

GEORGE H. SEELINGER—CV

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RESEARCH INTERESTS

Algebraic combinatorics: symmetric functions, Schubert calculus, Macdonald polynomials

APPOINTMENTS

University of Michigan

Postdoctoral Assistant Professor and Research Fellow

test

Ann Arbor, Michigan

August 2021–current

EDUCATION

Doctor of Philosophy, Mathematics

Advisor: Jennifer Morse

Dissertation title: *K-theoretic Catalan functions*

University of Virginia, Charlottesville, Virginia

May 2021

Master of Science, Mathematics

Loyola University Chicago, Chicago, Illinois

August 2015

Bachelor of Science, summa cum laude

Major: Mathematics and Computer Science

Interdisciplinary Honors

Loyola University Chicago, Chicago, Illinois

May 2015

PUBLICATIONS

A raising operator formula for Macdonald polynomials

arxiv:2307.06517

Joint with J. Blasiak, M. Haiman, J. Morse, and A. Pun

· Preprint available on arXiv.org

Dens, nests, and the Loehr-Warrington Conjecture

arxiv:2112.07070

Joint with J. Blasiak, M. Haiman, J. Morse, and A. Pun

· Submitted (2022). Preprint available on arXiv.org

LLT polynomials in the Schiffmann algebra

arxiv:2112.07063

Joint with J. Blasiak, M. Haiman, J. Morse, and A. Pun

· Submitted (2022). Preprint available on arXiv.org

A proof of the Extended Delta Conjecture

arxiv:2102.08815

Joint with J. Blasiak, M. Haiman, J. Morse, and A. Pun

· Forum of Mathematics, Pi, Volume 11 (2023).

A shuffle theorem for paths under any line

arxiv:2102.07931

Joint with J. Blasiak, M. Haiman, J. Morse, and A. Pun

· Forum of Mathematics, Pi, Volume 11 (2023).

K-theoretic Catalan functions

arxiv:2010.01759

Joint with Jonah Blasiak and Jennifer Morse

· Advances in Mathematics, Volume 404, Part B (2022).

- L'Enseignement Mathématique, **64** (2018) 23–63.

RESEARCH TALKS

Purdue Mathematical Physics Seminar

September 13, 2023

Purdue University

- Title: *A raising operator formula for Macdonald polynomials via LLT polynomials in the Schiffmann algebra*

Formal Power Series and Algebraic Combinatorics (FPSAC)

July 17, 2023

University of California, Davis

- Title: *A Catalan animal formula for Macdonald polynomials*

Canadian Mathematical Association Summer Meeting

Special session in equivariant Schubert calculus and beyond

June 5, 2023

University of Ottawa

- Title: *K-theoretic Catalan functions*

University of Michigan Combinatorics Seminar

March 27, 2023

University of Michigan

- Title: *Dens, nests, and Catalan animals: a walk through the zoo of shuffle theorems*

Illinois State University Algebra Seminar

October 27, 2022

Illinois State University

- Title: *Diagonal Harmonics and Shuffle Theorems*

University of Michigan Combinatorics Seminar

February 4, 2022

University of Michigan

- Title: *A raising operator formula for nabla on an LLT polynomial*

OIST Representation Theory Seminar

October 25, 2021

Okinawa Institute of Science and Technology

- Title: *Diagonal harmonics and shuffle theorems*

University of Virginia Algebra Seminar

April 5, 2021

University of Virginia

- Title: *K-theoretic Catalan functions*

LACIM Seminar

March 19, 2021

Université du Québec à Montréal

- Title: *K-theoretic Catalan functions*

Junior Mathematician Research Archive

December 1, 2020

- Title: *K-theoretic Catalan functions*

Philadelphia Area Combinatorics and Algebraic Geometry Seminar

February 6, 2020

University of Pennsylvania

- Title: *K-theoretic Catalan functions*

Garsiafest 90: Future Directions in Algebraic Combinatorics

June 18, 2019

The Scripps Seaside Forum, San Diego, CA. Lightning Talk

- Title: *Raising operators in Schubert calculus*

Mid-Atlantic Algebra, Combinatorics, and Geometry Workshop
Drexel University. Poster

