Christian Ikenmeyer

Contact Information

Address	University of Warwick Department of Mathematics Zeeman Building, Coventry, CV4 7EQ, U.K.
E-Mail	christian.ikenmeyer@warwick.ac.uk

Positions

Oct '22 – today	**Professor in Computer Science and Mathematics**, University of Warwick, UK
Aug '19 – Sep '22	**Senior Lecturer (UK system)**, University of Liverpool, UK
	Mar – Sep '22: Director of Postgraduate Research (PhD) in the Dept. of Comp. Science
Feb '19 – Jul '19	**Research Group Leader**, Max-Planck Institute for Software Systems, Saarbrücken, Germany
Aug '18 – Dec '18	**Research Fellow** at the Simons Institute for the Theory of Computing, Berkeley, California, for the semester-long program "Lower Bounds in Computational Complexity"
Mar '17 – Jan '19	**Senior Researcher**, Max-Planck Institute for Informatics, Department "Algorithms and Complexity", Saarbrücken, Germany
Aug '16 – Mar '17	**Mitarbeiter im wissenschaftlichen Bereich**, Max-Planck Institute for Informatics, Department "Algorithms and Complexity", Saarbrücken, Germany
Aug '14 – Dec '14	**Research Fellow** at the Simons Institute for the Theory of Computing, Berkeley, California, for the semester-long program "Algorithms and Complexity in Algebraic Geometry"
Sep '13 – Aug '16	**Visiting Assistant Professor** at Texas A&M University, College Station, Texas
Jan '13 – Apr '13	**Visiting Scholar** at Texas A&M University, College Station, Texas, guest of Prof. JM Landsberg
Dec '12 – Aug '13	**Wissenschaftlicher Mitarbeiter**, Universität Paderborn, Institute of Mathematics, working group "Algebraic Complexity and Algorithmic Algebra" of Prof. Peter Bürgisser

Education

2008 – 2012	**Dr. ret. nat.**, *summa cum laude*, Universität Paderborn, PhD thesis: "Geometric Complexity Theory, Tensor Rank, and Littlewood-Richardson Coefficients" Supervisor: Prof. Peter Bürgisser Date of defense: 2012-Dec-18
2004 – 2008	**Diplom in Mathematics**, Universität Paderborn Supervisor: Prof. Peter Bürgisser
2002 – 2008	**Diplom in Computer Science**, Universität Paderborn, thesis: "On the complexity of computing Kronecker coefficients and deciding positivity of Littlewood-Richardson coefficients" Supervisor: Prof. Peter Bürgisser
2002 – 2005	**Bachelor of Computer Science**, Universität Paderborn Supervisor: Prof. Wilhelm Schäfer **3-year scholarship** from Fujitsu Siemens Computers with several internships

Honors, Awards, Funding, Fellowships

2022	Research grant of the EPSRC: £430 596 (FEC) for a 3-year timeframe
2021	Fellowship of the Higher Education Academy (FHEA)
2019	Abilitazione Scientifica Nazionale – Settore Concorsuale 01/A2 Geometria e Algebra (required in Italy for a tenured associate professor position)
2018	Research grant of the Deutsche Forschungsgemeinschaft: 356 900 € for a 3-year timeframe
2018	Research Fellow at the Simons Institute for the Theory of Computing, Berkeley, USA (4 months)
2014	Research Fellow at the Simons Institute for the Theory of Computing, Berkeley, USA (4 months)
2013	Preis des Präsidiums für herausragende Dissertationen aus dem Jahr 2012/2013
2010	Preis der Universitätsgesellschaft Paderborn für herausragende Abschlussarbeiten

Publications

[DI24] J. Dörfler, C. Ikenmeyer. Functional Closure Properties of Finite $\mathbb{N}$-weighted Automata, accepted at *ICALP 2024*

[IK24] C. Ikenmeyer, P. Kullar. Advanced Spikes 'n' Stuff: An NP-hard puzzle game in which all tutorials are efficiently solvable, Accepted at *FUN with Algorithms 2024*

[DIKMNT24] P. Dutta, C. Ikenmeyer, B. Komarath, H. Mittal, S. Nanoti, D. Thakkar. On the power of border width-2 ABPs over fields of characteristic 2, *STACS 2024*

[DGIJL24] P. Dutta, F. Gesmundo, C. Ikenmeyer, G. Jindal, V. Lysikov. Fixed-parameter debordering of Waring rank, *STACS 2024*

[BCGHISZ23] S. Bravyi, A. Chowdhury, D. Gosset, V. Havlicek, C. Ikenmeyer, S. Subramanian, G. Zhu Quantum complexity of the Kronecker coefficients, `https://arxiv.org/abs/2307.02389`, accepted talk at QIP 2024 Taipei

[DGIJL23] P. Dutta, F. Gesmundo, C. Ikenmeyer, G. Jindal, V. Lysikov. Homogeneous Algebraic Complexity Theory and Algebraic Formulas, `https://arxiv.org/abs/2311.17019`, accepted for *Proceedings of the 15th Innovations in Theoretical Computer Science Conference (ITCS 2024)*

