

Curriculum Vitae

DUSTIN CARTWRIGHT

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Employment and education

2020– Associate Professor, University of Tennessee, Knoxville
2014–2020 Assistant Professor, University of Tennessee, Knoxville
2013–2014 Gibbs Assistant Professor, Yale University
2011–2013 NSF Postdoctoral Fellow at Yale University (mentor: Sam Payne)
2011 Postdoctoral Fellow, Mittag Leffler Institute, program on “Algebraic Geometry with a View Towards Applications”
2006–2010 Ph.D., University of California, Berkeley, Mathematics (adviser: Bernd Sturmfels).
2000–2004 A.B., Harvard University, Cambridge, MA, Mathematics (*magna cum laude*)

Visiting positions

2018 Oct–Nov Institute for Computational and Experimental Research in Mathematics, Brown, RI, program on “Nonlinear Algebra”
2018 Mar Mittag-Leffler Institute, Djursholm, Sweden, program on “Tropical Geometry, Amoebas, and Polytopes”
2015 Spring University of Georgia, Athens, GA.
2012 Spring Max-Planck Institute for Mathematics, Bonn, Germany.
2011 Fall Institute for Pure and Applied Mathematics, program on “Mathematical and Computational Approaches in High-Throughput Genomics.”

Honors and awards

2016–2018 NSA Young Investigator Grant
2011–2013 NSF Postdoctoral Fellowship
2011 Mittag-Leffler Postdoctoral Fellowship
2011 Ribet-Goldberg award for best thesis in algebra at UC Berkeley.

Research interests

Tropical geometry, algebraic matroids, combinatorial problems in algebraic geometry, applications to biology

Publications and preprints

- submitted 1. Combinatorial tropical surfaces. [arXiv:1506.02023](https://arxiv.org/abs/1506.02023).
- accepted 2. (with Guus P. Bollen and Jan Draisma) Matroids over one-dimensional groups. *Int. Math. Res. Not.*, rnaa175. [arXiv:1812.08692](https://arxiv.org/abs/1812.08692).
- 2021 3. A specialization inequality for tropical complexes. *Compos. Math.*, **157**:5 1051–1078.
- 2020 4. Tropical complexes. *Manuscripta Math.*, **261**, 227–261.
- 2018 5. Construction of the Lindström valuation of an algebraic extension. *J. Combin. Theory Ser. A*, **157**, 389–401.
- 2016 6. Excluded homeomorphism types for dual complexes of surfaces. *Nonarchimedean and Tropical Geometry*, Simons Symposia, Springer.
7. (with Andrew Dudzik, Madhusudan Manjunath, and Yuan Yao) Embeddings and immersions of tropical curves. *Collect. Math.*, **67**:1, 1–19.
- 2015 8. Lifting matroid divisors on tropical curves. *Res. Math. Sci.* **2**:23.
9. (with David Jensen and Sam Payne) Lifting divisors on a generic chain of loops. *Canad. Math. Bull.*, **58**, 250–262.
- 2014 10. (with Guy Bresler and David Tse) Feasibility of interference alignment for the MIMO interference channel. *IEEE Trans. Inf. Theory*, **60**:9, 5573–5586.
- 2013 11. (with Bernd Sturmfels) The number of eigenvalues of a tensor. *Linear Algebra Appl.*, **438**:2, 942–952.
- 2012 12. (with Sam Payne) Connectivity of tropicalizations. *Math. Res. Lett.*, **19**:5, 1089–1095.
13. (with Daniel Erman and Luke Oeding) Secant varieties of $\mathbb{P}^2 \times \mathbb{P}^n$ embedded by $\mathcal{O}(1, 2)$. *J. Lond. Math. Soc.*, **85**:1, 121–141.
14. (with Melody Chan) Three notions of tropical rank for symmetric matrices. *Combinatorica*, **32**:1, 55–84.
- 2011 15. An iterative method converging to a positive solution of certain systems of polynomial equations. *J. Algebr. Stat.*, **2**:1, 1–13.
16. (with Mathias Häbich, Bernd Sturmfels, and Annette Werner) Mustafin varieties. *Selecta Math.*, **17**:4, 757–793.
17. (with M. Angélica Cueto and Enrique A. Tobis) A characterization of maximum independent sets of de Bruijn graphs. *Electron. J. Combin.*, **18**:1, P194.
- 2010 18. (with Bernd Sturmfels) The Hilbert scheme of the diagonal in a product of projective spaces. *Int. Math. Res. Not.*, **2010**:9, 1741–1771.
- 2009 19. (with Siobhan M. Brady, David A. Orlando, Bernd Sturmfels, and Philip N. Benfey) Reconstructing spatio-temporal gene expression data from partial observations. *Bioinformatics*, **25**:19, 2581–2587.
20. (with Daniel Erman, Mauricio Velasco, and Bianca Viray) Hilbert schemes of 8 points. *Algebra Number Theory*, **3**:7, 763–795, 2009.
- 2007 21. (with Riccardo Velasco, Andrey Zharkikh, Michela Troggio, Alessandro Cestaro, *et al.*) A high quality draft consensus sequence of the genome of a heterozygous grapevine variety. *PLoS ONE* **2**:12, e1326.

