

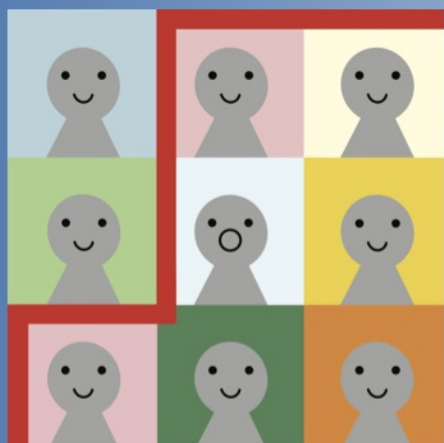
# FPSAC 2020

ONLINE MONDAYS, WEDNESDAYS, FRIDAYS  
JULY 6-24, 2020

[2020.fpsac.org](https://2020.fpsac.org)

32nd International Conference on Formal  
Power Series and Algebraic Combinatorics

Conference Program



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# Welcome to FPSAC 2020 Online!

## A word from the Organizing Committee

Welcome everyone to FPSAC 2020 Online! This conference will feature 27 talks, 3 poster sessions with +60 presenters, several opportunities to meet others in the community, and a rare opportunity to reimagine conferences in the 21 century. Participants have registered from all around the world including 39 countries. We hope you will enjoy the experience as we all learn some of the beautiful cutting edge mathematics in combinatorics and beyond.

We are grateful for financial support from our sponsors including the Department of Mathematics at Bar Ilan University in Israel, the Laboratoire de Recherche en Informatique, Université Paris Sud in France, the Department of Mathematics and Statistics at UMass, Amherst in the US, and to the Department of Mathematics at the University of Washington in the US. We are also grateful to the Program Committee for their efforts to select a strong and diverse collection of extended abstracts from the many submissions and to Eli Bagno and Olya Mandelshtam for the careful work with the extended abstracts. We are grateful to all the presenters for their willingness to present online and help us to make this virtual conference a success. We are grateful to the volunteers who have shared their ideas and suggestions for online social events, in particular to Vivien Ripoll for proposing the opening event “Fun Puzzle Solving for Amateurs and Connoisseurs.” We also thank William Dugan for his work preparing the conference booklet. Finally, we are grateful to the Executive Committee for FPSAC for giving us this opportunity to experiment with the concept of the virtual conference and for keeping our international research community strong for 32 years and counting!

Enjoy the conference,

*Alejandro Morales (chair), Dan Betea, Sara Billey, Angela Carnevale, Laura Colmenarejo, Christian Gaetz, Sean Griffin, Helen Jenne, Jang Soo Kim, Matjaž Konvalinka, and Nicolas M. Thiéry*

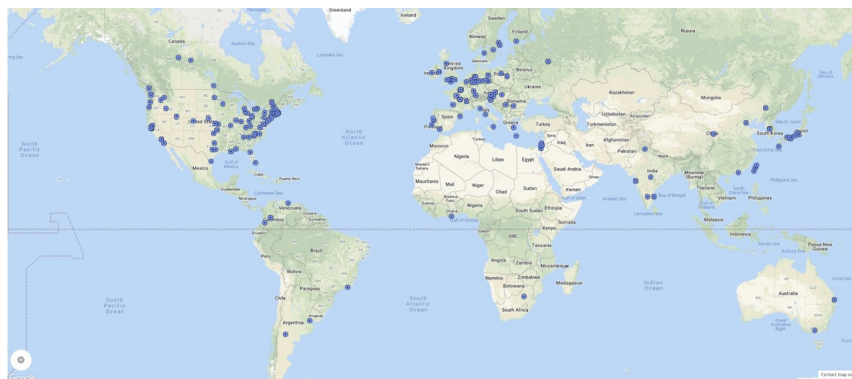


Figure 1: Location of institutions of registered participants as of July 1, 2020.

## A word from the Program Committee

Many thanks to all the authors who submitted their recent research results to FPSAC 2020. Your excellent submissions show how vibrant and thriving our community is!

Special thanks to all the devoted members of the Program Committee, and to the many other experts who served as secondary reviewers, for the demanding effort of evaluating all submissions. Your volunteer work was crucial to the success of the conference.

Last but not least, the resourceful Organizing Committee of FPSAC 2020 Online faced the enormous challenge of turning a planned physical event into a virtual one, under unexpected circumstances. Everyone can now enjoy the sweet fruits of your hard work. Thanks!

With great appreciation,

*Ron Adin, Christos Athanasiadis, Yuval Roichman and Michelle Wachs*

**Program Committee chairs**

## Sponsors

FPSAC 2020 is supported by

- Department of Mathematics, Bar Ilan University, Israel
- Laboratoire de Recherche en Informatique, Université Paris Sud, France
- Department of Mathematics, University of Washington, USA
- Department of Mathematics and Statistics, University of Massachusetts, Amherst, USA



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Sheila Sundaram: Pierpont School, USA  
Harry Tamvakis: University of Maryland, USA  
Alek Vainshtein: University of Haifa, Israel  
Masahiko Yoshinaga: Hokkaido University, Japan

### Proceedings

Eli Bagno: Jerusalem College of Technology, Israel  
Olya Mendalshtam: Brown University, USA

## Code of Conduct

The Organizing Committee of FPSAC 2020 is committed to providing a **rewarding and welcoming experience for all**. We are committed to ensuring that FPSAC 2020 online is professional and free of harassment and discrimination in all of its events. Furthermore, we are dedicated to creating a supportive environment that benefits from the diversity of experiences of all its participants. We aim to offer equal opportunity and treatment to every participant regardless of their mathematical experience, gender identity, nationality, race or ethnicity, religion, age, marital status, sexual orientation, disability, or any other factor.

We will not tolerate any form of discrimination or harassment. If you experience harassment or discriminatory behavior at a conference event, we encourage you to reach out to any member of the organizing committee so we may take appropriate actions to address the situation.

Special rules apply for online conferences. We require that every participant in an online conference represent themselves by the **name that they use for their professional work**. In addition, any speech or imagery that is posted in the chats or forms of the various conference activities must be appropriate for professional work.

Participants who violate this code may be sanctioned and/or expelled from the event at the discretion of the Organizing Committee. Any action will only be taken with the consent of the complaining party.

If you witness harassment or discriminatory behavior, please consider intervening. We need the whole community to work together to make this event the welcoming and rewarding experience for all that we strive to achieve. Thank you for your cooperation.

**Acknowledgments:** Parts of this agreement are based on:

- Federico Ardila's Code of Conduct of ECCO (Encuentro Colombiano de Combinatoria) available at <http://math.sfsu.edu/federico/SFSUColombia/eccoagreement.pdf>
- the Code of Conduct of EuroCrypt 2020 <https://eurocrypt.iacr.org/2020/conduct.php>
- on statements by the Association for Women in Mathematics and the XOXO Festival; and on <http://confcodeofconduct.com>.