[IPP22] C. Ikenmeyer, I. Pak, G. Panova. Positivity of the symmetric group characters is as hard as the polynomial time hierarchy, *Proceedings of the 2023 Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 3573–3586, 2023. Journal version: International Mathematics Research Notices, rnad273

[IKS21] C. Ikenmeyer, B. Komarath, N. Saurabh. Karchmer-Wigderson Games for Hazard-free Computation, *Proceedings of the 14th Innovations in Theoretical Computer Science Conference (ITCS 2023)*, LIPIcs.ITCS.2023.74, 74:1–74:25

[GGIL22] F. Gesmundo, P. Ghosal, C. Ikenmeyer, V. Lysikov. Degree-restricted strength decompositions and algebraic branching programs, `https://arxiv.org/abs/2205.02149`, *Proceedings of the Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2022*, LIPIcs.FSTTCS.2022.20, 20:1–20:15

[IP22] C. Ikenmeyer, I. Pak. What is in #P and what is not, *Proceedings of FOCS 2022*, 860–871

[IS22] C. Ikenmeyer, A. Sanyal A note on VNP-completeness and border complexity, *Information Processing Letters* 176 (2022)

[BI22] M. Bläser, C. Ikenmeyer. Introduction to Geometric Complexity Theory, *preliminary lecture notes*, `https://people.mpi-inf.mpg.de/~cikenmey/teaching/summer17/introtogct/gct.pdf`, accepted for *Theory of Computing Graduate Surveys*

[BIMH22] P. Breiding, R. Hodges, C. Ikenmeyer, M. Michałek, Equations for GL invariant families of polynomials, *Vietnam Journal of Mathematics, 50, 545—556, (2022)*

[BDI21] M. Bläser, J. Dörfler, C. Ikenmeyer. On the complexity of evaluating highest weight vectors, *Proceedings of the 36th Computational Complexity Conference (CCC 2021), LIPIcs 200, 29:1–29:36, 2021*

[BILPS21] M. Bläser, C. Ikenmeyer, V. Lysikov, A. Pandey, F. Schreyer On the Orbit Closure Containment Problem and Slice Rank of Tensors, (full version with different title: `https://arxiv.org/abs/1911.02534`), *SODA 2021*

[FI20] N. Fischer, C. Ikenmeyer. The Computational Complexity of Plethysm Coefficients, *computational complexity*, 29, 8 (2020)

[GIMOWW20] A. Garg, C. Ikenmeyer, V. Makam, R. Oliveira, M. Walter, A. Wigderson. Search problems in algebraic complexity, GCT, and hardness of generator for invariant rings, *Proceedings of the 35th Computational Complexity Conference (CCC 2020), Leibniz International Proceedings in Informatics (LIPIcs)* 169, 12:1–12:17, 2020

[BIMPS20] M. Bläser, C. Ikenmeyer, M. Mahajan, A. Pandey, N. Saurabh. Algebraic Branching Programs, Border Complexity, and Tangent Spaces, *Proceedings of the 35th Computational Complexity Conference (CCC 2020), Leibniz International Proceedings in Informatics (LIPIcs)* 169, 21:1–21:24, 2020

[IK20] C. Ikenmeyer, U. Kandasamy. Implementing geometric complexity theory: On the separation of orbit closures via symmetries, *Proceedings of the 52nd Annual ACM SIGACT Symposium on Theory of Computing (STOC 2020)*, 713–726, 2020

[DIP20] J. Dörfler, C. Ikenmeyer, G. Panova. On geometric complexity theory: Multiplicity obstructions are stronger than occurrence obstructions, *46th International Colloquium on Automata, Languages, and Programming (ICALP 2019), volume 132 of Leibniz International Proceedings in Informatics (LIPIcs), Dagstuhl, Germany, 2019*, 51:1–51:14. Journal version: *SIAM Journal on Applied Algebra and Geometry (SIAGA), 4(2), 354–376, 2020.*

[BILR19] G. Ballard, C. Ikenmeyer, J.M. Landsberg and N. Ryder. The geometry of rank decompositions of matrix multiplication II: 3×3 matrices, *Journal of Pure and Applied Algebra*, 223(2019), 3205–3224

[BIP19] P. Bürgisser, C. Ikenmeyer, G. Panova. No occurrence obstructions in geometric complexity theory, *Journal of the AMS*, 32(2019), 163–193
Conference version: *Proceedings 57th Annual IEEE Symposium on Foundations of Computer Science (FOCS 2017)*, 386–395

[IL18] C. Ikenmeyer, V. Lysikov. Strassen's 2×2 matrix multiplication algorithm: A conceptual perspective, *Annali dell Universit'a di Ferrara*, 65(2), 241–248, 2019
Conference version: 10th International Conference "Discrete models in Theory of Control Systems", Moscow

