)

Time: 17:05 – 17:08

Title: *Homotopy type of S^1 -equivariant embedding spaces*

Eugenia Loiudice (Philipps-Universität Marburg)

Time: 17:10 – 17:13

Title: *GKM actions on almost quaternionic manifolds*

Daniel Holmes (Institute of Science and Technology Austria)

Time: 17:15 – 17:18

Title: *Hamiltonian GKM spaces via Gromov-Witten theory*

Oded Elisha (Tel Aviv University)

Time: 17:20 – 17:23

Title: *Lattice-point counting on integral-integral affine manifolds*

Aerim Si (University of Illinois at Urbana-Champaign)

Time: 17:25 – 17:28

Title: *Fiber connectivity of Almost-Toric Systems in Four Dimensions*

Jaime Bajo da Costa (ETH Zürich)

Time: 17:30 – 17:33

Title: *Geometric description of non-equilibrium thermodynamics*

Rei Henigman (Tel Aviv University)

Time: 17:35 – 17:38

Title: *Symplectic torus actions with non-contractible orbits*

Maarten Mol (University of Toronto)

Time: 17:40 – 17:43

Title: *Totally real torus fibrations*

Andrea Piccirilli (Université de Neuchâtel)

Time: 18:00 – 18:03

Title: *Exotic tori in the 3-dimensional quadric*

Reto Kaufmann (ETH Zürich)

Time: 18:05 – 18:08

Title: *Visible Lagrangians in Toric Symplectic Manifolds*

João Camarneiro (University of Edinburgh)

Time: 18:10 – 18:13

Title: *Classification of infinite staircases for 4-dimensional polydiscs*

Shuo Liu (University of Maryland)

Time: 18:15 – 18:18

Title: *Stratified symplectic geometry of the character variety*

Seonjeong Park (Jeonju University)

Time: 18:20 – 18:23

Title: *Towards the smoothness of Hessenberg Schubert varieties*

Moriah Elkin (Cornell University)

Time: 18:25 – 18:28

Title: *Computing CSM classes of type A quiver orbits*

Eunjeong Lee (Chungbuk National University)

Time: 18:30 – 18:33

Title: *Tangent spaces of smooth Schubert varieties*

Tuesday, September 29

Oliver Goertsches (Philipps-Universität Marburg)

Time: 09:00 – 09:45

Title: *On orientability, Poincaré duality, and connectivity of GKM graphs*

Abstract: The (equivariant) rational cohomology of a GKM manifold is isomorphic to the (equivariant) rational graph cohomology of its GKM graph in the sense of Guillemin–Zara. Therefore, Poincaré duality of non-equivariant rational graph cohomology is a necessary condition on an abstract GKM graph to be realized by a GKM manifold. Given a GKM graph with free equivariant graph cohomology (which is automatic for graphs with T^2 -labeling) we prove that this condition is equivalent to a simple combinatorial, noncohomological notion of orientability. As an application of equivariant Poincaré duality for GKM graphs, we show that orientable GKM graphs remain connected after removing a single vertex.

This is joint work with Panagiotis Konstantis and Leopold Zoller.

Leopold Zoller (Universitat de Barcelona)

Time: 10:15 – 11:00

Title: *Finiteness and boundedness of positive monotone Hamiltonian GKM_3 -spaces*

Abstract: By a famous result of Kollár–Miyaoka–Mori, Fano manifolds of a fixed dimension are known to admit a quantitative bound on their volume and belong to a finite number of diffeomorphism classes. It is natural to ask whether results of similar flavor can be achieved on the more general class of positive monotone symplectic manifolds. In the presence of a Hamiltonian GKM_3 torus action, we prove a quantitative bound on the Chern numbers, which depends only on the dimension and the Euler characteristic. Furthermore, we prove certain boundedness results for the moment images of such actions. This is joint work with Panagiotis Konstantis and Silvia Sabatini.

Isabelle Charton (Instituto Superior Técnico Lisbon)

Time: 11:10 – 11:55

Title: *Kähler Complexity One Hamiltonian T -Manifolds Have Trivial Paintings*

Abstract: Let a torus T act on a symplectic manifold (M, ω) with moment map ϕ . The complexity of the T -manifold (M, ω, ϕ) is the non-negative integer $\frac{1}{2} \dim(M) - \dim(T)$. We say that (M, ω, ϕ) is Kähler if it admits a T -invariant compatible complex structure.

By Delzant's classification it is well-known that any Hamiltonian T -manifold of complexity zero is Kähler. This is no longer true if the complexity is one. Namely, in the late 90s Tolman gave an example of a six-dimensional Hamiltonian T -manifold of complexity one which is not Kähler. In this talk I will give a necessary condition for being Kähler among complexity one Hamiltonian T -manifolds, via Karshon–Tolman's painting invariant.

This is joint work with Liat Kessler and Susan Tolman.