## Contributing Speakers

### Nathan Williams and Carlos Arreche

#### *Normal reflection subgroups*

**Abstract.** We study normal reflection subgroups of complex reflection groups. Our point of view leads to a refinement of a theorem of Orlik and Solomon to the effect that the generating function for fixed-space dimension over a reflection group is a product of linear factors involving generalized exponents. Our refinement gives a uniform proof and generalization of a recent theorem of the second author.

### Spencer Backman, Christopher Eur and Connor Simpson

#### *Simplicial generation of Chow rings of matroids*

**Abstract.** We introduce a new presentation of the Chow ring of a matroid whose variables admit a combinatorial interpretation via the theory of matroid quotients and display a geometric behavior analogous to that of nef classes on smooth projective varieties. We apply these properties to produce a bijection between a standard monomial basis of our presentation and a relative generalization of Schubert matroids. As a corollary we obtain the Poincaré duality property for Chow rings of matroids. We then give a formula for the volume polynomial with respect to our presentation and show that it is log-concave in the positive orthant. We recover the portion of the Hodge theory of matroids in [Adiprasito–Huh–Katz, 2018], which implies the Heron–Rota–Welsh conjecture on the log-concavity of the coefficients of the characteristic polynomial. We emphasize that our work eschews the use of flipping, which is the key technical tool employed in [Adiprasito–Huh–Katz, 2018]. Thus our proof does not leave the realm of matroids.

### Angela Carnevale, Michael Schein and Christopher Voll

#### *Generalized Igusa functions and ideal growth in nilpotent Lie rings*

**Abstract.** We introduce a new class of combinatorially defined rational functions and apply them to deduce explicit formulae for local ideal zeta functions associated to the members of a large class of nilpotent Lie rings which contains the free class-2-nilpotent Lie rings and is stable under direct products. Our results unify and generalize a substantial number of previous computations. We show that the new rational functions, and thus also the local zeta functions under consideration, enjoy a self-reciprocity property, expressed in terms of a functional equation upon inversion of variables. We establish a conjecture of Grunewald, Segal, and Smith on the uniformity of normal zeta functions of finitely generated free class-2-nilpotent groups.



### Federico Castillo and Fu Liu

#### *On the Todd class of the permutohedral variety*

**Abstract.** In the special case of braid fans, we give a combinatorial formula for the Berline–Vergne’s construction for an Euler–Maclaurin type formula that computes number of lattice points in polytopes. Our formula is obtained by computing a symmetric expression for the Todd class of the permutohedral variety. By showing that this formula does not always have positive values, we prove that the Todd class of the permutohedral variety  $X_d$  is not effective for  $d \geq 24$ . Additionally, we prove that the linear coefficient in the Ehrhart polynomial of any lattice generalized permutohedron is positive.



**Laura Colmenarejo Hernando, Rosa Orellana,  
Franco Saliola, Anne Schilling and Mike Zabrocki**

*An insertion algorithm for diagram algebras*

**Abstract.** We generalize the Robinson–Schensted–Knuth algorithm to the insertion of two row arrays of multisets. This generalization leads to an algorithm from partition diagrams to pairs of a standard tableau and a standard multiset tableau of the same shape, which has the remarkable property that it is well-behaved with respect to restricting a representation to a subalgebra. This insertion algorithm matches recent representation-theoretic results of Halverson and Jacobson.



**Ilse Fischer and Matjaž Konvalinka**

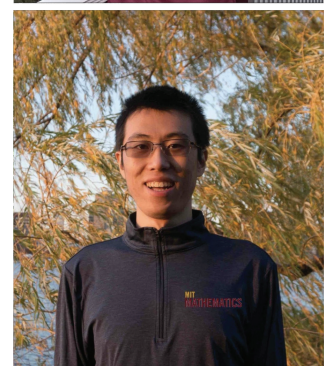
*The first bijective proof of the refined ASM theorem*

**Abstract.** Alternating sign matrices are known to be equinumerous with descending plane partitions, totally symmetric self-complementary plane partitions and alternating sign triangles, but a bijective proof for any of these equivalences has been elusive for almost 40 years. In this extended abstract, we provide a sketch of the first bijective proof of the enumeration formula for alternating sign matrices, and of the fact that alternating sign matrices are equinumerous with descending plane partitions. The bijections are based on the operator formula for the number of monotone triangles due to the first author. The starting point for these constructions were known “computational” proofs, but the combinatorial point of view led to several drastic modifications and simplifications. We also provide computer code where all of our constructions have been implemented.

**Christian Gaetz and Yibo Gao**

*Separable elements: linear extensions, graph associahedra,  
and splittings of Weyl groups*

**Abstract.** We introduce *separable elements* in finite Weyl groups, generalizing the wellstudied class of separable permutations. We prove that the principal upper and lower order ideals in weak Bruhat order generated by a separable element are rank-symmetric and rank-unimodal, and that the product of their rank generating functions equals that of the whole group, answering an open problem of Fan Wei (2012), who proved this result in type  $A$ . We prove that the multiplication map  $W/V \times V \rightarrow W$  for a generalized quotient of the symmetric group is always surjective when  $V$  is an order ideal in right weak order; interpreting these sets of permutations as linear extensions of 2-dimensional posets gives the first direct combinatorial proof of an inequality due originally to Sidorenko in 1991, answering an open problem Morales, Pak, and Panova. We show that this multiplication map is a bijection if and only if  $V$  is an order ideal in right weak order generated by a separable element, thereby classifying those generalized quotients which induce *splittings* of the symmetric group, answering a question of Björner and Wachs (1988). All of these results are conjectured to extend to arbitrary finite Weyl groups. Next, we show that separable elements in  $W$  are in bijection with the faces of all dimensions of two copies of the graph associahedron of the Dynkin diagram of  $W$ . This correspondence associates to each separable element  $w$  a certain *nested set*; we give elegant product formulas for the rank generating functions of the principal upper and lower order ideals generated by  $w$  in terms of these nested sets. Finally we show that separable elements, although initially defined recursively, have a non-recursive characterization in terms of root system pattern avoidance in the sense of Billey and Postnikov.





Niklas Affolter, **Max Glick**, Pavlo Pylyavskyy and Sanjay Ramassamy

*Vector-relation configurations and plabic graphs*

**Abstract.** We study a simple geometric model for local transformations of bipartite graphs. The state consists of a choice of a vector at each white vertex made in such a way that the vectors neighboring each black vertex satisfy a linear relation. Evolution for different choices of the graph coincides with many notable dynamical systems including the pentagram map,  $Q$ -nets, and discrete Darboux maps. On the other hand, for plabic graphs we prove unique extendability of a configuration from the boundary to the interior, an elegant illustration of the fact that Postnikov's boundary measurement map is invertible. In all cases there is a cluster algebra operating in the background, resolving the open question for  $Q$ -nets of whether such a structure exists.

