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

2023 – 2028	Simons Travel Support for Mathematicians
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

accepted 1. (with Dony Varghese) Characteristic sets of matroids. *European J. Combin.*, to appear.

2022 2. (with Guus P. Bollen and Jan Draisma) Matroids over one-dimensional groups. *Int. Math. Res. Not.*, **2022**:3 2298–2336.

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 talks

2023 Jan Algebra Seminar, Georgia Tech University: Characteristic sets of matroids

2021 Dec Algebra and Number Theory Seminar, Queen Mary University, United Kingdom (virtual): Characteristic sets of matroids

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

Advising and mentoring

- Anna Lawson, PhD, 2022, "DVR-Matroids of Algebraic Extensions"
- Dony Varghese, PhD, 2022, "Characteristic sets of matroids"
- Gabriel Dusing, PhD, 2020, "A Method for Determining the Realizabilty of Tropical Curves in $\mathbb{R}^3$"
- Supervised two undergraduate honors thesis: Spring 2021 and 2022–2023.
- Mentored an undergraduate student research project, 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 Applied Mathematics, Advances in Mathematics, Algebra and Number Theory, Bulletin of the London Mathematical Society, Collectanea Mathematica, Combinatorial Theory, Compositio Mathematica, Constructive Algebra, Electronic Journal of Combinatorics, Experimental Mathematics, European Journal of Combinatorics, Foundations of Data Science, 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 the London Mathematical Society, 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 Annalen, 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 of Applied Algebra and Geometry, SIAM Journal on Matrix Analysis and Applications, Transactions of the AMS, Vietnam Journal of Mathematics.
- Doctoral committee member, Eindhoven University of Technology, the Netherlands, 2018.
- Second reader for undergraduate thesis, Harvey Mudd, 2013.