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Education

Purdue University, West Lafayette IN, BS (Mathematics), May 2003.

University of Maryland, College Park MD, MA (Mathematics), December 2006.

University of Maryland, College Park MD, PhD (Mathematics), May 2009.

Positions

MSRI, Berkeley CA, Postdoctoral Fellowship (Mathematics), August 2009- December 2009.

University of California, Berkeley, Berkeley CA, NSF Postdoctoral Fellowship (Mathematics), 2009-2012.

George Mason University, Fairfax VA, Assistant/Associate Professor, 2012-2017.

University of Kentucky, Lexington KY, Assistant Professor, 2017-present.

Courses

Combinatorial Representation Theory, Summer 2012, Goethe University.

Math 106 Quantitative Reason, Fall 2012, GMU.

Math 322 Advanced Linear Algebra, Fall 2012, Fall 2014, GMU.

Math 641 Combinatorics and Graph Theory, Fall 2013, GMU.

Math 631 Topology, Spring 2014, GMU.

Math 315 Advanced Calculus I, Spring 2015, GMU.

Math 113 Analytic Geometry and Calculus I, Spring 2015, Fall 2015, Spring 2016, GMU.

Math 639 Algebraic Geometry, Fall 2015, GMU.

Math 400 History of Mathematics, Spring 2016, GMU.

Math 113 Calculus I, Fall 2017, UK.

Math 765 Topics in Algebra: Combinatorial Commutative Algebra, Fall 2017, UK.

Math 322 Matrix Algebra, Spring 2018, UK.

Service

Reviewer for Annals of Combinatorics, Duke Math Journal, Journal of Algebraic Combinatorics, Central European Journal of Combinatorics, Michigan Math Journal, Advances in Mathematics, Combinatorial Theory series A, SIDMA, ICRM, Canadian Journal of Mathematics, Journal of Symplectic Geometry, IMRN, Transformation Groups, Transactions of the AMS.

Reader, thesis committee, Kaie Kubjas, FU Berlin, Spring 2013.

GMU Mathematical Sciences Graduate Committee, Fall 2013 - 2017.

External referee, thesis committee, Takuya Murata, University of Pittsburg, Fall 2014.

GMU Mathematical Sciences Policy and Hiring Committee, Spring 2016 - 2017.

Grants

NSF Postdoctoral Fellowship, (DMS 0902710), \$135,000, 2009-2012.

4VA Innovation Grant, joint with E. Sander (GMU), P. Seshaiyer (GMU), \$20,000, 2014-2015.

REGS sub-award, GEAR (DMS 1107452, 1107263, 1107367), <http://gear.math.illinois.edu/programs/regs/>, joint with S. Lawton (GMU), \$15,500, 2015.

NSF Research Grant, Enumeration Problems in Geometry and Representation Theory, (DMS 1500966), \$100,000, 2015-2018.

Simons Foundation Collaboration Grant, Convexity and Commutative Algebra (587209), \$42,000, 2018-2023.

Research Activities

GEAR member, <http://gear.math.illinois.edu/index.html>, 2014–present.

Associate director, Mason Experimental Geometry Lab (MEGL), <http://meglab.wikidot.com>, 2014 – 2017,

Co-organizer TADS seminar <http://math.gmu.edu/tad-seminar.php>, GMU, 2014–2017.

Co-organizer StReeTs seminar <http://meglab.wikidot.com/strets>, GMU, 2014–2017.

Organizer, with Sean Lawton (GMU) and Adam Sikora (SUNY Buffalo), Character Varieties: Experiments and New Frontiers <http://www.ams.org/programs/research-communities/mrc-16>, MRC, Snowbird UT, 6/5/2016-6/11/2016,

Director, University of Kentucky Math Lab, <http://www.ms.uky.edu/~geometrylab/>, 2017–present.

Organizer, with Sean Lawton (GMU) and Daniel Ramras (IUPUI), Special Session on Geometry of Representation Spaces, Joint Meetings, Baltimore MD, 1/19/2019.

Organizer, with Emily J. King (Bremen), Dustin Mixon (OSU), and Cynthia Vincent (NC State), Oberwolfach minisession on Algebraic, Geometric, and Combinatorial Methods in Frame Theory, 09/20/2018 - 10/06/2018.

