Christopher Allen Manon
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Employment

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, 2017-2019.

University of Kentucky, Lexington KY, Associate Professor, 2019-present.

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.

Research

Journal Publications

(1) C. Manon, *Presentations of semigroup algebras of weighted trees*, J. Alg. Comb. **31** (2010), no. 4, 467-489.

(2) B. Howard, C Manon, J. Millson, *The toric geometry of triangulated polygons in euclidean space*, Canad. J. Math. **63** (2011), 878-937.

(3) C. Manon, *Dissimilarity maps on trees and the representation theory of* $SL_m(\mathbb{C})$, J. Alg. Comb. **33** (2011), no. 2, 199-213.

(4) C. Manon, *Gorenstein semigroup algebras of weighted trees*, J. Algebra, **354** (2012), no. 1, 110-120.

(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, **365** (2012), no. 1, 163-183.

(6) C. Manon, *Dissimilarity maps on trees and the representation theory of $GL_n(\mathbb{C})$*, Elec. J. Combinatorics **19** (2012), no. 3.

(7) C. Manon, *The algebra of $SL_3(\mathbb{C})$ conformal blocks*, Trans. Groups, **18** (2013), no. 4, 1165-1187.

(8) C. Manon, Z. Zhou, *Semigroups of $sl_3(\mathbb{C})$ tensor product invariants*, J. Algebra, **400** (2014), no. 1, 94 -104.

(9) K. Kubjas, C. Manon, *Conformal blocks, Berenstein-Zelevinksy triangles, and group-based models*, J. Alg. Comb. **40** (2014), no. 3, 861-886.

(10) C. Manon, *Compactifications of character varieties and skein relations on conformal blocks*, Geom. Dedicata. **179** (2015), no. 1, 335 - 376.

(11) C. Manon, *Newton-Okounkov polyhedra for character varieties and configuration spaces*, Trans. Amer. Math. Soc. **368** (2016), no. 8, 5979-6003.

(12) C. Manon, *Cox rings of moduli of quasi parabolic principal bundles and the K-Pieri rule*, J. Comb. Theory. A **139** (2016), 1-29.

(13) S. Lawton, C. Manon, *Character varieties of free groups are Gorenstein but not always factorial*, J. Algebra **456** (2016), no. 1, 278-293.

(14) J. Hilgert, C. Manon, J. Martens, *Contraction of Hamiltonian $K-$spaces*, Int. Math. Res. Notices. (IMRN) **20** (2017), 6255-6309.

(15) C. Manon *The algebra of conformal blocks*, J. Eur. Math. Soc. (JEMS) **20** (2018), no. 11, 2685-2715.

(16) C. Manon *Toric geometry of free group $SL_2(\mathbb{C})$ character varieties from outer space*, Canad. J. Math. **70** (2018), no. 2, 354-399.

(17) K. Kaveh, C. Manon *Gröbner theory and tropical geometry on spherical varieties*, Trans. Groups **4** (2019), 1095-1145.

(18) N. Ilten, C. Manon *Rational Complexity-One T-Varieties are Well-Poised*, Int. Math. Res. Notices. (IMRN) **13** (2019), 4198-4232.

(19) K. Kaveh, C. Manon *Khovanskii bases, higher rank valuations and tropical geometry*, SIAM J. Appl. Algebra Geometry **3** (2019), no. 2, 292-336.

(20) T. Faust, C. Manon, *The Gorenstein property for projective coordinate rings of rank 2 parabolic vector bundles on a smooth curve*, Elec. J. Combinatorics, **26** (2019), no. 4.

(21) K. Kaveh, C. Manon, T. Murata *Generic tropical initial ideals of Cohen-Macaulay algebras*, J. Pure Appl. Algebra **225** (2021), no. 11, 106713.

(22) J. Cecil, N. Dutta, C. Manon, B. Riley, A. Vichitbandha *Well-Poised Hypersurfaces*, Communications in Algebra **49** (2021), no. 6, 2645-2654.

(23) C. Manon, J. Yang *Tropical geometry and Newton-Okounkov cones for Grassmannian of planes from compactifications*, Canad. J. Math. **74** (2022), no. 1, 199-231.

(24) K. Kaveh, C. Manon *Toric principal bundles, piecewise linear maps, and buildings*, Math. Z. **302** (2022), no. 3, 1367–1392.

(25) K. Kaveh, C. Manon, T. Murata *On degenerations of projective varieties to complexity-one T-varieties*, International Mathematics Research Notices (IMRN) **3** (2023), 2665-2697.