**Sean Griffin**

*Ordered set partitions, Tanisaki ideals, and rank varieties*

**Abstract.** We introduce a family of quotient rings  $R_{n,\lambda,s}$  which contain both the cohomology rings of Springer fibers  $R_\lambda$  and the Haglund-Rhoades-Shimozono rings  $R_{n,k}$  as special cases. We then show that many of the previously known formulas for  $R_\lambda$  and  $R_{n,k}$  extend to  $R_{n,\lambda,s}$ . In particular, we realize the  $S_n$ -module structure of  $R_{n,\lambda,s}$  in terms of a certain collection of ordered set partitions. We also find formulas for the Hilbert series in terms of inversion statistics, and for the graded Frobenius characteristic in terms of Hall-Littlewood functions. We then connect our work with the geometry of Eisenbud-Saltman rank varieties.



**Gabor Hetyei**

*The dual of the type  $B$  permutohedron as a Tchebyshev triangulation*

**Abstract.** We show that the order complex of intervals of a poset, ordered by inclusion, is a Tchebyshev triangulation of the order complex of the original poset. Besides studying the properties of this transformation, we show that the dual of the type  $B$  permutohedron is combinatorially equivalent to the order complex of the poset of intervals of a Boolean algebra (with the minimum and maximum elements removed).

**Il-Seung Jang and Jae-Hoon Kwon**

*Flagged Littlewood-Richardson tableaux and branching rule for orthogonal groups*

**Abstract.** We give a new combinatorial formula for the branching rule from  $GL_n$  to  $O_n$  generalizing the Littlewood's restriction formula. The formula is given in terms of Littlewood-Richardson tableaux with certain flag conditions which vanish in a stable range.



## Helen Jenne

### *Combinatorics of the double-dimer model*

**Abstract.** We prove that the partition function for tripartite double-dimer configurations of a planar bipartite graph satisfies a recurrence related to the Desnanot–Jacobi identity from linear algebra. A similar identity for the dimer partition function was established nearly 20 years ago by Kuo and has applications to random tiling theory and the theory of cluster algebras. This work was motivated in part by the potential for applications in these areas. Additionally, we discuss an application to Donaldson–Thomas and Pandharipande–Thomas theory which will be the subject of a forthcoming paper. The proof of our recurrence requires generalizing work of Kenyon and Wilson; specifically, lifting their assumption that the nodes of the graph are black and odd or white and even.

## Karim Adiprasito, Daniel Kalmanovich and Eran Nevo

### *On the realization space of the cube*

**Abstract.** We prove that the realization space of the  $d$ -dimensional cube is contractible. For this we first show that any two realizations are connected by a finite sequence of projective transformations and normal transformations. As an application we use this fact to define an analog of the connected sum construction for cubical  $d$ -polytopes, and apply this construction to certain cubical  $d$ -polytopes to conclude that the rays spanned by  $f$ -vectors of cubical  $d$ -polytopes are dense in Adin’s cone. The connectivity result on cubes extends to any product of simplices, and further, it shows the respective realization spaces are contractible

## Pavel Galashin, Steven Karp and Thomas Lam

### *Regularity theorem for totally nonnegative flag varieties*

**Abstract.** We show that the totally nonnegative part of a partial flag variety  $G/P$  (in the sense of Lusztig) is a regular CW complex, confirming a conjecture of Williams. In particular, the closure of each positroid cell inside the totally nonnegative Grassmannian is homeomorphic to a ball, confirming a conjecture of Postnikov

## Peter Dukes, Ferdinand Ihringer and Nathan Lindzey

### *On the algebraic combinatorics of injections*

**Abstract.** We consider the algebraic combinatorics of the set of injections from a  $k$ -element set to an  $n$ -element set. In particular, we give a new combinatorial formula for the spherical functions of the Gelfand pair  $(S_k \times S_n, \text{diag}(S_k) \times S_{n-k})$ . We use this combinatorial formula to give new LP bounds on the size of codes over injections.

Sylvie Corteel, Jim Haglund, **Olya Mandelshtam**, Sarah Mason and Lauren Williams

*Compact formulas for Macdonald polynomials and quasisymmetric Macdonald polynomials*

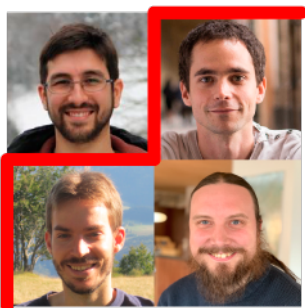
**Abstract.** We present several new and compact formulas for the modified and integral form of the Macdonald polynomials, building on the compact “multiline queue” formula for Macdonald polynomials due to Corteel, Mandelshtam and Williams. We also introduce a new quasisymmetric analogue of Macdonald polynomials. These *quasisymmetric Macdonald polynomials* refine the (symmetric) Macdonald polynomials and specialize at  $q = t = 0$  to the quasisymmetric Schur polynomials defined by Haglund, Luoto, Mason, and Van Willigenburg.



**Łukasz Maślanka and Piotr Śniady**

*Limit shapes of evacuation and jeu de taquin paths in random square Young tableaux*

**Abstract.** We consider large random square Young tableaux and look for typical (in the sense of probability) *jeu de taquin* paths and *evacuation paths* in the asymptotic setting. We show that the probability distribution of such paths converges to a random *meridian* connecting the opposite corners of the square



**Arnau Padrol, Yann Palu, Vincent Pilaud and Pierre-Guy Plamondon**

*On type cones of  $g$ -vector fans*

**Abstract.** We study the type cone (*i.e.* the space of all polytopal realizations) of  $g$ -vector fans of finite type cluster-like complexes (finite type cluster complexes, nonkissing complexes of gentle algebra, and graphical nested complexes). We show that this cone is often simplicial, which explains an elegant “kinematic” construction of the associahedron as a section of a high dimensional positive orthant by certain affine subspaces parametrized by a low dimensional positive orthant.

**Andrew Elvey Price**

*Counting lattice walks by winding angle*

**Abstract.** We address the problem of counting walks by winding angle on the Kreweras lattice, an oriented version of the triangular lattice. Our method uses a new decomposition of the lattice, which allows us to write functional equations characterising a generating function of walks counted by length, endpoint and winding angle. We then solve these functional equations in terms of Jacobi theta functions. By using this result in conjunction with the reflection principle, we count walks confined to a cone of opening angle any multiple of  $\frac{\pi}{3}$ , allowing us to extract asymptotic and algebraic information for these walks. Our method and results extend analogously to three other lattices, including the square lattice and triangular lattice. On the square lattice, most of our results were derived by Timothy Budd in 2017, so the current work can be seen as an extension of Budd’s results to the three other lattices that we consider. Budd’s method of deducing these results was very different, as it was based on an explicit eigenvalue decomposition of certain matrices counting paths in the lattice.



Elia Bisi, Fabio Deelan Cunden, Shane Gibbons and **Dan Romik**

*Sorting networks, staircase Young tableaux and last passage percolation*

**Abstract.** We present new combinatorial and probabilistic identities relating three random processes: the oriented swap process on  $n$  particles, the corner growth process, and the last passage percolation model. We prove one of the probabilistic identities, relating a random vector of last passage percolation times to its dual, using the duality between the Robinson–Schensted–Knuth and Burge correspondences. A second probabilistic identity, relating those two vectors to a vector of “last swap times” in the oriented swap process, is conjectural. We give a computer-assisted proof of this identity for  $n \leq 6$  after first reformulating it as a purely combinatorial identity, and discuss its relation to the Edelman–Greene correspondence.