Publications

Journal articles.

- (1) C. Manon, *Presentations of semigroup algebras of weighted trees*, J. Alg. Comb. Vo. 31, 4, (2010) 467-489.
- (2) C. Manon, *Gorenstein semigroup algebras of weighted trees*, J. Algebra, Vo. 354, 1, (2012) 110-120.
- (3) B. Howard, C Manon, J. Millson, *The toric geometry of triangulated polygons in euclidean space*, Canad. J. Math. 63, (2011), 878-937.
- (4) C. Manon, *The m -dissimilarity map and representation theory of $SL_m(\mathbb{C})$* , J. Alg. Comb. Vo. 33, 2, (2011) 199-213.
- (5) C. Manon, *Coordinate rings for the moduli of $SL_2(\mathbb{C})$ quasi-parabolic principal bundles on a curve and toric fiber products*, J. Algebra, Vo. 365, 1, (2011) 163-183.
- (6) C. Manon, *Dissimilarity maps on trees and the representation theory of $GL_n(\mathbb{C})$* , Elec. J. Combinatorics, Vo. 19, 3, (2012).
- (7) C. Manon, Z. Zhou, *Semigroups of $sl_3(\mathbb{C})$ tensor product invariants*, J. Algebra, Vo. 400, 1, (2013) 94 -104.
- (8) C. Manon, *The algebra of $SL_3(\mathbb{C})$ conformal blocks*, Trans. Groups, Vo. 18, 4, (2013) 1165-1187.
- (9) K. Kubjas, C. Manon, *Conformal blocks, Berenstein-Zelevinsky triangles, and group-based models*, J. Alg. Comb. Vo. 40, 3, (2014) 861-886.
- (10) C. Manon, *Compactifications of character varieties and skein relations on conformal blocks*, Geom. Dedicata. (2015), 179, 1, 335 - 376.
- (11) C. Manon, *Newton-Okounkov polyhedra for character varieties and configuration spaces*, Trans. Amer. Math. Soc. 368 (2016) 5979-6003.
- (12) C. Manon, *Cox rings of moduli of quasi parabolic principal bundles and the K-Pieri rule*, J. Comb. Theory. A 136 (2016) 1-29.

- (13) S. Lawton, C. Manon, *Character varieties of free groups are Gorenstein but not always factorial*, J. Algebra 456 (2016), 278-293.
- (14) C. Manon *The algebra of conformal blocks*, to appear in J. Eur. Math. Soc. (JEMS), arXiv:0910.0577 [math.AG].
- (15) J. Hilgert, C. Manon, J. Martens, *Contraction of Hamiltonian K -spaces*, Int. Math. Res. Notices. (IMRN), 20 (2017), 6255-6309.
- (16) C. Manon *Toric geometry of free group $SL_2(\mathbb{C})$ character varieties from outer space*, Canad. J. Math. 70 (2018), 2, 354-399.
- (17) K. Kaveh, C. Manon *Spherical Tropical Geometry: A Survey Of Recent Developments*, Acta Math. Sin. 34 (2018), 3, 454-465.
- (18) N. Ilten, C. Manon *Rational Complexity-One T -Varieties are Well-Poised*, Int. Math. Res. Notices. (IMRN), arXiv:1704.01629 [math.AG].
- (19) K. Kaveh, C. Manon *Gröbner theory and tropical geometry on spherical varieties*, submitted to Trans. Groups, arXiv:1611.01841[math.AG].
- (20) K. Kaveh, C. Manon *Khovanskii bases, higher rank valuations and tropical geometry*, submitted to SIAGA, arXiv:1610.00298 [math.AG].

Conference Proceedings.

- (1) C. Manon, *Phylogenetic trees and the tropical geometry of flag varieties*, FPSAC 2012, DMTCS proc, AR (2012)
- (2) C. Manon, *Symplectic geometry of the Vinberg monoid and branching problems*, Mathematisches Forschungsinstitut Oberwolfach Report No. 27/2014, 31-35, DOI: 10.4171/OWR/2014/27.