(26) C. George, C. Manon *Cox rings of projectivized toric vector bundles and Toric flag Bundles*, J. Pure Appl. Algebra **227** (2023), no. 11, 107437.

(27) J. Cummings, B. Hollering, C. Manon *Invariants for level-1 phylogenetic networks under the Cavendar-Farris-Neyman Model*, Adv. Applied. Math. **153** (2024), 102633.

(28) J. Cummings, C. Manon *Fano compactification of the* $\mathrm{SL}_2(\mathbb{C})$ *free group character variety*, Geom. Dedicata. **218** (2024), no. 17.

(29) C. George, C. Manon *Algebra and geometry of irreducible toric vector bundles of rank* n *on* $\mathbb{P}^n$. to appear in J. Algebra, arXiv:2308.09017 [math.AG]

Refereed Proceedings

(30) C. Manon *Phylogenetic trees and the tropical geometry of flag varieties*, DMTCS proc. vol. AR, 24th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2012).

Non-Refereed Proceedings

(31) C. Manon *Symplectic geometry of the Vinberg monoid and branching problems*, Oberwolfach Reports (2014), no. 27, 31-35.

(32) M. Ehler, M. Hering, C. Manon, T. Needham, C. Shonkwiler *The Paulsen problem made symplectic*, Oberwolfach Reports (2018), no. 4, 2790-2794.

(33) C. Manon *Khovanskii bases in three settings*, Oberwolfach Reports 46 (2019),15-18.

Survey Articles

(34) K. Kaveh, C. Manon *Spherical Tropical Geometry: A Survey Of Recent Developments*, Acta Math. Sin. 34 (2018), no. 3, 454-465.

Preprints

(35) K. Kaveh, C. Manon *Toric flat families, valuations, and applications to projectivized toric vector bundles.* Preprint 2019. Under review, arXiv:1907.00543 [math.AG]

(36) J. Cummings, C. Manon *The well-poised property and torus quotients.* Preprint 2020. Under review, arXiv:2009.09105 [math.AG]

(37) K. Kaveh, C. Manon, B. Tsvelikhovskiy *Toric vector bundles over a discrete valuation ring and Bruhta-Tits buildings.* Preprint 2022. Under review, arXiv:2208.04299 [math.AG]

(38) K. Kaveh, C. Manon *Toric vector bundles, valuations, and tropical geometry.* Preprint 2023. Under review, arXiv:2304.11211 [math.AG]

(39) C. George, C. Manon *Positivity properties of divisors on toric vector bundles.* Preprint 2023. Under review, arXiv:2308.09014 [math.AG]

(40) A. Botero, K. Kaveh, C. Manon *Equivariant Chern classes of toric vector bundles over a DVR and Bruhat-Tits buildings.* Preprint 2024. arXiv:2402.18712 [math.AG]

(41) K. Kaveh, C. Manon *Tropical vector bundles and matroids* Preprint 2024. arXiv:2405.03576 [math.AG]

(42) J. Dasgupta, C. Gangopadhyay, K. Kaveh, C. Manon *Equivariant vector bundles on complexity-one T-varieties and Bruhat-Tits buildings* Preprint 2024. arXiv:2406.02912 [math.AG]

(43) L. Escobar, M. Harada, C. Manon *Geometric families of degenerations from mutations of polytopes* Preprint 2024. arXiv:2408.01785 [math.AG]

(44) A. Cook, L. Escobar, M. Harada, C. Manon *Gorenstein-Fano polytopes and compactifications of rank 2 polyptych lattices* , Preprint 2024. arXiv:2408.01788 [math.AG]

Funding

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

(2) 4VA Innovation Grant, joint with E. Sander (GMU), P. Seshaiyer (GMU), $20,000, 2014-2015.

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

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

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

(6) NSF Research Grant, Collaborative Research: Toric Geometry, Tropical Geometry, and Combinatorial Buildings, (DMS 2101911), $160,000, 2021-2024.

Invited Seminar and Conference Talks

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

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

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

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

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

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

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

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

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

(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

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

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

(13) *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.

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

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

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

(17) *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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(34) *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.

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

(36) *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.

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

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

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

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

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

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

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

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

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

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

(47) *3D printing and Mathematics*, UVA Mathematics Student Seminar, Charlottesville VA, 3/3/2015.

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

(49) *3D printing and Mathematics*, Centreville HS, Centreville VA, 4/15/2015.

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

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

(52) *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.

(53) *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.

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

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

(56) *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.

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

(58) *Contraction of a Hamiltonion K-space*, TADS Seminar, GMU, 4/15/2016.

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

(60) 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.

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

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

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

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

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

(66) *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.

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

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

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

(70) *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.