Arvind Ayyer and **Shubham Sinha**

*Random  $t$ -cores and hook lengths in random partitions*

**Abstract.** Fix  $t \geq 2$ . We first give an asymptotic formula for certain sums of the number of  $t$ -cores. We then use this result to compute the distribution of the size of the  $t$ -core of a uniformly random partition of an integer  $n$ . We show that this converges weakly to a gamma distribution after appropriate rescaling. As a consequence, we find that the size of the  $t$ -core is of the order of  $\sqrt{n}$  in expectation. We then apply this result to show that the probability that  $t$  divides the hook length of a uniformly random cell in a uniformly random partition equals  $1/t$  in the limit. Finally, we extend this result to all modulo classes of  $t$  using abacus representations for cores and quotients.



Petter Brändén and **Liam Solus**

*Some algebraic properties of lecture hall polytopes*

**Abstract.** In this note, we investigate some of the fundamental algebraic and geometric properties of  $s$ -lecture hall simplices and their generalizations. We show that all  $s$ -lecture hall order polytopes, which simultaneously generalize  $s$ -lecture hall simplices and order polytopes, satisfy a property which implies the integer decomposition property. This answers one conjecture of Hibi, Olsen and Tsuchiya. By relating  $s$ -lecture hall polytopes to alcoved polytopes, we then use this property to show that families of  $s$ -lecture hall simplices admit a quadratic Gröbner basis with a square-free initial ideal. Consequently, we find that all  $s$ -lecture hall simplices for which the first order difference sequence of  $s$  is a  $0,1$ -sequence have a regular and unimodular triangulation. This answers a second conjecture of Hibi, Olsen and Tsuchiya, and it gives a partial answer to a conjecture of Beck, Braun, Köppe, Savage and Zafeirakopoulos.



Federico Ardila, **Mariel Supina** and Andrés Vindas Meléndez

*The equivariant Ehrhart theory of the permutahedron*

**Abstract.** Equivariant Ehrhart theory enumerates the lattice points in a polytope with respect to a group action. Answering a question of Stapledon, we describe the equivariant Ehrhart theory of the permutahedron, and we prove his Effectiveness Conjecture in this special case.



## Sara Billey, Matjaž Konvalinka and Joshua Swanson

*On the distribution of the major index on standard Young tableaux*

**Abstract.** The study of permutation and partition statistics is a classical topic in enumerative combinatorics. The major index statistic on permutations was introduced a century ago by Percy MacMahon in his seminal works. In this extended abstract, we study the well-known generalization of the major index to standard Young tableaux. We present several new results. In one direction, we introduce and study two partial orders on the standard Young tableaux of a given partition shape, in analogy with the strong and weak Bruhat orders on permutations. The existence of such ranked poset structures allows us to classify the realizable major index statistics on standard tableaux of arbitrary straight shape and certain skew shapes, and has representation-theoretic consequences, both for the symmetric group and for Shephard–Todd groups. In a different direction, we consider the distribution of the major index on standard tableaux of arbitrary straight shape and certain skew shapes. We classify all possible limit laws for any sequence of such shapes in terms of a simple auxiliary statistic, after generalizing earlier results of Canfield–Janson–Zeilberger, Chen–Wang–Wang, and others. We also study unimodality, log-concavity, and local limit properties.

## Philippe Nadeau and Vasu Tewari

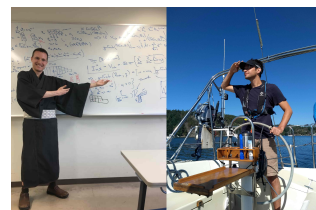
*Divided symmetrization and quasisymmetric functions*

**Abstract.** We study various aspects of the divided symmetrization operator, which was introduced by Postnikov in the context of volume polynomials of permutahedra. Divided symmetrization is a linear form which acts on the space of polynomials in  $n$  indeterminates of degree  $n - 1$ . Our main results are related to quasisymmetric polynomials. We show that divided symmetrization applied to a quasisymmetric polynomial in  $m \leq n$  indeterminates has a natural interpretation. We further show that divided symmetrization of any polynomial can be naturally computed with respect to a direct sum decomposition due to Aval–Bergeron–Bergeron, involving the ideal generated by positive degree quasisymmetric polynomials in  $n$  indeterminates. Our main motivation for studying divided symmetrization comes from studying the cohomology class of the Peterson variety

## Brendon Rhoades and Andrew Wilson

*Vandermondes, superspace, and delta conjecture modules*

**Abstract.** Superspace is an algebra  $\Omega_n$  with  $n$  commuting generators  $x_1, \dots, x_n$  and  $n$  anticommuting generators  $\theta_1, \dots, \theta_n$ . We present an extension  $\delta_{n,k}$  of the Vandermonde determinant to  $\Omega_n$  which depends on positive integers  $k \leq n$ . We use superspace Vandermondes to build representations of the symmetric group  $S_n$ . In particular, we construct a doubly graded  $S_n$ -module  $\mathbb{V}_{n,k}$  whose bigraded Frobenius image  $\text{grFrob}(\mathbb{V}_{n,k}; q, t)$  conjecturally equals the symmetric function  $\Delta'_{e_{k-1}} e_n$  appearing in the Haglund–Remmel–Wilson Delta Conjecture. We prove the specialization of our conjecture at  $t = 0$ . We use a differentiation action of  $\Omega_n$  on itself to build bigraded quotients  $\mathbb{W}_{n,k}$  of  $\Omega_n$  which extend the Delta Conjecture coinvariant rings  $R_{n,k}$  defined by Haglund–Rhoades–Shimozono and studied geometrically by Pawłowski–Rhoades. Despite the fact that the Hilbert polynomials of the  $R_{n,k}$  are not palindromic, we show that  $\mathbb{W}_{n,k}$  exhibits a superspace version of Poincaré Duality.



# Conference Schedule

All the times are in UTC.