Seminar and Conference talks

2009

Presentations of Semigroup Algebras of Weighted Trees, University of Washington Mathematics Combinatorics Seminar, Seattle WA, 04/21/09

Presentations of Semigroup Algebras of Weighted Trees, NSF FRG Conference on Eigenvalue and Saturation Problems for Reductive Groups, Chapel Hill NC, 05/28/09

Moduli of Bundles, Phylogenetic Algebraic Geometry, and the Verlinde Formula, UC Berkeley Discrete Math Seminar, Berkeley CA, 09/30/09

The Algebra of Conformal Blocks, Representation Theory, Geometry, and Combinatorics Joint Seminar at Berkeley, Berkeley CA, 10/14/09

Phylogenetic Algebraic Geometry and the Verlinde Formula, Texas A&M Geometry Seminar, College Station TX, 11/04/09

2010

Gorenstein semigroup rings and moduli of points on the line, Berkeley Commutative Algebra and Algebraic Geometry Seminar, 02/23/10

Phylogenetic algebraic geometry and the Verlinde formula, University of Washington Mathematics Combinatorics Seminar, Seattle WA, 04/07/10

Phylogenetic algebraic geometry and the Verlinde formula, University of Georgia Algebraic Geometry Seminar, Athens GA, 04/20/10.

Phylogenetic algebraic geometry and the Verlinde formula, North Carolina State University Algebra and Combinatorics Seminar, Raleigh NC, 04/30/10.

Dissimilarity vectors of metric trees and the representation theory of $SL_m(\mathbb{C})$, Berkeley summer tropical geometry seminar, Berkeley CA, 5/30/10

Moment angle complexes and Hamiltonian systems, Berkeley topological combinatorics seminar, Berkeley CA, 09/30/10.

Deformations of branching algebras, Berkeley Representation Theory, Geometry, and Combinatorics seminar, Berkeley CA, 11/23/10

2011

Dissimilarity vectors of metric trees and the representation theory of $SL_m(\mathbb{C})$, Oslo workshop on algebraic geometry in the sciences, Oslo NO, 01/10-14/11.

Dissimilarity vectors of metric trees and the representation theory of $SL_m(\mathbb{C})$, UC Davis discrete math seminar, Davis CA, 01/27/11

Toric degenerations and integrable systems on configuration spaces, Berkeley Representation Theory, Geometry, and Combinatorics seminar, Berkeley CA, 04/04/11

Degenerations of branching algebras, University of Texas Pan-American Algebra and geometry seminar, Ft. Allen TX, 04/24/11

Conformal blocks and presentations of projective coordinate rings for the moduli of $SL_2(\mathbb{C})$ principal bundles on a punctured curve, GAeL XIX, Berlin DE, 07/18-22/11

Phylogenetic trees and the tropical geometry of flag varieties, CAGS Seminar, George Mason University, Fairfax VA, 10/21/11

Phylogenetic trees and the tropical geometry of flag varieties, Frankfurt Discrete Math Seminar, Frankfurt DE, 11/2/11

Phylogenetic trees and the tropical geometry of flag varieties, FU Berlin Discrete Geometry Seminar, Berlin DE, 11/4/11

Phylogenetic trees and the tropical geometry of flag varieties, University of Georgia Algebraic Geometry Seminar, Athens GA, 11/9/11

2012

Payne's homeomorphism, Math 209: Tropical and Non-archimedean Geometry, Berkeley CA, 01/31/12

The combinatorial commutative algebra of conformal blocks, UC Davis discrete math seminar, Davis CA, 02/02/12

The combinatorial commutative algebra of conformal blocks, George Mason University Mathematics Colloquium, Fairfax VA, 02/10/12

The combinatorial commutative algebra of conformal blocks, Universidad De Los Andes, Bogota CO, 02/13/12

The combinatorial commutative algebra of conformal blocks, SIAM annual meeting special session on algebraic combinatorics, Minneapolis MN, 07/10/12

Phylogenetic trees and the tropical geometry of flag varieties, FPSAC 2012, Nagoya JP, 08/03/12

Three part lecture series, *The combinatorial commutative algebra of conformal blocks*, School on Conformal Blocks, ICMAT, Madrid, ES, 10/15/2012- 10/19/2012.

