

表現論の組合せ論的側面とその周辺

日程: 2023 年 10 月 23 日 (月) ~ 27 日 (金)

会場: 早稲田大学西早稲田キャンパス 62W 号館 1 階大会議室 A

アブストラクト

10/23 (月)

- 14:30 – 15:30 浅井 聡太 (東京大学)

Faces of interval neighborhoods of silting cones

Abstract: This talk is based on joint work with Osamu Iyama. In the representation theory of a finite dimensional algebra A over a field, it is important to study certain subcategories called torsion classes of the category $\text{mod } A$ of finitely generated A -modules. Baumann-Kamnitzer-Tingley associated two semistable torsion classes to each element θ in the real Grothendieck group $K_0(\text{proj } A)_{\mathbb{R}}$ of the category $\text{proj } A$ of finitely generated projective A -modules. This real Grothendieck group is the Euclidean space whose canonical basis is given by the isoclasses of indecomposable projective A -modules. By using semistable torsion classes, I introduced an equivalence relation called TF equivalence on $K_0(\text{proj } A)_{\mathbb{R}}$. A typical example of TF equivalence classes is the silting cone $C^\circ(U)$ of each 2-term presilting complex U , which is the cone generated by the g-vectors of the indecomposable direct summands of U . In general, there can be other TF equivalence classes, and we are studying them. For this purpose, we use the interval neighborhood N_U of each silting cone $C^\circ(U)$. The closure $\overline{N_U}$ is a rational polyhedral cone in the Euclidean space $K_0(\text{proj } A)_{\mathbb{R}}$, so it is natural to consider its faces. I will talk on some nice representation-theoretical and combinatorial properties of faces of $\overline{N_U}$.

- 16:00 – 17:00 山根 宏之 (富山大学)

一般化された有限ルート系のワイル垂群のケイリーグラフおよびハミルトン閉路

Abstract: TBA

10/24 (火)

- 9:30 – 10:30 西山 雄太 (熊本大学)

歪 mitosis 作用素の組合せ論

Abstract: A 型のシューベルト計算における組合せ論的なモデルとして, pipe dream と呼ばれる図形が用いられる. それぞれの pipe dream には対称群の元が対応しており, それぞれの元に対応する pipe dream たちは mitosis 作用素を用いて構成できる. この pipe dream の C 型への拡張として歪 pipe dream が知られており, それぞれの歪 pipe dream には C 型 Weyl 群の元が対応する. 本講演では, C 型 Weyl 群の各元に対応する歪 pipe dream たちが歪 mitosis 作用素を用いて構成できることを紹介する. なお本講演の内容は藤田直樹氏 (熊本大学) との共同研究に基づく.

Title (English): Combinatorics of skew mitosis operators Abstract (English): Diagrams called pipe dreams are used as a combinatorial model in Schubert calculus in type A. Each pipe dream corresponds to an element of the symmetric group, and the set of pipe dreams corresponding to each element of the symmetric group can be constructed with mitosis operators. Skew pipe dreams are known as an extension of pipe dreams to type C, and each skew pipe dream corresponds to an element of Weyl group of type C. In this talk, we show that the set of skew pipe dreams corresponding to each element of Weyl group can be constructed with skew mitosis operators. This talk is based on a joint work with Naoki Fujita (Kumamoto University).

- 11:00 – 12:00 岡田 聡一 (名古屋大学)
Proof of Mizukawa–Nakajima–Yamada’s Conjecture on Q -functions
Abstract: TBA
- 14:00 – 15:00 山口 航平 (名古屋大学)
Equivariant K -homology of the symplectic affine Grassmannian
Abstract: TBA
- 15:30 – 16:30 河野 隆史 (早稲田大学)
The relation between the quantum K -ring of Lagrangian Grassmannians and the K -homology ring of affine Grassmannians in type C
Abstract: TBA

10/25 (水)