## Week 1, July 6,8,10 2020

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<p><b>13:45-14:00</b> Opening remarks</p> <p><b>14:00-14:25</b> <b>Vincent Pilaud</b> On type cones of g-vector fans</p> <p><b>14:30-14:55</b> <b>Helen Jenne</b> Combinatorics of the double-dimer model</p> <p><b>15:00-15:25</b> <b>Federico Castillo</b> On the Todd class of the permutohedral variety</p> <p><b>15:30-16:00</b> <b>Coffee break</b></p>		<p><b>06:00-07:30</b> <b>Poster Session I</b></p> <p><b>14:00-14:25</b> <b>Angela Carnevale</b> Generalized Igusa functions and ideal growth in nilpotent Lie rings</p> <p><b>14:30-14:55</b> <b>Carlos Arreche</b> Normal reflection subgroups</p> <p><b>15:00-15:25</b> <b>Cristian Gaetz</b> Separable elements: linear extensions, graph associahedra, and splittings of Weyl groups</p> <p><b>15:30-16:00</b> <b>Coffee break</b></p>		<p><b>14:00-14:25</b> <b>Vasu Tewari</b> Divided symmetrization and quasisymmetric functions</p> <p><b>14:30-14:55</b> <b>Olya Mandelshtam</b> Compact formulas for Macdonald polynomials and quasisymmetric Macdonald polynomials</p> <p><b>15:00-15:25</b> <b>Andrew Elvey Price</b> Counting lattice walks by winding angle</p> <p><b>15:30-16:00</b> <b>Coffee break</b></p>

## Week 2, July 13,15,17 2020

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<p><b>22:00-22:25</b> <b>Joshua Swanson</b> On the distribution of the major index on standard Young tableaux</p> <p><b>22:30-22:55</b> <b>Sean Griffin</b> Ordered set partitions, Tanisaki ideals, and rank varieties</p> <p><b>23:00-23:25</b> <b>Andrew Wilson</b> Vandermondes, superspace, and delta conjecture modules</p> <p><b>22:30-23:00</b> <b>Coffee break</b></p>		<p><b>06:00-06:25</b> <b>Shubham Sinha</b> Random t-cores and hook lengths in random partitions</p> <p><b>06:30-06:55</b> <b>Il-Seung Jang</b> Flagged Littlewood-Richardson tableaux and branching rule for orthogonal groups</p> <p><b>07:00-07:25</b> <b>Łukasz Maślanka</b> Limit shapes of evacuation and jeu de taquin paths in random square Young tableaux</p> <p><b>07:30-08:00</b> <b>Coffee break</b></p> <p><b>14:00-15:30</b> <b>Poster Session II</b></p>		<p><b>22:00-22:25</b> <b>Spencer Backman</b> Simplicial generation of Chow rings of matroids</p> <p><b>22:30-22:55</b> <b>Max Glick</b> Vector-relation configurations and plabic graphs</p> <p><b>23:00-23:25</b> <b>Gabor Hetyei,</b> The dual of the type B permutohedron as a Tchebyshev triangulation</p> <p><b>23:30-24:00</b> <b>Coffee break</b></p>

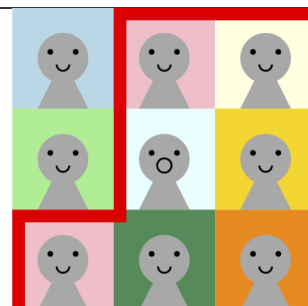
## Week 2, July 20,22,24 2020

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<b>14:00-14:25</b> <b>Ilse Fischer</b> The first bijective proof of the refined ASM theorem <b>14:30-14:55</b> <b>Mariel Supina</b> The equivariant Ehrhart theory of the permutahedron <b>15:00-15:25</b> <b>Daniel Kalmanovich</b> On the realization space of the cube <b>15:30-16:00</b> <b>Coffee break</b>		<b>14:00-14:25</b> <b>Laura Colmenarejo Hernando</b> An insertion algorithm for diagram algebras <b>14:30-14:55</b> <b>Steven Karp</b> Regularity theorem for totally nonnegative flag varieties <b>15:00-15:25</b> <b>Nathan Lindzey</b> On the algebraic combinatorics of injections <b>15:30-16:00</b> <b>Coffee break</b> <b>22:00-23:30</b> <b>Poster Session III</b>		<b>14:00-14:25</b> <b>Liam Solus</b> Some algebraic properties of lecture hall polytopes <b>14:30-14:55</b> <b>Jacob White</b> On Cohen-Macaulay Hopf monoids in species <b>15:00-15:25</b> <b>Dan Romik</b> Sorting networks, staircase Young tableaux and last passage percolation <b>15:30-16:00</b> <b>Concluding remarks and awards presentation</b>

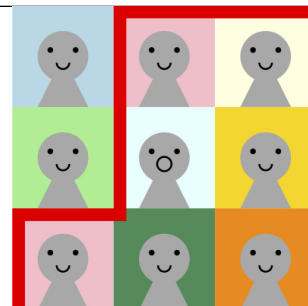
## Poster Sessions

Wednesday July 8, 06:00 UTC

Guillaume Chapuy and **Theo Douvropoulos**, *Coxeter factorizations and the Matrix Tree theorem with generalized Jucys-Murphy weights.*



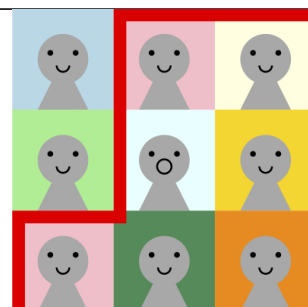
Élie de Panafieu and **Sergey Dovgal**, *Counting directed acyclic and elementary digraphs*



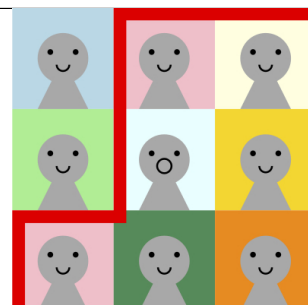
**Shoni Gilboa** and Erez Lapid, *Some combinatorial results on smooth permutations*



**Assaf Goldberger** and Ilias Kotsireas, *Formal orthogonal pairs via monomial representations and cohomology*



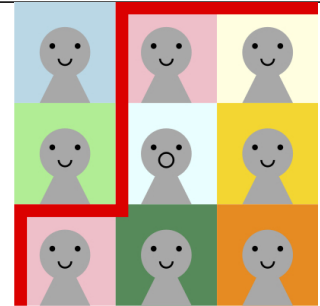
**Darij Grinberg**, *The Petrie symmetric functions*



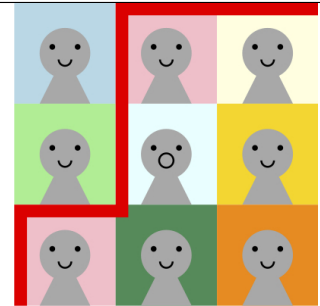
**Bin Han**, Jianxi Mao and Jiang Zeng, *Eulerian polynomials and excedance statistics via continued fractions*



Vincent Pilaud and **Florent Hivert**, *Signaletic operads*



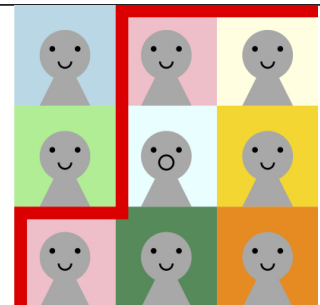
Hyunsoo Cho, **JiSun Huh** and Jaebum Sohn, *The  $(s, s + d, \dots, s + pd)$ -core partitions and rational Motzkin paths*



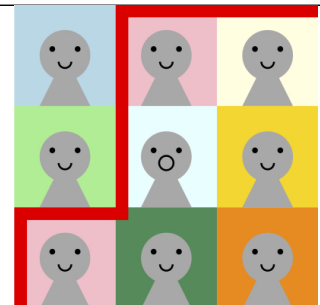
**Byung-Hak Hwang**, Woo-Seok Jung, Kang-Ju Lee, Jaeseong Oh and Sang-Hoon Yu, *Acyclic orientation polynomials and the sink theorem for chromatic symmetric functions*



