GEORGE H. SEELINGER—CV

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RESEARCH INTERESTS

Algebraic combinatorics: symmetric functions, Schubert calculus, Macdonald polynomials

APPOINTMENTS

University of Michigan Ann Arbor, Michigan
Postdoctoral Assistant Professor and Research Fellow *August 2021–current*

EDUCATION

Doctor of Philosophy, Mathematics University of Virginia, Charlottesville, Virginia
Advisor: Jennifer Morse *May 2021*
Dissertation title: *K-theoretic Catalan functions*

Master of Science, Mathematics Loyola University Chicago, Chicago, Illinois
August 2015

Bachelor of Science, summa cum laude Loyola University Chicago, Chicago, Illinois
Major: Mathematics and Computer Science *May 2015*
Interdisciplinary Honors

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).

Canonical idempotents of multiplicity-free families of algebras   arxiv:1606.08900
Joint with Stephen Doty and Aaron Lauve

· L'Enseignment Mathematique, **64** (2018) 23–63.

RESEARCH TALKS

Pisa Seminar on Combinatorics, Lie Theory, and Topology   October 12, 2023
Università di Pisa

· Title: *A raising operator formula for Macdonald polynomials*

Loyola Topology Algebra Combinatorics and Operators Seminar   October 4, 2023
Loyola University Chicago

· Title: *A raising operator formula for Macdonald polynomials via LLT polynomials in the elliptic Hall algebra*

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 Catalanimal 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 Catalanimals: 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   May 4, 2019
Drexel University. Poster

· Title: *K-theoretic Catalan functions*

Sage Days 65   June 11, 2015
Loyola University Chicago

· 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

· **Referee for various journals**   Spring 2022–current
   Algebraic Combinatorics, International Math Research Notices, and Transactions of the AMS
· **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