Megumi Harada (McMaster University)

Time: 17:00 – 17:45 (online talk)

Title: *An invitation to polyptych lattices – beyond toric and cluster geometry*

Abstract: This is joint work with Christopher Manon and Laura Escobar, with further developments proceeding with Timothy Magee and Bosco Frias-Medina.

In this talk, we introduce the theory of polyptych lattices. We are motivated by a desire to simultaneously generalize phenomena in toric, cluster, and tropical geometry, among others. In particular, we seek to build a combinatorics-geometry dictionary reminiscent of that in toric geometry. Our theory builds the notion of mutations directly into the definitions, and gives geometric interpretations to these mutations. In particular, in some cases, a polyptych-lattice (“PL”) polytope encodes a compactification X of an affine variety $U = \text{Spec}(A)$ whose coordinate ring A can be equipped with a valuation to a canonical semialgebra associated to the polyptych lattice. This is analogous to the known phenomenon that a toric variety may be viewed as a compactification of a complex torus $(\mathbb{C}^*)^n$ by toric divisors, and the complex torus can be viewed as Spec of the Laurent polynomial ring, which can in turn be equipped with the valuation that takes a Laurent polynomial to its Newton polytope. Moreover, aspects of the geometry of the compactification X can be understood combinatorially; for instance, in some cases, the resulting compactifications are arithmetically Cohen-Macaulay, and have finitely generated class group and finitely generated Cox rings. Finally, our theory naturally encodes multiple toric degenerations of the compactification X to toric varieties whose moment map images are related by mutations.

In this talk, we give a brief introduction to this circle of ideas.

Christopher Manon (University of Kentucky)

Time: 18:00 – 18:45

Title: *Polyptych lattices 2: Polyptych varieties and the Gel'fand-Cetlin toric variety*

Abstract: This talk is part 2 of two talks on polyptych lattices. The talk is based on joint work with Laura Escobar, Megumi Harada, Tim Magee, Bosco Frias-Medina, Adrian Cook, Silas Vriend, Akihiro Higashitani, and Naoki Fujita, in various combinations.

In this talk I will describe the geometry of a class of spaces described by the combinatorics of polyptych lattices. Polyptych varieties are very close to toric varieties in three senses: they have a distinguished subvariety which is covered by open tori, they come equipped with many toric degenerations, and much of their geometry can be described combinatorially. Then I will talk about recent work with Laura Escobar, Megumi Harada, Akihiro Higashitani, and Naoki Fujita, where we find that the Gel'fand-Cetlin toric variety has a richer polyptych structure incorporating the geometry and combinatorics of FFLV polytopes. This leads to several open questions about the combinatorics and geometry of Gel'fand-Cetlin patterns.

Wednesday, September 30

Ana Rita Pires (University of Edinburgh)

Time: 09:00 – 09:45

Title: *Infinite staircases in symplectic ball packings of one-point blowups of $\mathbb{CP}^2$*

Abstract: The symplectic version of the problem of packing K balls into a ball in the densest way possible (in 4 dimensions) can be extended to that of symplectically embedding an ellipsoid into a ball as small as possible. A classic result due to McDuff and Schlenk asserts that the function that encodes this problem has a remarkable structure: its graph has infinitely many corners, determined by Fibonacci numbers, that fit together to form an infinite staircase.

This ellipsoid embedding function can be equally defined for other targets, and this talk will be about other targets for which the function has and does not have an infinite staircase. More specifically, we look at the family of one-point blowups of $\mathbb{CP}^2$, where the answer involves self-similar behaviour akin to the Cantor set.

This talk is based on joint work with Maria Bertozzi, Tara Holm, Emily Maw, Dusa McDuff, Grace Mwakyoma, Morgan Weiler, and Nicki Magill.

Nicki Magill (UC Berkeley)

Time: 10:15 – 11:00

Title: *Almost toric fibrations and symplectic embeddings*

Abstract: Almost toric fibrations provide a geometric way to construct symplectic embeddings, while perfect classes give obstructions to these embeddings. In this talk, I will explain a correspondence between mutations of almost toric base diagrams and recursive operations on perfect classes for Hirzebruch surfaces and polydisks. This correspondence allows us to construct optimal embeddings matching the obstructions from perfect classes. I will also explain how these classes relate to rational cuspidal curves and how the curves can be seen in the almost toric diagrams.

Yunhyung Cho (Sungkyunkwan University)

Time: 11:10 – 11:55

Title: *Toric structure on $X \times \mathbb{P}^n$*

Abstract: Motivated by a question of McDuff concerning the uniqueness of toric structures on monotone symplectic toric manifolds, we study monotone symplectic toric manifolds of the form $X \times \mathbb{P}^n$. Starting from an exotic toric structure on $X \times \mathbb{P}^n$, we use toric Mori theory to show that its moment polytope is combinatorially a product, and hence that the corresponding toric variety is a toric $\mathbb{P}^n$ -bundle over some toric Fano manifold X' . We then use Casagrande's theory of contractible curve classes to show that this bundle is in fact trivial. Consequently the exotic toric structure is a product toric structure. This is joint work with Taekgyu Hwang.

