

Toric Degenerations and Mirror Symmetry in Kumamoto

Date: October 13 and 14, 2022

Venue: Kumamoto City International Center (Kumamoto, Japan)
(held in a hybrid mode using Zoom)

Abstract (the schedule is written in JST, GMT+9)

Oct. 13 (Thu)

- 9:30 – 10:30 Andrea Petracci (University of Bologna)
On deformations of toric Fano varieties
- 11:00 – 12:00 Thomas Hall (University of Nottingham)
The behaviour of Kähler–Einstein polygons under mutation
- 14:00 – 15:00 Oliver Clarke (Osaka University)
Combinatorial Mutations of GT-Polytopes, FFLV-Polytopes, and Block Diagonal Matching Field Polytopes
- 15:30 – 16:30 Eunjeong Lee (Chungbuk National University) (Zoom)

On string polytopes

Abstract: Let G be a semisimple algebraic group and B a Borel subgroup. The flag variety G/B is a smooth projective variety that has a fruitful connection with representations. Indeed, the set of global sections $H^0(G/B, \mathcal{L})$ is an irreducible G -representation for a very ample line bundle $\mathcal{L} \rightarrow G/B$; and string polytopes are combinatorial objects which encode the characters of irreducible G -representations. There exist combinatorially different string polytopes. The string polytopes are related to the geometry of flag varieties via the theory of Newton–Okounkov bodies. Moreover, for each string polytope Δ , there is a toric degeneration of the flag variety whose special fiber is the toric variety. In this talk, we will study Gelfand–Cetlin-type string polytopes, their enumerations, and we will present small toric resolutions of certain string polytopes. This talk is based on joint works with Yunhyung Cho, Jang Soo Kim, Yoosik Kim, and Kyeong-Dong Park.

- 17:00 – 18:00 Xin Fang (University of Cologne) (Zoom)
Seshadri stratification, Newton–Okounkov complex and semi-toric degeneration

Abstract: In this talk I will introduce the notion of a Seshadri stratification on an embedded projective variety. Such a structure allows us to construct (1). a Newton–Okounkov simplicial complex with an extra integral structure; (2). a flat degeneration of the variety into a reduced union of toric varieties. For Schubert varieties, Lakshmibai–Seshadri paths got interpreted as successive vanishing orders of regular functions within this framework. Joint work with Rocco Chirivì and Peter Littelmann.

Oct. 14 (Fri)

- 11:00 – 12:00 Francesca Zaffalon (Ghent University)
Toric degenerations of partial flag varieties and combinatorial mutations of matching field polytopes
- 14:00 – 15:00 Matej Filip (University of Ljubljana)
Mutations of Laurent polynomials and deformations of toric varieties

- 15:30 – 16:30 Yunhyung Cho (Sungkyunkwan University)

Construction of Infinitely many monotone Lagrangian tori using quiver mutation

Abstract: For each monotone Lagrangian torus in a symplectic manifold, one can associate a Laurent polynomial, called a potential function. In this talk, we consider a complete flag variety of type A and show that there are infinitely many monotone Lagrangian tori not Hamiltonian isotopic to each other. The proof relies on toric degenerations associated to cluster polytopes of certain seeds of a flag variety. This is joint work with Yunhyung Cho, Myungho Kim, Yoosik Kim, Jaehoon Kwon, and Euiyong Park.

- 17:00 – 18:00 Bea de Laporte (University of Cologne) (Zoom)

Landau–Ginzburg potentials via projective representations

Abstract: Many interesting spaces arise as partial compactifications of Fock-Goncharov’s cluster varieties, among them (affine cones over) flag varieties which are important objects in representation theory of algebraic groups. Due to a construction of Gross-Hacking-Keel-Kontsevich those partial compactifications give rise to Landau-Ginzburg potentials on the dual cluster varieties whose tropicalizations define interesting polyhedral cones parametrizing the theta basis on the ring of regular functions on the cluster varieties. In this talk, after explaining the background, we give an interpretation of these Landau-Ginzburg potentials as F-polynomials of projective representations of Jacobian algebras. This is joint work with Daniel Labardini-Fragoso.

Organizers:

Naoki Fujita (Kumamoto University)

Akihiro Higashitani (Osaka University)