- 9:30 – 10:30 降旗 駿 (京都大学)
On the Beem–Nair Conjecture
Abstract: TBA
- 11:00 – 12:00 元良 直輝 (東京大学)
W 代数の段階的還元
Abstract: TBA
- 14:00 – 15:00 桑原 敏郎 (筑波大学)
Vertex superalgebras associated with Hilbert schemes of points in the plane
Abstract: TBA
- 15:30 – 16:30 楫 元 (早稲田大学)
Push-Forward Formula for Grassmann Bundles and Its Application
Abstract: I explain a push-forward formula for Grassmann bundles, which is a joint work with T. Terasoma (Hosei University), and compute the degree of 2-step flag varieties, as an application.

10/26 (木)

- 9:30 – 10:30 Duc-Khanh Nguyen (沖縄科学技術大学院大学)
A generalization of the Murnaghan–Nakayama rule for K - k -Schur and k -Schur functions
Abstract: The K - k -Schur functions and k -Schur functions appeared in the study of K -theoretic and affine Schubert Calculus as polynomial representatives of Schubert classes. In this paper, we introduce a new family of symmetric functions $\mathcal{F}_\lambda^{(k)}$, that generalizes the constructions via the Pieri rule of K - k -Schur functions and k -Schur functions. Then we obtain the Murnaghan–Nakayama rule for the generalized functions. The rule is described explicitly in the cases of K - k -Schur functions and k -Schur functions, with concrete descriptions and algorithms for coefficients. Our work recovers the result of Bandlow, Schilling, and Zabrocki for k -Schur functions, and explains it as a degeneration of the rule for K - k -Schur functions. In particular, many other special cases and connections promise to be detailed in the future.
- 11:00 – 12:00 Martín Forsberg Conde (沖縄科学技術大学院大学)
Specht Module の Carter–Payne 準同型の一般化
Abstract: TBA
- 14:00 – 15:00 足利 涼介 (北海道大学)
Construction of dynamical reflection maps
Abstract: TBA
- 15:30 – 16:30 大本 豊数 (岡山大学), 高山 義輝 (岡山大学)
交代符号行列に関連した半順序集合上のコイン裏返しゲーム
Abstract: TBA

10/27 (金)

- 9:30 – 10:30 渡邊 英也 (大阪公立大学)
A new branching rule from $GL_{2n}(\mathbb{C})$ to $Sp_{2n}(\mathbb{C})$
Abstract: In this talk, I will introduce a new branching rule from the general linear group $GL_{2n}(\mathbb{C})$ to the symplectic group $Sp_{2n}(\mathbb{C})$ by establishing a simple algorithm which gives rise to a bijection from the set of semistandard tableaux of a fixed shape to a disjoint union of several copies of the sets of symplectic tableaux of various shapes. The algorithm arises from representation theory of a quantum symmetric pair of type AII_{2n-1} , which is a q -analogue of the classical symmetric pair $(\mathfrak{gl}_{2n}(\mathbb{C}), \mathfrak{sp}_{2n}(\mathbb{C}))$.
- 11:00 – 12:00 宮地 兵衛 (大阪公立大学)

Hecke 環における二つの相互律について

Abstract: Hecke 代数の 2 つの相互律について話す。(1) 一つは、岩堀 Hecke 代数の Kazhdan-Lusztig cells についてである。ここでは cell は、Weyl 群の元としての意味での左 cell を意味している。この cell に関して Mackey 公式が成立することを報告する。(2) 群環において既約加群と直既約射影加群に関して Robinson の相互律という定理が知られている。これの次数付き版の拡張定理を構成したので報告する。主だった用途は、巡回的箝 Hecke 代数やその他の型の箝 Hecke 代数である。この 2 つ目の相互律は、岩堀 Hecke 代数や巡回的 Hecke 代数についてでも新しいものである。

世話人:

藤田直樹 (熊本大学)

池田岳 (早稲田大学)

Oct. 13 (Thu)

- 9:30 – 10:30 Andrea Petracchi (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)