22. (with Michela Troggio, Giulia Malacarne, Giuseppina Coppola, Cinzia Segala, *et al.*) A dense single-nucleotide polymorphism-based genetic linkage map of grapevine (*Vitis vinifera L.*) anchoring Pinot noir bacterial artificial chromosome contigs. *Genetics* **176**:4, 2637–2650.
23. (with Michela Troggio, Riccardo Velasco, and Alexander Gutin) Genetic mapping in the presence of genotyping errors. *Genetics* **176**:4, 2521–2527.

Invited lecture series

2013 May Notre Dame: Undergraduate summer school: Tropical geometry (4 lectures to undergraduates)

Invited talks

- 2018 Dec Intercity Number Theory Seminar, Eindhoven University of Technology, The Netherlands: One-dimensional groups and algebraic matroids
- Mar Mittag-Leffler Institute, Djursholm, Sweden: Construction of Lindström valuations of algebraic extensions
- Jan University of Waterloo, Geometry and Topology Seminar: Topology of dual complexes
- 2017 Nov University of South Carolina, Algebraic geometry seminar: Dual complexes of uniruled varieties.
- Aug SIAM Conference on Algebraic Geometry, special session on Computational Tropical Geometry, Atlanta, GA: Construction of Lindström valuations of algebraic extensions.
- 2016 Apr AMS Sectional Meeting, special session on Interactions with Algebraic Geometry, Fargo, ND: Dual complexes of uniruled varieties.
- Apr AGNES, Yale University: Dual complexes of uniruled varieties.
- Mar AMS Sectional Meeting, special session on Commutative Algebra: The Gröbner stratification of a tropical variety, Athens, GA.
- Mar AMS Sectional Meeting, special session on Interactions Between Algebraic and Tropical Geometry, Athens, GA: On dual complexes of degenerations.
- Mar AMS Sectional Meeting, special session on Discrete and Applied Algebraic Geometry, Athens, GA: A quantitative version of Mnëv’s theorem.
- Feb Georgia Tech, Algebra seminar: Dual complexes of unirational varieties.
- 2015 Dec Brown University, Algebraic geometry seminar: Tree compactifications of the moduli space of genus 0 curves.
- Nov Clemson University, Algebra and discrete math seminar: A quantitative version of Mnëv’s theorem.
- Oct Ohio State, Algebraic Geometry seminar: Excluded homeomorphism types for dual complexes of surfaces.
- Aug SIAM Conference on Algebraic Geometry: On dual complexes of degenerations.
- Jul AMS Summer Institute in Algebraic Geometry, Salt Lake City, UT: Combinatorial tropical surfaces.
- Apr Colorado State, Geometry and number theory seminar: Excluded homeomorphism types for dual complexes of surfaces.
- Apr Georgia Tech, Meeting on Algebraic Geometry for Applications: A quantitative version of Mnëv’s theorem.
- Mar University of Georgia, Algebraic geometry seminar: Tree compactifications of the moduli space of genus 0 curves.