Thursday, October 1

Allen Knutson (Cornell University)

Time: 09:00 – 09:45

Title: *Localization, cobordism, and Chern-Schwartz-MacPherson classes*

Abstract: The AB/BV localization formula can be seen as a way of writing 1 as a sum over fixed points. This prompts the question: do the individual terms in the sum have geometric meaning? One answer was given by Ginzburg-Guillemin-Karshon, through a noncompact cobordism. I'll give a different one (in the complex projective case), using Chern-Schwartz-MacPherson classes, which then allows for many generalizations of the localization formula.

Peter Crooks (Utah State University)

Time: 10:15 – 11:00

Title: *Algebraic symplectic implosion and symplectic duality*

Abstract: Symplectic duality is an evolving framework for formulating and recognizing mirror symmetry in quiver gauge theories. One may associate such a theory to a complex semisimple group G and parabolic subgroup $P \subset G$. This theory is conjectured to admit the affinization $\overline{T^*(G/U_P)}$ of $T^*(G/U_P)$ as its Coulomb branch, where $U_P \subset P$ is the unipotent radical. In particular, $\overline{T^*(G/U_P)}$ is expected to be a stratified hyperKähler variety.

I will explain that an open dense subset of $\overline{T^*(G/U_P)}$ is hyperKähler when P satisfies a criterion related to $\mathfrak{sl}_2$ -triples. Connections to algebro-geometric symplectic implosion will be emphasized throughout the presentation. This represents joint work with Yiannis Loizides and Maxence Mayrand.

Stéphanie Cupit-Foutou (Ruhr-Universität Bochum)

Time: 11:10 – 11:55

Title: *Introducing complete simplicial spherical stacks*

Abstract: I will introduce the notion of complete and simplicial spherical stacks, as a generalization of quantum toric stacks (and in particular, toric quasifolds). We will show that any spherical stack is the base of some foliated non-Kähler compact complex manifold by compact complex tori. These complex manifolds are naturally equipped with a maximal group action; when the group is abelian, they are complex moment-angle manifolds (aka manifolds with a maximal torus action).

Kiumars Kaveh (University of Pittsburgh)

Time: 17:00 – 17:45 (online talk)

Title: *Torus equivariant vector bundles on complexity-one T -varieties*

Abstract: We give a combinatorial classification of torus-equivariant vector bundles on normal projective complexity-one T -varieties. This simultaneously extends Petersen–Süß’s classification of equivariant line bundles on complexity-one T -varieties and Klyachko’s classification of equivariant vector bundles on toric varieties. A key ingredient is the classification of torus-equivariant vector bundles on toric schemes over a DVR by piecewise affine maps to the extended Bruhat–Tits building of the general linear group. This is joint work with Jyoti Dasgupta, Chandranandan Gangopadhyay, and Christopher Manon.

Donghoon Jang (Pusan National University)

Time: 18:00 – 18:45

Title: *Non-Hamiltonian actions with minimal fixed points*

Abstract: On a closed symplectic manifold, a Hamiltonian action of the circle group is symplectic and has fixed points. Several results have shown that the converse holds under certain conditions. On the other hand, McDuff constructed a symplectic action on a 6-manifold with fixed tori that is not Hamiltonian. It remained an open question whether a symplectic action with isolated fixed points must be Hamiltonian. Tolman answered this question by constructing a non-Hamiltonian action on a 6-manifold with 32 fixed points. In joint work with Susan Tolman, we reduced the number of fixed points by 10. We discuss how to construct a non-Hamiltonian action with the minimal number of fixed points (two fixed points); this is ongoing work with Susan Tolman.

Friday, October 2

Mikiya Masuda (Osaka Metropolitan University)

Time: 09:00 – 09:45

Title: *Torus orbit closures in the flag variety*

Abstract: The study of torus orbit closures in the (complete) flag variety was initiated by Klyachko and Gelfand–Serganova in the mid-1980s. Since then, relatively little work seems to have been done on this topic.

In this talk, we review some classical work and present recent work with Eunjeong Lee and Seonjeong Park on the topology, geometry, and combinatorics of torus orbit closures in the flag variety. Details can be found in our survey article, arXiv:2203.16750, published in Handbook of Combinatorial Algebraic Geometry “Subvarieties of the Flag Variety,” edited by Erik Insko, Martha Precup, and Edward Richmond.

Yael Karshon (Tel-Aviv University)

Time: 10:15 – 11:00

Title: *Classification of complexity one Hamiltonian torus actions*

Abstract: I will report on our (ongoing; partially completed) classification, joint with Sue Tolman, of Hamiltonian torus actions of complexity one.