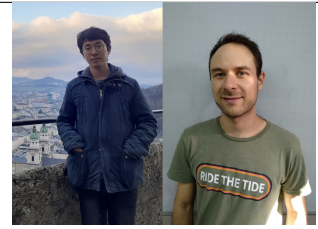
**Young-Hun Kim**, Se-jin Oh and Young-Tak Oh, *Cyclic sieving phenomenon on dominant maximal weights*



**Jean-Philippe Labbé**, *Universal oriented matroids for subword complexes of Coxeter groups*



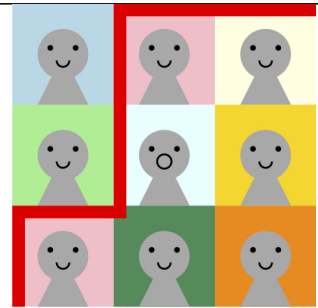
Minki Kim and **Alan Lew**, *Complexes of graphs with bounded independence number*



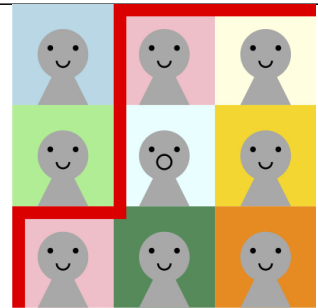
**Jeremy Meza**, *On the combinatorics of LLT polynomials in  $Sp_{2n}$*



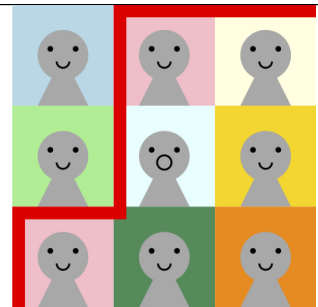
**Hariharan Narayanan**, *On the distribution of random words in a compact Lie group*



**Raul Penaguiao** and Jacopo Borga, *The feasible region for consecutive patterns of permutations is a cycle polytope*



Graham Hawkes and **Travis Scrimshaw**, *Crystal structures for canonical and dual weak symmetric Grothendieck functions*



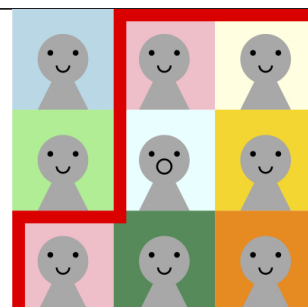
Joscha Diehl, Kurusch Ebrahimi-Fard and **Nikolas Tapia**, *Iterated-sums signature, quasi-symmetric functions and time series analysis*



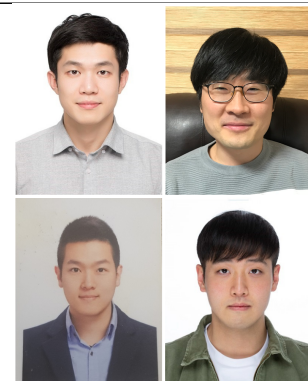
**Jacinta Torres**, Maciej Dołęga and Thomas Gerber, *A positive combinatorial formula for symplectic Kostka-Foulkes polynomials I: rows*



Takahiro Nagaoka and **Akiko Yazawa**, *Strict log-concavity of the Kirchhoff polynomial and its applications*

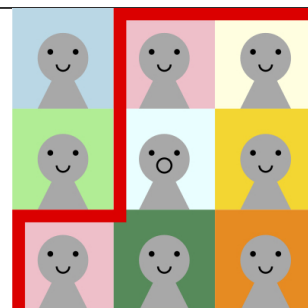


Byung-Hak Hwang, Jang Soo Kim, Jaeseong Oh and **Sang-Hoon Yu**, *On linearization coefficients of  $q$ -Laguerre polynomials*



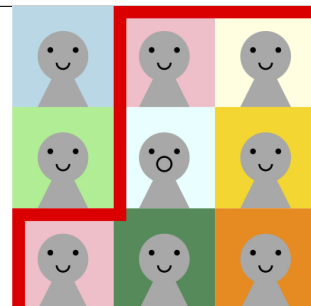
**Wednesday July 15, 14:00 UTC**

**Florian Aigner**, Ilse Fischer, Matjaž Konvalinka, Philippe Nadeau and Vasu Tewari, *Alternating sign matrices and totally symmetric plane partitions*





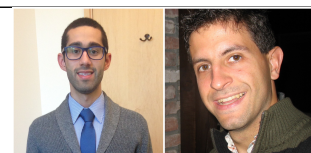
**Jordan Almeter**, *Generalizing nestohedra and graph associahedra for simple polytopes*



**Andrei Asinowski**, Cyril Banderier and Valerie Roitner, *Generating functions for lattice paths with several forbidden patterns*



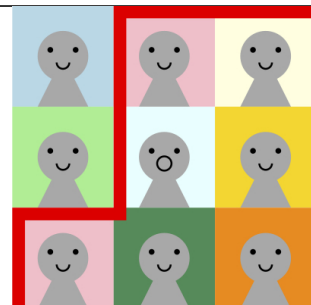
**Juan Auli** and Sergi Elizalde, *Inversion sequences avoiding consecutive patterns*



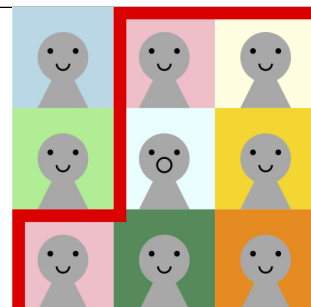
**Cristina Ballantine** and Mircea Merca, *The minimal excludant and colored partitions*



**Yuliy Baryshnikov**, *Euler characteristics of exotic configuration spaces*



**Dan Betea**, *Determinantal point processes from symplectic and orthogonal characters and applications*

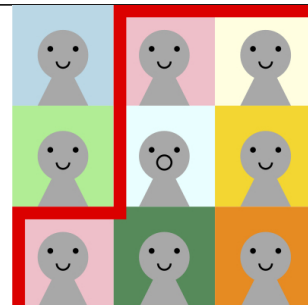




**Camille Combe** and Samuele Giraudo, *Three interacting families of Fuss-Catalan posets*



**Aram Dermenjian**, Christophe Hohlweg, Thomas McConville and Vincent Pilaud, *The facial weak order on hyperplane arrangements*



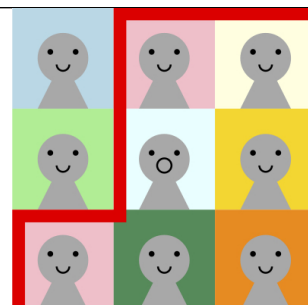
**Sergi Elizalde**, *Measuring symmetry in lattice paths and partitions*