May 4, 2019

- Title: *K-theoretic Catalan functions*

Sage Days 65
Loyola University Chicago

June 11, 2015

- Title: *Orthogonal idempotents in semisimple Brauer algebras*

EXPOSITORY TALKS

University of Michigan Algebraic Combinatorics Reading Seminar 2021–2023
Seminar on topics including diagonal harmonics, link homology, cluster algebras, dimer models, and Schubert calculus

- Divided difference operators to pipe dreams Winter 2023
- Producing a Poisson cluster variety using dimer models Fall 2022
- Braid Varieties and Positroids Winter 2022
- Torus Knot Link Homology Fall 2021
- The shuffle theorem Fall 2021

University of Virginia Representation Theory Reading Seminar 2016 – 2020
Seminar talks on various topics; selected titles listed

- k -Schur functions as Schubert representatives for the affine Grassmannian Spring 2020
- Introduction to the affine Grassmannian Spring 2020
- Chern class computations, flag manifolds, and the Grassmannian Spring 2019
- Schur- Q functions and related combinatorics Fall 2018
- Applications of the Jacobson-Morozov Theorem Fall 2017
- The principal, subregular, and minimal nilpotent orbits Fall 2016

University of Virginia Integrable Probability and Combinatorics Seminar 2019
Seminar talks on various topics

- Multispecies ASEP and nonsymmetric Macdonald polynomials Fall 2019
- A q -analogue of de Finetti's theorem Spring 2019
- Extreme characters of $U(\infty)$ Spring 2019

Undergraduate Math Club
University of Virginia

- A Window into Symmetric Function Theory March 2, 2021
- Generating functions: a mathematical link October 2, 2018

TEACHING EXPERIENCE

Instructor of Record University of Michigan

- Independent study: Representation theory of symmetric groups and symmetric functions *Winter 2023*
- Math 566: Combinatorial Theory (Algebraic Combinatorics) *Winter 2023*
- Math 215: Multivariable and Vector Calculus *Fall 2022*
- Math 417: Matrix Algebra *Winter 2022*
- Math 115: Calculus I (flipped classroom) *Fall 2021*

Instructor of Record

University of Virginia

- MATH 1310: Calculus I (flipped classroom) *Fall 2019*
- MATH 1220: Survey of Calculus II *Spring 2018*
- MATH 1210: Survey of Calculus I *Fall 2017*

HONORS, AWARDS, AND FELLOWSHIPS

- NSF Postdoctoral Fellowship, 2023–2026
- AMS-Simons Travel Grant, \$5000, 2022–2023
- Dorothy M. Batten Jefferson Fellowship, 2016–2021, by the Jefferson Scholars Foundation, UVa
- Phi Beta Kappa Honor Society, inducted May 7, 2015
- Alpha Sigma Nu Honor Society, inducted October 14, 2014

SERVICE AND OUTREACH

Department

- **Co-organizer, Learning Seminar in Algebraic Combinatorics** *Fall 2021–present*
- **Lab of Geometry Project Mentor & Admissions Committee Member** *Fall 2023*
- **Panelist, Grants Writing Panel** *Fall 2023*
- **Member and Webmaster, Association for Women in Mathematics** *Fall 2018–Spring 2021*
Help maintain the UVa AWM chapter's website and developed a blog for other members to post content.
- **Mentor, Directed Reading Program at University of Virginia** *Fall 2018*
Guided my undergraduate DRP mentee, Dylan Hunt, through a machine learning textbook and helped him prepare for a presentation at UVa's Math Club.
- **UVa Math Ambassador** *Fall 2017– Spring 2019*
UVa's Mathematics outreach program to Albemarle County and Charlottesville city schools.
- **Panelist, Prospective Graduate Student Open House** *Spring 2018*

