

Darij Grinberg

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Web:

<http://www.cip.ifi.lmu.de/~grinberg/> (research)

<http://www-users.math.umn.edu/~dgrinber/> (teaching)

Field of research

algebraic combinatorics / Hopf algebras / Young tableaux / combinatorial representation theory / noncommutative algebra / invariant theory

Education and affiliations

2016– Dunham Jackson Assistant Professor at [University of Minnesota](#), working with Victor Reiner.

2016, June 3 Ph.D. in Mathematics at [Massachusetts Institute of Technology](#), advised by Alexander Postnikov. ([Thesis](#)¹.)

2011–2016 Graduate student at [Massachusetts Institute of Technology](#).

2011, July 1 Diploma (rough equivalent to M.S.) in Mathematics at the [Ludwig-Maximilians-Universität München](#) (Munich), with a minor in Computer Science. ([Thesis](#); comprehensive grade “very good”).

2006–2011 Undergraduate at the [Ludwig-Maximilians-Universität München](#) (Munich).

Publications and preprints (peer-reviewed marked with #)

2018 *Shuffle-compatible permutation statistics II: the exterior peak set*, arXiv:1806.04114, submitted.

2018 *The n body matrix and its determinant*, joint with Peter J. Olver, arXiv:1802.02900, submitted.

2017 *Noncommutative Abel-like identities*, in progress.

¹Thesis committee: Alexander Postnikov, Pavel Etingof, Ira Gessel.

All material in this thesis also appears in the preprints and papers listed below.

- 2017** *On binomial coefficients modulo squares of primes*, arXiv:1712.02095, submitted.
- 2017** *Critical groups for Hopf algebra modules*, joint with Jia Huang, Victor Reiner, arXiv:1704.03778, submitted.
- # **2017** *t-unique reductions for Mészáros's subdivision algebra*, arXiv:1704.00839, SIGMA **14** (2018), 078, 34 pages.
- 2016** *From Chio Pivotal Condensation to the Matrix-Tree theorem*, joint with Karthik Karnik, Anya Zhang, arXiv:1606.08193 (report of student research).
- 2016** *A note on non-broken-circuit sets and the chromatic polynomial*, arXiv:1604.03063.
- 2016** *The Bernstein homomorphism via Aguiar-Bergeron-Sottile universality*, arXiv:1604.02969.
- # **2016** *Proof of a conjecture of Bergeron, Ceballos and Labbé*, joint with Alexander Postnikov, arXiv:1603.03138, New York Journal of Mathematics **23** (2017), pp. 1581–1610.
- # **2015** *Double posets and the antipode of $QSym$* , arXiv:1509.08355, published in the Electronic Journal of Combinatorics (2016).
- # **2015** *Refined dual stable Grothendieck polynomials and generalized Bender-Knuth involutions*, joint with Pavel Galashin and Gaku Liu, arXiv:1509.03803, published in the Electronic Journal of Combinatorics (2016).
- 2015** *The signed random-to-top operator on tensor space (draft)*, arXiv:1505.01201.
- # **2014** *Dual immaculate creation operators and a dendriform algebra structure on the quasisymmetric functions*, arXiv:1410.0079, Canadian Journal of Mathematics **69** (2017), pp. 21–53.
- 2014** *Hopf Algebras in Combinatorics*, joint with Victor Reiner, arXiv:1409.8356 (extended lecture notes).
- # **2014** *Iterative properties of birational rowmotion*, joint with Tom Roby, arXiv:1402.6178. This has been split in two parts and submitted to the Electronic Journal of Combinatorics; the first part has been published in 2016, whereas the second has been published in 2015.
- # **2013** *Boolean Witt vectors and an integral Edrei-Thoma theorem*, joint with James Borger, arXiv:1311.5031, Selecta Mathematica, 22(2), pp. 595–629 (doi:10.1007/s00029-015-0198-6).

2011 *Poincaré-Birkhoff-Witt type results for inclusions of Lie algebras*, diploma thesis (link to updated version) under supervision of Andreas Rosen-schon and guidance by Damien Calaque and Giovanni Felder. The thesis has not been submitted to a journal but has already been cited twice.

2011 *Zeckendorf family identities generalized*, arXiv:1103.4507.

2007–2012 Various [problems and solutions](#) submitted to mathematical magazines.