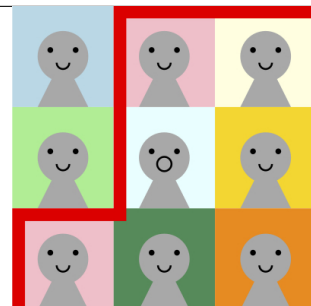
**Subhajit Ghosh**, *Cutoff for the warp-transpose top with random shuffle*



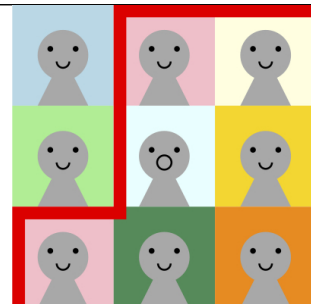
**Liam Hanany** and Doron Pruder, *Word measures on symmetric groups*



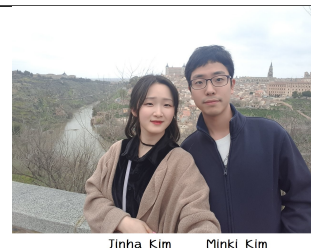
**Théo Karaboghossian**, Adrian Tanasa, Samuele Giraudo and Jean-Christophe Aval, *Graph insertion operads*



**Matjaž Konvalinka** and Vasu Tewari, *Smirnov trees*



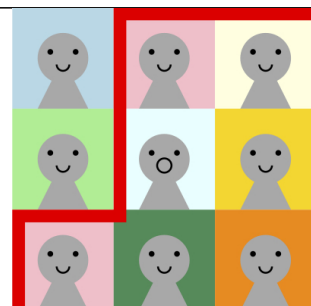
**Jinha Kim** and Minki Kim, *Noncover complexes, independence complexes, and domination numbers of hypergraphs*



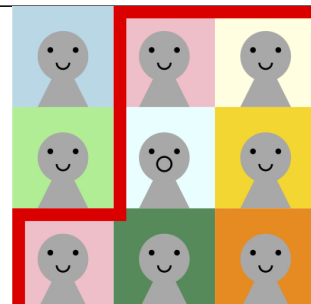
Caroline Klivans and **Patrick Liscio**, *Results in labeled chip-firing*



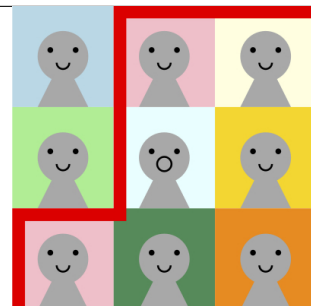
**Isaac Konan**, *Beyond Göllnitz' theorem I: a bijective approach*



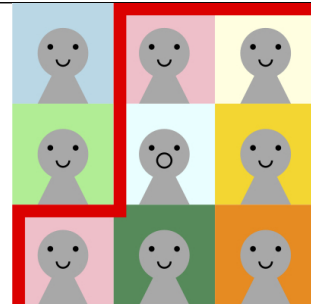
**Lukas Kühne** and **Geva Yashfe**, *Undecidability of c-arrangement matroid representations*



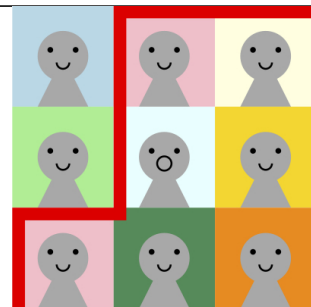
**Kento Nakada**, *Order structure of shapes of predominant integral weights and cylindric Young diagrams*



**Oliver Pechenik** and Travis Scrimshaw, *K-theoretic crystals for set-valued tableaux of rectangular shapes*



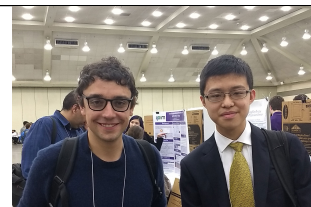
**Inês Rodrigues**, *An action of the cactus group on shifted tableau crystals*



**Viola Siconolfi**, *Coxeter groups, graphs and Ricci curvature*

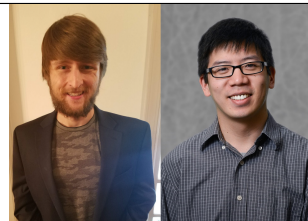


**Alejandro H. Morales** and Daniel G. Zhu, *On the Okounkov-Olshanski formula for standard tableaux of skew shapes*

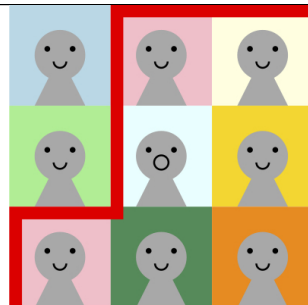


Wednesday July 22, 22:00 UTC

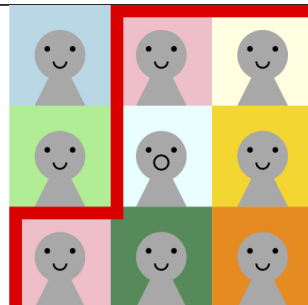
**Grant Barkley** and Ricky Ini Liu, *Billiards, channels, and perfect matching 2-divisibility*



**Valentin Buciumas**, Travis Scrimshaw and Katherine Weber, *Colored five-vertex models and Lascoux polynomials and atoms*



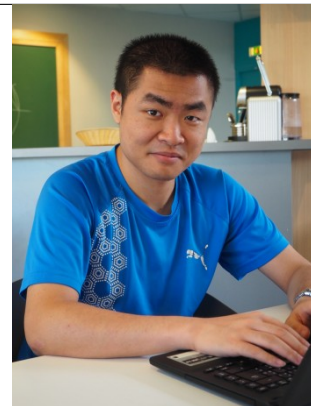
**Jose Alejandro Samper**, Federico Castillo and Jeremy Martin, *Hopf monoids of ordered simplicial complexes*



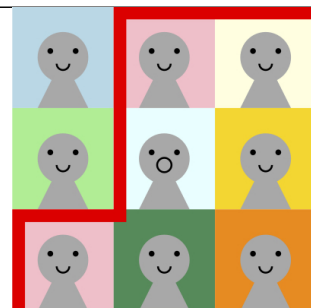
**Colin Defant**, *Uniquely sorted permutations*



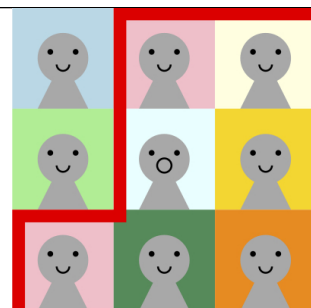
**Wenjie Fang**, *Bijjective link between Chapoton's new intervals and bipartite planar maps*



Renzo Cavalieri, **Maria Gillespie** and Leonid Monin, *Projective embeddings of  $\overline{M}_{0,n}$  and parking functions*



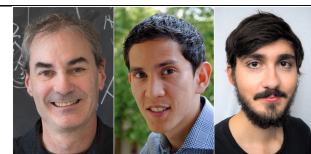
**Jimmy He**, *A characteristic map for the symmetric space of symplectic forms over a finite field*