- Feb Simons Symposium on Nonarchimedean and Tropical Geometry: On homotopy types of analytifications.
- 2014 Dec Canadian Mathematical Society Winter Meeting, Hamilton, Ontario: Tree compactifications.
- Nov University of Kentucky, Algebra seminar: Crossing numbers for tropical curves.
- Oct AMS Sectional Meeting, San Francisco, CA: A quantitative version of Mnev's theorem.
- Apr Banff International Research Station: Lifting divisors and matroid realizability.
- Jan University of Tennessee: Colloquium: Tropical complexes.
- 2013 Dec University of Wisconsin: Applied algebra seminar: Interference alignment for the MIMO channel.
- Dec University of Wisconsin: Colloquium: Tropical complexes.
- Oct University of Georgia: Algebraic geometry seminar: Lifting rank 2 divisors from graphs to curves.
- Sep Queen's University: Algebraic geometry seminar: Lifting rank 2 divisors from graphs to curves.
- Mar Georgia Tech: Algebra Seminar: Tropical Complexes.
- Mar Brown University: Algebra Seminar: Lifting divisors from graphs to curves.
- Jan San Diego, CA: Joint Meetings: AMS Session on Tropical Geometry: Tropical Complexes.
- 2012 Oct Emory University, Atlanta: Algebra Seminar: Tropical Complexes.
- Oct Emory University, Atlanta: Colloquium: Combinatorics of Splice Graphs.
- Oct Akron, OH: AMS Session on Toric Algebraic Geometry and Beyond: Tropical Complexes.
- Sep University of Massachusetts, Amherst: Tropical Complexes.
- Jun Halifax, Nova Scotia: SIAM Conference on Discrete Mathematics: Combinatorics of Splice Graphs.
- Jun Halifax, Nova Scotia: SIAM Conference on Discrete Mathematics: Divisors on Tropical Models.
- May Nankai University, Tianjin, China: Conference on spectral theory of tensors: The number of eigenvalues of a tensor.
- May University of Frankfurt, Germany: Colloquium: Divisors in tropical geometry.
- Apr Edinburgh, UK: ICMS Tropical Geometry: Divisors on tropical varieties.
- Mar Warwick, UK: Algebraic geometry seminar: Divisors on tropical varieties.
- Jan Boston, MA: MAA Session on Algebraic Statistics: Hypothesis testing on tensors.
- 2011 Oct Raleigh, NC: SIAM Conference on Algebraic Geometry. Secant varieties of Segre-Veronese varieties.
- Sep University of Saarland, Germany: Conference on tropical geometry and computational biology. Different stratifications of tropical varieties.
- May Linköping University, Sweden: Colloquium, Interference alignment.
- Apr KTH, Sweden: Combinatorics seminar, The notions of tropical rank for symmetric matrices.
- Apr Chalmers University, Göteborg, Sweden: Statistics seminar, How are SNPs distributed in genes?
- Feb Solving Polynomial Equations, KTH, Stockholm: Non-interference in communications channels.
- Feb KTH, Stockholm: How are SNPs distributed in genes?
- 2010 Nov Yale University: Secant varieties of Segre-Veronese varieties.
- May Stanford University: Mustafin varieties.
- Apr University of Utah: Reconstructing spatiotemporal gene expression data from partial observations.
- Apr University of Utah: Mustafin varieties.
- Mar Cornell University: Three notions of tropical rank for symmetric matrices.

- 2009 Nov MSRI, Berkeley, CA: Program on Tropical Geometry: Three notions of tropical rank for symmetric matrices.
 Oct University Park, PA: AMS Eastern Sectional Meeting: Hilbert scheme of the diagonal in a product of projective spaces.
- 2008 May University of Genoa, Italy: Hilbert schemes of points.
- 2007 May North Carolina State University: Hilbert schemes of points.

Conferences attended

- 2018 Dec Intercity Number Theory Seminar, Eindhoven University, The Netherlands
 Nov Nonlinear Algebra in Applications, Institute for Computational and Experimental Mathematics, Providence, RI
 Feb Georgia Algebraic Geometry Symposium, Atlanta, GA
- 2017 Aug SIAM Conference on Algebraic Geometry, Atlanta, GA
 May Simons Symposium on Tropical and Non-archimedean Geometry, Schloss Elmau, Germany
- 2016 Dec Combinatorial Moduli Spaces, Fields Institute, Toronto, Canada
 May Algebraic vision, American Institute of Mathematics, San José, California
 Apr AMS Sectional Meeting, Fargo, ND
 Apr AGNES, Yale University, New Haven, CT
 Mar Workshop on Toric Varieties, Oberwolfach, Germany
 Mar AMS Sectional Meeting, Athens, GA
 Jan Workshop on Hodge Theory in Combinatorics, Georgia Tech, Atlanta, GA
 Jan AMS-MAA Joint Meetings, Seattle, WA
- 2015 Nov Sandpile groups, BIRS, Casa Matemática Oaxaca, Mexico
 Aug SIAM Conference on Algebraic Geometry Daejeon, South Korea
 Jul AMS Summer Institute in Algebraic Geometry Salt Lake City, UT
 Apr Workshop on applied and computational algebraic geometry, Georgia Tech, Atlanta, GA
 Feb Simons Symposium on Nonarchimedean and Tropical Geometry, Rio Grande, Puerto Rico
- 2014 Dec Canadian Mathematical Society Winter Meeting, Hamilton, Ontario
 Oct AMS Sectional Meeting, San Francisco, CA
 Oct Georgia Algebraic Geometry Symposium, University of Georgia, Athens, GA
 Oct Triangle Lectures in Combinatorics, High Point University, High Point, NC
 May Workshop on Algebraic Foundations for Tropical Geometry, Yale University, New Haven, CT
 Apr AGNES: Algebraic Geometry Northeastern Series: SUNY Stony Brook, NY
 Apr Specialization of Linear Series for Algebraic and Tropical Curves, Banff, Canada
 Jan Joint Meetings of the AMS and MAA, Baltimore, MD
- 2013 Oct Georgia Algebraic Geometry Symposium, University of Georgia, Athens, GA
 Aug SIAM Conference on Algebraic Geometry, Colorado State University, Fort Collins, CO
 Jul Generalizations of chip-firing and the critical group: AIM, Palo Alto, CA
 Jun Tropical and nonarchimedean analytic geometry (as a teaching assistant): Mathematics Research Community, Snowbird, UT