Combinatorial commutative algebra of $SL_3(\mathbb{C})$ conformal blocks, AMS sectional meeting, Akron OH, 10/20/2012-10/21/2012.

The combinatorial commutative algebra of conformal blocks, ACG Seminar, U-Pitt, Pittsburgh PA, 11/15/2012.

The combinatorial commutative algebra of conformal blocks, CAGE Seminar, U-Penn, Philadelphia PA, 11/28/2012.

2013

Conformal blocks and group-based phylogenetic statistical models, PEAKS workshop, Riezlern, AT, 3/17/2013- 3/23/2013.

Polyhedral presentations of fusion algebras, Applied algebra seminar, Penn State, State College PA, 4/3/2013.

The symplectic and algebraic geometry of polygon spaces 2013 Georgia Topology Conference - Geometry and Topology of Polygons and Applications to Physical and Biological Sciences, University of Georgia, Athens GA, 07/08/2013 - 07/12/2013.

On the usefulness of triangles, Howard Mathematics Colloquium, Howard University, Washington DC, 10/4/2013.

On a compactification of $SL_2(\mathbb{C})$ character varieties, Workshop on Character varieties and Geometric Structures, Howard University, Washington DC, 12/16/2013-12/20/2013.

2014

Degenerations of character varieties, BIRS Convex Bodies and Representation Theory, Banff CA, 2/2/2014-2/8/2014.

The combinatorics of Newton Okounkov bodies associated to moduli spaces of vector bundles, VCU Discrete Mathematics Seminar, Richmond VA, 03/04/2014.

The combinatorics of Newton Okounkov bodies associated to moduli spaces of vector bundles, GMU CAGS Seminar, Fairfax VA, 3/21/2014.

Symplectic horospherical contraction and branching problems, Oberwolfach Workshop: Okounkov Bodies and Applications, Oberwolfach DE, 05/25/2014-05/30/2014.

Symplectic horospherical contraction, ACA, Fordham University, New York City NY, 07/09/2014-07/12/2014.

Moduli spaces of principal bundles and compactifications of character varieties, Caltech Algebraic Geometry Seminar, Palo Alto CA, 11/17/2014.

Outer space and the combinatorics of character varieties, Berkeley combinatorics seminar, Berkeley CA, 11/21/2014.

Outer space and the combinatorics of character varieties, Queen's college algebraic geometry seminar, Kingston ON, 11/24/2014.

Moduli spaces of principal bundles and compactifications of character varieties, CMS sectional meeting, Hamilton ON, 12/7/2014.

2015

Toric geometry of moduli spaces of principal bundles on a curve, UVA Geometry Seminar, Charlottesville VA, 3/3/2015.

3D printing and Mathematics, UVA Mathematics Student Seminar, Charlottesville VA, 3/3/2015.

Outer space and the combinatorics of character varieties, Princeton Algebraic Topology Seminar, Princeton NJ, 3/26/2015.

3D printing and Mathematics, Centreville HS, Centreville VA, 4/15/2015.

Recent Developments in the Geometry and Combinatorics of Hessenberg Varieties, Fields Institute, Toronto CA, 7/22/2015-7/24/2015.

Polygons, Proteins, and the geometry of the Grassmannian variety, Universität Bremen, Bremen DE, 7/27/2015-7/31/2015.

An introduction to 3D printing in the STEM classroom joint with E. Sander, P. Seshaiyer, Innovations in Teaching and Learning conference, GMU, Fairfax VA, 9/18/2015.

Combinatorics and toric geometry of spaces of polygons, Symplectic and Algebraic Geometry in the Statistical Physics of Polymers, Simons Center, SUNY Stonybrook, 10/12/2015-10/16/2015.

The toric geometry of character varieties, *Workshop on Geometric Structures*, Hitchin Components and Representation Varieties, KIAS, Seoul SK, 10/19/2015-10/25/2015.

Newton-Okounkov bodies in geometry and representation theory, Department of Mathematics and Statistics Colloquium, Georgetown University, Washington DC, 12/04/2015.

Free group character varieties are Gorenstein, but not always factorial, joint w/ S. Lawton, Topology Seminar, University of Maryland College Park, College Park MD, 12/14/2015.