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

(72) *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.

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

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

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

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

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

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

(79) *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.

(80) *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.

(81) *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.

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

(83) *Toric Bundles*, TADS Seminar, GMU, 9/29/2018.

(84) *Toric degenerations of the algebra of conformal blocks and compactifications of character varieties*, Algebra Seminar, University of Pittsburgh, 11/29/2018.

(85) *Classification of toric bundles on toric varieties*, CMS Joint Meetings, Special Session On Algebraic Geometry, 12/7/2018.

(86) *Tropical and algebraic geometry of character varieties*, Geometry Seminar, University of Missouri, 3/14/19.

(87) Research in Groups at ICMS, Edinburgh, with Alex Fink and Milena Hering, 7/15/2019-7/26/2019.

(88) *Complexity 1 spaces in algebraic and symplectic geometry*, Workshop on Discrete Geometry with a view on Symplectic and Tropical Geometry, Köln Universität, Köln, DE, 9/23/2019-9/27/2019.

(89) Workshop on Toric Geometry, Oberwolfach, DE, 9/23/2019-9/27/2019.

(90) *Khovanskii bases in three settings* (three part lectures series), Mini workshop on Degenerations in Representation Theory, Oberwolfach, DE, 10/7/2019-10/11/2019.

(91) *Toric Vector Bundles and Piecewise Linear maps to Buildings*, Buildings, Varieties, and Applications, MPI Leipzig, DE, 11/11/2019-11/13/2019.

(92) *Complexity 1 spaces in algebraic and symplectic geometry*, FRAGMENT Seminar, CSU, 2/6/2020.

(93) *Toric Vector Bundles and the tropical geometry of piecewise-linear functions*, Algebra Seminar, Georgia Institute of Technology, 3/2/2020

(94) *Toric Flat Families*, Summer workshop on toric degenerations, 7/6/2020.

(95) *Spaces of Eigenvalues*, CODEX Seminar, 9/1/2020.

(96) *Counting on Toric Degenerations*, University of Pittsburgh Mathematics Colloquium, 10/17/2020.

(97) *When is a (projectivized) toric vector bundle a Mori dream space?*, NASO seminar (hosted by Max Planck Leipzig), 1/19/2021.

(98) *When is a (projectivized) toric vector bundle a Mori dream space?*, Tulane Algebra Seminar, 3/10/2021.

(99) *When is a (projectivized) toric vector bundle a Mori dream space?*, UC Riverside Algebra Seminar, 5/1/2021.

(100) *When is a (projectivized) toric vector bundle a Mori dream space?*, Toric Degenerations (Conference, hosted by Goethe Universitat), 6/11/2021.

(101) *Searching for Mori dream spaces*, Colorado State University Mathematics Colloquium, 10/4/2021.

(102) *Searching for Mori dream spaces*, Algebra Seminar, University of Kentucky, 10/20/2021.

(103) *Combinatorics of Bundles of Flag Varieties and The Mori Dream Space Property*, CMS Winter Meeting, Special Session on Combinatorial Algebraic Geometry and Commutative Algebra, 12/6/2021.

(104) *Toric Bundles, Mori Dream Spaces, and Representation Stability*, Seminar on Lie Algebras and Applications, HSE/Skoltech center joint seminar, 2/15/2022.

(105) Workshop on Toric Geometry, Oberwolfach, DE, 3/28/2022-4/1/2022.

(106) *Matroids and Toric Vector Bundles*, LMS Bath Symposium on Combinatorial Algebraic Geometry, 8/1/2022 - 8/5/2022.

(107) *Vector Bundles and Combinatorics*, Algebra Seminar, University of Kentucky, 8/31/2022

(108) *Toric Vector Bundles And Tropical Geometry*, LOGARTOS Seminar, 9/9/2022

(109) *Matroids and the geometry of toric vector bundles*, Combinatorial Algebraic Geometry Workshop, LMS Bath, 8/2/2023

(110) *Toric degenerations and conformal field theory* , Toric Degenerations, BIRS Banff, 12/5/2023

(111) *Matroids and the geometry of toric vector bundles*, University of Pittsburgh Algebra Seminar, 3/21/2023.

(112) *Cox rings of toric vector bundles*, CATS conference, University of Alabama, 4/15/2023.

(113) *The algebra and geometry of irreducible toric vector bundles on projective space* , Algebra Seminar, University of Kentucky, 8/30/2023.

(114) *The Convex Algebraic Geometry of Toric Vector Bundles*, Workshop Vector bundles and combinatorial algebraic geometry, Frankfurt DE, 10/9/2023-10/13/2023.