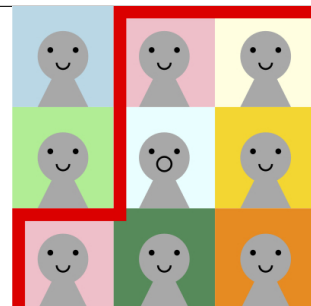
**Hans Höngesberg**, *On a fourfold refined enumeration of alternating sign trapezoids*



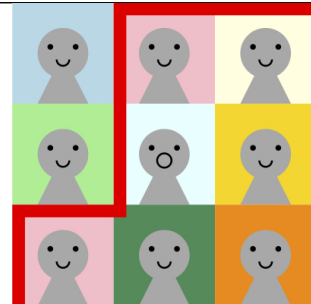
Nantel Bergeron, Cesar Ceballos and **Josef Küstner**, *Elliptic and  $q$ -analogs of the Fibonomial numbers*



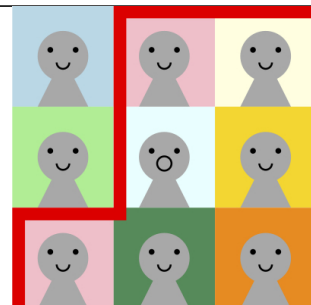
**Stephen Lacina**, *Poset topology of  $s$ -weak order via SB-labelings*



Eugene Gorsky, **Mikhail Mazin** and Monica Vazirani, *Recursions for rational  $q,t$ -Catalan numbers*



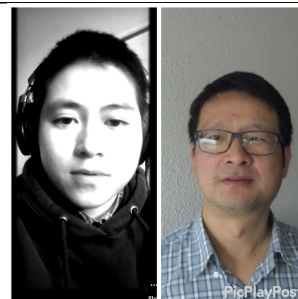
**Hugo Mlodecki**, *Basis of totally primitive elements of  $WQSym$*



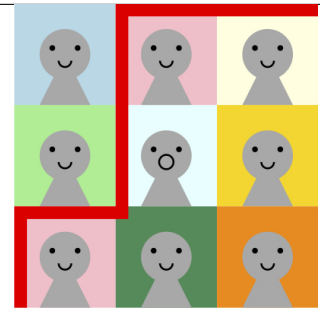
Jennifer Morse, **Jianping Pan**, Wencin Poh and Anne Schilling, *Crystal for stable Grothendieck polynomials*



**Qiongqiong Pan** and Jiang Zeng, *The  $y$ -coefficients of Brändén's  $(p,q)$ -Eulerian polynomials and André permutations*



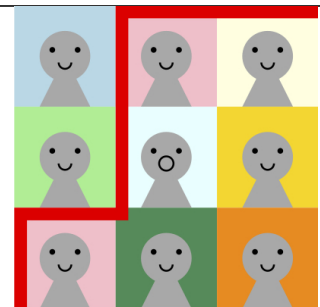
Darij Grinberg and **Fedor Petrov**, *The Bhargava greedoid*



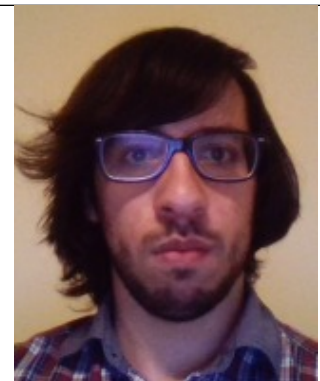
**William Craig** and Anna Ying Pun, *Higher order Turán inequalities for  $k$ -regular partitions*



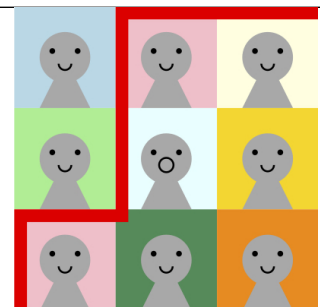
Vonjy Rasendrahasina and **Vlady Ravelomanana**, *Generating functions of some families of directed uniform hypergraphs*



**João Santos**, *Symplectic keys and Demazure atoms in type C*

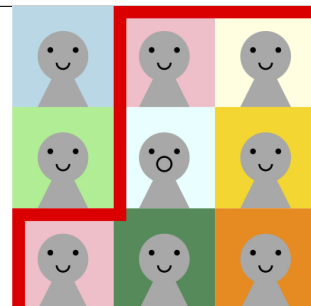


**Dominic Searles**, *Extended Schur functions and 0-Hecke modules*





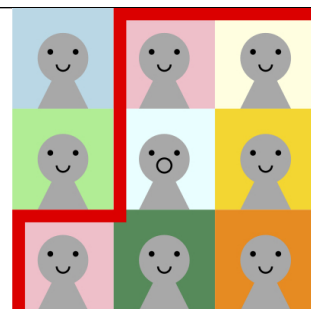
Sunita Chepuri and **Melissa Sherman-Bennett**, *123, 2143-avoiding Kazhdan-Lusztig immanants and  $k$ -positive matrices*



Hugh Thomas and **Nathan Williams**, Independence posets



Ira Gessel and **Yan Zhuang**, *Counting permutations by peaks, descents, and cycle type*





## Social Activities

### Welcome Reception

We are excited to announce that Vivien Ripoll (Solving Fun) has organized a special event for our welcome reception, titled "Fantabulous Puzzle Solving for Amateurs and Connoisseurs, on Sunday July 5." The puzzles have been created specifically for the event, and include references to FPSAC, to algebraic combinatorics, and to math in general.

As FPSAC participants are from all over the world we will have two welcome receptions: 14:00 and 22:00 UTC on Sunday July 5. Please arrive on time! The reception will begin promptly with a short welcome and instructions for the puzzle hunt. Participants will then be split into small teams (in breakout rooms), so that each team can work on the puzzles independently. We estimate the fastest teams will be done within one hour but everyone is welcome to continue to work on puzzles and socialize for longer.

The puzzles will be the same at both welcome receptions. If you come to both receptions, please do not spoil the fun for others by revealing answers to participants who have not seen the puzzles before!

### Conference Banquet

The conference banquet will take place Saturday, July 18th using Zoom. We encourage you to have a picnic (with other local conference attendees, if it is allowed in your region) and zoom in at 6:00, 14:00, or 22:00 UTC. Please take pictures and post them on social media with the hashtag `fpsac2020` and/or post them to the FPSAC 2020 Facebook Group.

### Contests

**DESIGN YOUR OWN T-SHIRT!** Make your own T-shirt based on our FPSAC 2020 logo. There will be a prize awarded on the final Friday for "Best T-shirt design". Submit a picture of you in your T-shirt by Friday, July 17th. See the website for details.

**BEST ZOOM BACKGROUND!** With over 500 registered participants, we hope to see some excellent virtual backgrounds! Submit nominations (of yourself or others, with their permission) by submitting a screenshot by Friday, July 17th. See the website for details.

Do you have other ideas for contests? Email Helen Jenne or Laura Colmenarejo!

An online version of this booklet is available on the conference website <http://2020.fpsac.org>.