- Jun Motivic invariants and singularity theory: University of Notre Dame, South Bend, IN
- May Motivic invariants and singularity theory: Graduate and postdoc summer school: University of Notre Dame, South Bend, IN
- Apr AGNES: Algebraic Geometry Northeastern Series: Yale University, New Haven, CT
- Jan Joint meetings of the AMS and MAA, San Diego, CA
- 2012 Oct AGNES: Algebraic Geometry Northeastern Series: Brown University, Providence, RI
- Oct AMS Sectional meeting, Akron, OH
- Jun SIAM Conference on Discrete Mathematics, Halifax, Canada
- Jun Char- p and p -adic geometry, University of Mainz, Germany
- May Conference on spectral theory of tensors, Nankai University, Tianjin, China
- Apr Tropical Geometry, International Centre for Mathematical Sciences, Edinburgh, UK
- Feb International workshop on tropical and quantum geometries, Research Institute for Mathematical Sciences, Kyoto University, Japan
- Jan Joint meetings of the AMS and MAA, Boston, MA
- 2011 Oct SIAM Conference on Algebraic Geometry, North Carolina State, Raleigh, NC
- Sep Conference on tropical geometry and biology, University of Saarland, Saarbrücken, Germany
- Aug A celebration of algebraic geometry, Harvard University, Cambridge, MA
- Jun Toric geometry and applications, K.U. Leuven, Belgium
- Jun MEGA: Effective Methods in Algebraic Geometry, Stockholm University, Sweden
- Feb Solving polynomial equations, KTH, Stockholm, Sweden
- 2010 Jul Components of Hilbert schemes, AIM, Palo Alto, CA
- May WAGS: Western Algebraic Geometry Symposium, University of British Columbia, Vancouver, Canada
- 2009 Nov Mathematical developments arising from biology, MBI, Columbus, OH
- Jun Toric varieties (as a teaching assistant), MSRI, Berkeley, CA
- 2008 Sep Algebraic methods in systems biology and statistics, opening workshop, SAMSI, Research Triangle Park, NC
- Jul Geometry and representation theory of tensors, MSRI, Berkeley, CA
- May Mathematical explorations in contemporary statistics, Sestri Levante, Italy
- May Workshop on algebraic statistics, Oberwolfach Seminar, Germany
- 2007 Jul Applicable algebraic geometry, Texas A&M, College Station, TX
- May Algebraic geometry and algebraic combinatorics (school and workshop), Centre de Recherches Mathématiques, Montréal, Canada

Advising and mentoring

- Anna Lawson, PhD student
- Dony Varghese, PhD student
- Gabriel Dusing, PhD, 2020, “A Method for Determining the Realizability of Tropical Curves in \mathbb{R}^3 ”
- Mentored an undergraduate student research project at Yale, spring 2013.

Organizational activities

- Co-organizer of “Tropical and Nonarchimedean Analytic Geometry,” a special session at the Joint Meetings of the AMS and MAA, 2014 (with Melody Chan and Joe Rabinoff).
- Co-organizer of “Algebraic and Tropical Geometry,” weekly research seminar at Yale University, 2012–2014 (with Sam Payne, Asher Auel, and Dave Jensen).

Service

- Referee for: *Advances in Mathematics*, *Algebra and Number Theory*, *Bulletin of the London Mathematical Society*, *Collectanea Mathematica*, *Compositio Mathematica*, *Constructive Algebra*, *Electronic Journal of Combinatorics*, *Experimental Mathematics*, *European Journal of Combinatorics*, *German Academic Exchange Service*, *International Journal of Computer Mathematics*, *International Math Research Notices*, *Izvestiya RAN*, *Journal of Algebraic Combinatorics*, *Journal of Algebra and its Applications*, *Journal of Combinatorial Algebra*, *Journal of Combinatorial Optimization*, *Journal of Mathematical Biology*, *Journal of Pure and Applied Algebra*, *Journal of Symbolic Computation*, *Journal of the Association of Computing Machinery*, *Linear Algebra and Applications*, *Mathematical Research Letters*, *Mathematics of Computation*, *Mathematische Zeitschrift*, *MEGA: Effective Methods in Algebraic Geometry*, *Numerical Linear Algebra with Applications*, *Open Mathematics*, *Proceedings of the American Mathematical Society*, *Selecta Mathematica*, *SIAM Journal on Matrix Analysis and Applications*, *Transactions of the AMS*.
- Doctoral committee member, Eindhoven University of Technology, the Netherlands, 2018.
- Second reader for undergraduate thesis, Harvey Mudd, 2013.
- Officer of the Mathematics Graduate Student Association, UC Berkeley, 2007–2010.