(115) *The Cox ring of the moduli SL_4 principal bundles on a curve*, Algebraic Geometry Seminar, UT Austin, 11/9/2023.

(116) *Toric vector bundles, piecewise linear geometry, and buildings*, IPPS Seminar, 3/7/2024.

(117) *Toric Matroid Bundles*, Pittsburgh Combinatorial Algebraic Geometry Mini-Workshop, University of Pittsburgh, 4/20/2024-4/21/2024.

(118) *Toric Matroid Bundles*, Harvard/MIT Combinatorics Seminar, Harvard University, 5/1/2024.

(119) UBCO Workshop: Homological Perspective on Splines and Finite Elements, 5/19/2024-5/24/2024.

(120) *Mutations of polytopes and compactifications of varieties*, Mirror Symmetry for Cluster Varieties and Representation Theory, King's College, 6/17/2024-6/21/2024.

(121) *Toric Matroid Bundles*, Fields Institute Focus Program: Toric Topology, Geometry and Polyhedral Products, 7/29/2024-8/2/2024.

(122) *TBD*, Conference in Honor of Jürgen Hausen's birthday, 10/7/24-10/11/24.

(123) Fields Institute Thematic Program in Commutative Algebra and Applications, 1/1/25-6/1/25.

(124) Workshop on Toric Geometry, Oberwolfach, DE, 4/6/25-4/11/25.

Teaching

Courses

(1) Combinatorial Representation Theory, Summer 2012, Goethe University.

(2) Math 106 Quantitative Reason, Fall 2012, GMU.

(3) Math 322 Advanced Linear Algebra, Fall 2012, Fall 2014, GMU.

(4) Math 641 Combinatorics and Graph Theory, Fall 2013, GMU.

(5) Math 631 Topology, Spring 2014, GMU.

(6) Math 315 Advanced Calculus I, Spring 2015, GMU.

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

(8) Math 639 Algebraic Geometry, Fall 2015, GMU.

(9) Math 400 History of Mathematics, Spring 2016, GMU.

(10) Math 113 Calculus I, Fall 2017, Fall 2018 UK.

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

(12) Math 322 Matrix Algebra, Spring 2018, UK.

(13) Math 561 Modern Algebra I, Fall 2018, UK.

(14) Math 661 Modern Algebra II, Spring 2019, UK.

(15) Math 114 Calculus II, Fall 2019, Fall 2021- Spring 2023, UK.

(16) Math 765 Topics in Algebra: Introduction to Tropical Geometry, Fall 2019, UK.

(17) Math 340 Applicable Algebra, Spring 2020, UK.

(18) Math 361 Modern Algebra I, Fall 2020, UK.

(19) Math 362 Modern Algebra II, Spring 2021, UK.

(20) Math 765 Topics in Algebra: Representation Theory, Spring 2021, UK.

(21) Math 765 Topics in Algebra: Toric Varieties, Spring 2022, UK.

(22) Math 665 Rings and Modules, Fall 2022, Fall 2023, UK.

(23) Math 601 TA Teaching Seminar, Fall 2023, Fall 2024, UK.

(24) Math 765 Topics in Algebra: Khovanskii Bases, Spring 2024, UK.

(25) Math 561 Modern Algebra I, Fall 2025, UK.

Graduate advising

(1) Joseph Cummings (graduated Spring 2022)

(2) Courtney George (graduated Spring 2023)

(3) Casey Hill (expected Spring 2025)

(4) Sara Church (expected Spring 2025)

Undergraduate mentoring

George Mason University

(1) Faculty Mentor, *Polyopes*, undergraduate research in the Mason Experimental Geometry Lab: Austin Alderete (Summer 2015 - Spring 2016), Conor Nelson (Summer 2015- Spring 2016), James Chiriaco (Summer 2015), Mezel Smith (Summer 2015), Mark Tuben (Fall 2015- Fall 2016), Shams Alyusof (graduate student assistant, Fall 2015- Spring 2016), Jason Lasseigne (Spring 2016 - Summer 2016), Joseph Frias (Spring 2016 - Spring 2017), Cody Djuric (Fall 2016- Spring 2017), Jiarong Che (Spring 2017).

University of Kentucky

(1) Faculty Mentor, *Computations in Tropical Geometry*, undergraduate research in the UK Math Lab, 2018-2019: Joseph Cecil, Alston Crowley, Neelav Dutta, David Ma, Benjamin Riley, Angela Vichitbandha.

(2) Faculty Mentor, *Heisenberg Polytopes*, undergraduate research in the UK Math Lab, 2019-2020: Michael Boyd, Joseph Cecil, Sean Grate, Angela Vichitbandha.