Professional

- **Reviewer for Algebraic Combinatorics** *Spring 2022*
- **TA for ICERM Workshop session on Affine Schubert Calculus** *February 3, 2021*
- **Organizing committee, Mid-Atlantic Algebra, Geometry, and Combinatorics Workshop** *Spring, 2020*
Cancelled due to Covid-19
- **Contributor, SageMath (Open-Source Computer Algebra Software)** *2013, 2015, 2018*

University

- **Jefferson Scholar Selection Weekend Seminar Planner and Leader, Jefferson Scholars Foundation, UVa** *Spring 2020*
Cancelled due to Covid-19
- **Jefferson Scholar Selection Weekend Seminar Planner, Jefferson Scholars Foundation, UVa** *Spring 2019*
- **Panelist, Institute for Leadership and Citizenship Graduate School Panel Jefferson Scholars Foundation, UVa** *Summer 2018*
- **Member, Sujack Teaching Award Committee, Loyola University Chicago** *Spring 2015*

MATHEMATICAL SOFTWARE CONTRIBUTIONS

Contributions to SageMath

<http://sagemath.org>

- Implementation of Young's Raising Operators (ticket #26939) Fall 2018
- Implement Jucys-Murphys elements for Brauer algebra (ticket #18798) Summer 2015
- Major improvement to usability of diagram algebras (tickets #18707,18720,18762) Summer 2015
- Initial implementation of diagram algebras (ticket #14234) Spring 2013

k-Combinat for Sage

https://github.com/MareoRaft/k_combinat_for_sage/

- Maintain and improve code relating to Catalan functions

CONFERENCES AND WORKSHOPS ATTENDED

- International Conference on Formal Power Series and Algebraic Combinatorics July 17–21, 2023
University of California, Davis
- AlCoVE: an Algebraic Combinatorics Virtual Expedition June 26–27, 2023
- Canadian Mathematical Society Summer Meeting:
Special session on equivariant Schubert calculus and beyond June 5–6, 2023
University of Ottawa
- Interactions between Hessenberg Varieties, Chromatic Functions, and LLT Polynomials
Banff International Research Station October 16–21, 2022
- Open Problems in Algebraic Combinatorics May 16–20, 2022
University of Minnesota
- ICERM Geometry and Combinatorics from Root Systems March 22–26, 2021
- ICERM Introductory Workshop: Combinatorial Algebraic Geometry February 1–5, 2021
- Hilbert schemes, categorification, and combinatorics, UC Davis June 19–23, 2019
- Garsiafest, Scripps Seaside Forum, San Diego, CA June 17–20, 2019
- Algebra, Geometry and Combinatorics Day, Loyola University Chicago May 25, 2019
- Mid-Atlantic Algebra, Geometry, and Combinatorics (MAAGC) Workshop, May 3–4, 2019
Drexel University
- Triangle Lectures in Combinatorics, Wake Forest University March 30, 2019
- Combinatorics and beyond: the many facets of Sergey Fomin's mathematics, November 8–11, 2018
University of Michigan
- Workshop on Representation Theory, Combinatorics, and Geometry, October 19–21, 2018
University of Virginia
- Women's Intellectual Network Research Symposium, University of Virginia September 15, 2018
- Joint Mathematics Meetings, San Diego, CA January 10–13, 2018
- AMS Fall Central Sectional Meeting, Loyola University Chicago October 2–4, 2015
- Sage Days 65, Loyola University Chicago June 8–12, 2015
- AMS Spring Western Sectional Meeting, University of Colorado Boulder April 13–14, 2013
- Sage-Combinat Days 40, July 9–13, 2012
Institute for Mathematics and its Applications at University of Minnesota
- Sage Days 38, Centre de Recherches Mathématique, Montreal May 7–11, 2012

TECHNICAL STRENGTHS

Computer Languages

Proficiency with: Python, Sage, Java and Scala.
Experience with: Mathematica, R and C/C++.

Languages

Fluent: English
Elementary Proficiency: French, Italian