2016

Workshop on Toric Geometry, Oberwolfach, DE, 3/27/2016-4/2/2016.

Contraction of a Hamiltonian K -space, TADS Seminar, GMU, 4/15/2016.

BIRS-CMO Workshop on Non-Archimedean Geometry, Oaxaca, MX, 5/1/2016-5/7/2016.

Two part lecture series, *An introduction to tropical geometry, The tropical geometry of character varieties*, Character Varieties: Experiments and New Frontiers, MRC, Snowbird UT, 6/5/2016-6/11/2016.

Long Term Visitor, Fields Institute Major Thematic Program on Combinatorial Commutative Algebra, Toronto CA, Fall 2016.

Tropical geometry, Khovanskii bases, and Newton-Okounkov bodies of projective varieties, Workshop on Convexity, Fields Institute, Toronto CA, 10/3/2016-10/5/2016.

Khovanskii bases, Newton-Okounkov polytopes, and tropical geometry of projective varieties, CAGS seminar, GMU, 11/4/2016.

Khovanskii bases, Newton-Okounkov polytopes, and tropical geometry of projective varieties, Colloquium, IUPUI, Indianapolis, IN, 11/18/2016.

2017

Newton-Okounkov cones of Character Varieties, Special Session on Character Varieties, Joint Mathematics Meetings, Atlanta GA, 1/5/17.

The horospherical contraction of a Hamiltonian K -space, Special Session on Symplectic Geometry, Moment Maps and Morse Theory, Joint Mathematics Meetings, Atlant GA, 1/6/17.

Convexity, Algebra, and Geometry, Colloquium, University of Kentucky, Lexington, KY, 1/27/17.

Khovanskii bases, higher rank valuations, and tropical geometry, PEAKS workshop, Riezlern, AT, 2/3/2017- 2/9/2017.

Tropical geometry of complexity 1 T -varieties, TADS seminar, GMU, 2/17/17.

Contraction of a Hamiltonian K -space with applications to free group character varieties, Special Session on Representation Spaces and Toric Topology, AMS sectional meeting, New York, NY, 5/6/2017.

Rational Complexity-One T -Varieties are Well-Poised BIRS-CMO Workshop Beyond Toric Geometry, Oaxaca, MX, 5/7/2017-5/12/2017.

Khovanskii bases, higher rank valuations, and tropical geometry, Minisymposium on Newton-Okounkov bodies and Khovanskii bases, SIAM AG Meeting, Atlanta, GA, 7/31/17-8/4/17.

Counting on Khovanskii Bases, Heilbronn Institute Focused Research Workshop on Toric Degenerations, Bristol, UK, 8/21/17-8/25/17.

Introduction to Khovanskii Bases, UK Algebra and Number Theory Seminar, University of Kentucky, Lexington, KY, 9/13/2017.

Problems with Khovanskii bases, Ohio State Combinatorics Seminar, OSU, Columbus OH, 11/7/2017.

2018

The Combinatorics, Algebra, and Geometry of Conformal Blocks, UK Algebra and Number Theory Seminar, University of Kentucky, Lexington, KY, 1/31/18.

Problems with Khovanskii bases, University of Tennessee Algebra Seminar, UTK, Knoxville TN, 2/5/2018.

Three part lecture series, *Tropical Geometry and Representation Theory of Reductive Groups*, Workshop for young researchers: Tropical Geometry meets Representation Theory, University of Cologne, Cologne DE, 3/12/2018-3/18/2018.

Results on Khovanskii bases of graded algebras, Special Session on Algebraic and Combinatorial Aspects of Tropical Geometry, AMS Sectional Meeting, OSU, Columbus OH, 3/19/2018-3/20/2018.

Newton-Okounkov bodies of rational complexity 1 varieties, Special Session on Convex Bodies in Algebraic Geometry and Representation Theory, AMS Sectional Meeting, OSU, Columbus OH, 3/19/2018-3/20/2018.

Introduction to Spherical Tropicalization, Special Session on Algebraic Geometry, Representation Theory, and Applications, AMS Sectional Meeting, Vanderbilt, Nashville TN, 4/14/2018-4/15/2018.

Convex structures and toric flat families, Algebra Seminar, Köln Universität, Köln, DE, 7/8/2018.