(3) Faculty Mentor, *Toric Vector Bundles*, undergraduate research in the UK Math Lab, 2020-present: Alex Blose, Ayush Tibrewal.

(4) Faculty Mentor, *The Geometry of Toric Vector Bundles*, MSTC capstone project, Paul Laurence Dunbar High School, Ayush Tibrewal.

(5) Faculty Mentor, *The Mathematics of Gerrymandering*, undergraduate research in the UK Math Lab, 2020-present: Michael Boyd, Benjamin Cortas, Nathan Jones, Nik Rieke, Jason Sikes, Benjamin Wang.

(6) Faculty Mentor, *Ehrhart Functions for Phylogenetics and Conformal Blocks*, undergraduate research in the UK Math Lab, Spring 2022 - Spring 2023, Ian Castro, Nathan Jones, Nik Rieke, Sairakshitha Yalla, Ale Lozano.

(7) Faculty Mentor, *Chow rings of graphical matroids*, undergraduate research in the UK Math Lab, Spring 2023-Spring 2024, Ehren Dolan, Zachary Beard, Austin Fessler, Derek Forte.

(8) Faculty Mentor, *Tropical linear series on matroids*, undergraduate research in the UK Math Lab, Spring 2024-present, Ehren Dolan, Zachary Beard, Austin Fessler, Catherine Lucier.

Service

Professional Service

Organizing

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

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

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

(4) Organizer, with Dave Jensen, KOALA 2024, University of Kentucky, 5/21/2024-5/22/2024.

Reviewing

(1) 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.

Local Service

(1) Associate director, Mason Experimental Geometry Lab (MEGL), `http://meglab.wikidot.com`, $2014-2017$,

(2) Co-organizer TADS seminar `http://math.gmu.edu/tad-seminar.php`, GMU, $2014-2017$.

(3) Co-organizer StReeTs seminar `http://meglab.wikidot.com/strets`, GMU, $2014-2017$.

(4) Director, University of Kentucky Math Lab, `http://www.ms.uky.edu/~geometrylab/`, $2017-$present.

(5) Organizer, UK Math Lab summer research program, Summer 2022.

(6) Organizer, UK Math Lab summer research program, Summer 2023.

(7) Organizer, Eaves Lecture, Spring 2024.

(8) Organizer, UK Math Lab summer research program, Summer 2024.

Committees

External

(1) Reader, thesis committee, Kaie Kubjas, FU Berlin, Spring 2013.

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

(3) External referee, thesis committee, Jack Love, George Mason University, Summer 2019.

(4) External referee, thesis committee, Daniel Ehrman, University of Pittsburg, Fall 2019.

Local

(1) GMU Mathematical Sciences Graduate Committee, Fall 2013 - 2017.

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

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

(4) Graduate Program Committee, 2018-2019.

(5) Diversity, Equity, and Inclusion Committee, Fall 2020.

(6) Graduate Committee, 2020-2021.

(7) Chair Algebra Prelim Committee, Spring 2019-2022, Fall 2023, Spring 2024

(8) Undergraduate program committee, Fall 2022.

(9) Graduate Committee, Spring 2024.

Masters and PhD committees

(1) Barhite , Justin MA MATH 04/18/19

(2) Bruegge , Kaitlin MA MATH 09/21/20

(3) Bruegge , Kaitlin PHD MATH 05/16/23

(4) Chavan , Roshan Anandrao PHD MEEN 05/07/21

(5) Cook-Powell , Kaelin MA MATH 02/14/18

(6) Cook-Powell , Kaelin PHD MATH 06/18/21

(7) Cummings , Joseph MA MATH 09/26/18

(8) Cummings , Joseph PHD MATH 04/13/22

(9) Franz , Kyle MA MATH 04/10/18

(10) Frotan Pour , Ali PHD PHYS 04/19/21

(11) George , Courtney MA MATH 09/18/19

(12) George , Courtney PHD MATH 05/22/23

(13) Hall , John PHD MATH 04/02/24

(14) Hanely , Derek PHD MATH 04/15/22

(15) Hanson , Angela MA MATH 10/02/19

(16) Hanson , Angela PHD MATH 04/06/23

(17) Jany , Benjamin MS MATH 03/04/20

(18) Liu , Sinong PHD PHYS 05/27/21

(19) Morrow , Michael MA MATH 04/28/21

(20) Morrow , Michael PHD MATH 04/11/24

(21) Napier , Chloé MS MATH 04/18/23

(22) Ramachandran , Suvarna PHD PHYS 08/22/18

(23) Rizer , Williem MA MATH 10/03/22