2002–2004 Four publications in *Forum Geometricorum* on elementary geometry: *The Apollonius Circle as a Tucker Circle* (2002), joint with Paul Yiu; *On the Kosnita point and the reflection triangle* (2003); *Orthopoles and the Pappus Theorem* (2004), joint with Atul Dixit; *A Generalization of the Kiepert Hyperbola* (2004), joint with Alexei Myakishev; and problem 11025 proposed in the American Mathematical Monthly (joint with Floor van Lamoen).

Conference proceedings (peer-reviewed marked with #)

2018 Erik Aas, Darij Grinberg, Travis Scrimshaw, *Multiline queues with spectral parameters (extended abstract)*, Séminaire Lotharingien de Combinatoire, 80B.46 (2018), 12 pp. (FPSAC 2018).

2017 Darij Grinberg, *Double Posets and the Antipode of QSym (extended abstract)*, Séminaire Lotharingien de Combinatoire, 78B.33 (2017), 12 pp. (FPSAC 2017).

2014 Darij Grinberg, Tom Roby, *The order of birational rowmotion (extended abstract)*, DMTCS Proceedings vol. AT, 26th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2014), pp. 753–764.

Teaching

2018 lecturer at UMN in [Math 4707 \(Combinatorics\)](#).

2017 lecturer at UMN in [Math 4990 and Math 4707 \(two combinatorics classes\)](#).

2017 lecturer at UMN in [Math 5707 \(Graph Theory\)](#).

2016 lecturer at UMN in [Math 4242 \(Applied Linear Algebra\)](#).

- 2012–2015** mentor in [the MIT’s PRIMES program](#), supervising [two projects](#) (2012, 2013) by William Kuszmaul and [one](#) (2014) by Eric Neyman, as well as a reading course by two new students (2015). In 2015, I was sponsored by a [George Lusztig PRIMES mentorship](#).
- 2015** teaching assistant at MIT in 18.781 (Theory of Numbers) by Ju-Lee Kim.
- 2014** teaching assistant and recitation leader at MIT in 18.06 (Linear Algebra) by Alexander Postnikov.
- 2013** teaching assistant at MIT in 18.310A (Principles of Discrete Applied Mathematics) by Neil Olver, and in 18.S996 (Category Theory for Scientists) by David Spivak.
- 2009** teaching assistant and recitation leader at LMU Munich in a Euclidean geometry class by Rudolf Fritsch.
- 2007** teaching assistant and recitation leader at LMU Munich in an Abstract Algebra I class by Hans-Jürgen Schneider.

Selected talks

- 2018** at [Dartmouth College Hanover](#).
- 2018** at [Leibniz Universität Hannover](#).
- 2018** at [University of Minnesota Student Combinatorics Seminar, Minneapolis](#) (expository talk).
- 2018** at [University of Washington, Seattle](#) and at [University of Illinois Urbana-Champaign](#) (slightly streamlined version of above talk); also, expository pre-talk for the latter talk.
- 2017** at [University of Wisconsin, Madison](#).
- 2017** at [Combinatorial Algebra meets Algebraic Combinatorics, UQAM, Montréal](#), and at [Cornell](#) (slightly extended version of Montréal talk).
- 2016** at [AMS Sectional Meeting, University of St. Thomas, Minneapolis](#).
- 2016** at the [Combinatorics Seminar at Brandeis](#) and at [Massachusetts Institute of Technology](#) (thesis defense).
- 2015** at [University of Minnesota Combinatorics Seminar, Minneapolis](#) and at [AMS Sectional Meeting, Chicago](#).
- 2014** at [The Applied Algebra Seminar, York University, Toronto](#).

2014 at [Arbeitsgemeinschaft Diskrete Mathematik](#), Vienna.

2013 at [University of Connecticut](#) (expository talk).

Various contributions

2018 Organizing committee: [SageDays@ICERM](#), July 2018.

2012– [Programming and code review](#) for the [SageMath](#) project.

2010– Member of [MathOverflow](#) and [math.stackexchange](#), contributing over 400 answers.

2005– Mathematical exposition at various levels (mostly undergraduate) on [website](#).

Awards and Honors

2015 [George Lusztig PRIMES mentorship](#) for “exceptional mentor service in past years”.

2008 first place in the 15th [Vojtěch Jarník Annual International Mathematical Competition](#) (a contest for university students).

2006–2011 scholarship from the [Studienstiftung des Deutschen Volkes](#).

2006 gold medal in the [International Mathematical Olympiad](#).

2004–2005 silver medals in the International Mathematical Olympiad.

2003–2006 Bundessieger (national-level award) in the [Bundeswettbewerb Mathematik Deutschland](#) (German national mathematical olympiad).