[BIJL18] M. Bläser, C. Ikenmeyer, G. Jindal, V. Lysikov. Generalized matrix completion and algebraic natural proofs, *Proceedings of the ACM Symposium on the Theory Of Computing (STOC 2018)*, 1193–1206

[IKLLMS18] C. Ikenmeyer, B. Komarath, C. Lenzen, V. Lysikov, A. Mokhov, K. Sreenivasaiah. On the complexity of hazard-free circuits, *Proceedings of the ACM Symposium on the Theory Of Computing (STOC 2018)*, 878–889, Journal version: JACM

[CHILO18] L. Chiantini, J. Hauenstein, C. Ikenmeyer, J.M. Landsberg, G. Ottaviani. Polynomials and the exponent of matrix multiplication, *Bulletin of the London Mathematical Society*, 50, 369–389, 2018

[CILO19] L. Chiantini, C. Ikenmeyer, J.M. Landsberg, G. Ottaviani. The geometry of rank decompositions of matrix multiplication I: 2×2 matrices, *Experimental Mathematics*, 28(3), 322–327, 2019

[IM18] C. Ikenmeyer, S. Mengel. On the relative power of reduction notions in arithmetic circuit complexity, *Information Processing Letters*, 130, 7–10, 2018

[IP17] C. Ikenmeyer, G. Panova. Rectangular Kronecker coefficients and plethysms in geometric complexity theory, *Advances in Mathematics*, 319, 40–66, 2017
Conference version: *Proceedings 57th Annual IEEE Symposium on Foundations of Computer Science (FOCS 2017)*, 396–405.

[GIP17] F. Gesmundo, C. Ikenmeyer, G. Panova. Geometric complexity theory and matrix powering, *Differential Geometry and its Applications*, 55:106–127, 2017

[IMW17] C. Ikenmeyer, K. Mulmuley, M. Walter. On vanishing of Kronecker coefficients, *Computational Complexity*, 26(4):949–992, 2017

[BIZ17] K. Bringmann, C. Ikenmeyer, J. Zuiddam. On algebraic branching programs of small width, *Proceedings of the 32nd Computational Complexity Conference (CCC 2017), 20:1–20:31*
Journal version: *Journal of the ACM 65: pages 32:1–32:29, 2018*

[IL17] C. Ikenmeyer, J.M. Landsberg. On the complexity of the permanent in various computational models, *Journal of Pure and Applied Algebra, 221(12):2911–2927, 2017*

[BI17] P. Bürgisser, C. Ikenmeyer. Fundamental invariants of orbit closures, *Journal of Algebra 477:390–434, 2017*

[CIM16] M. Cheung, C. Ikenmeyer, S. Mkrtchyan. Symmetrizing Tableaux and the 5th case of the Foulkes Conjecture, *Journal of Symbolic Computation 80(3):833–843, 2016.*

[BHI17] P. Bürgisser, J. Hüttenhain, C. Ikenmeyer. Permanent versus determinant: not via saturations, *Proceedings of the AMS, 145:1247-1258, 2017*

[HI16] J. Hüttenhain, C. Ikenmeyer. Binary determinantal complexity, *Linear Algebra and its Applications 504:559–573, 2016.*

[Ike16] C. Ikenmeyer. Small Littlewood-Richardson coefficients, *Springer Journal of Algebraic Combinatorics, 44(1):1–29* (with typesetter's erratum on the next pages), *2016*

[AIR16] A. Abdesselam, C. Ikenmeyer, G. Royle. 16051 formulas for Ottaviani's invariant of cubic threefolds, *Journal of Algebra, 447:649–663, 2016*

[Ike15] C. Ikenmeyer. The Saxl Conjecture and the dominance order, *Discrete Mathematics, 338(11):1970–1975, 2015*

[GHIL16] F. Gesmundo, J. Hauenstein, C. Ikenmeyer, JM Landsberg. Complexity of linear circuits and geometry, *Foundations of Computational Mathematics 16(3):599–635, 2016*,

[HIL13] J. Hauenstein, C. Ikenmeyer, and J.M. Landsberg. Equations for lower bounds on border rank, *Experimental Mathematics, 22(4):372–383, 2013*

[BI13a] P. Bürgisser and C. Ikenmeyer. Deciding Positivity of Littlewood-Richardson Coefficients, *SIAM J. Discrete Math., 27(4):1639–1681, 2013*

[BI13b] P. Bürgisser and C. Ikenmeyer. Explicit Lower Bounds via Geometric Complexity Theory, *Proceedings 45th Annual ACM Symposium on the Theory Of Computing (STOC 2013), 141–150, 2013*

[Ike12] C. Ikenmeyer. Geometric Complexity Theory, Tensor Rank, and Littlewood-Richardson Coefficients, *PhD thesis, 2012, Universität Paderborn*, `http://digital.ub.uni-paderborn.de/ubpb/urn/urn:nbn:de:hbz:466:2-10472`

[BI11] P. Bürgisser and C. Ikenmeyer. Geometric Complexity Theory and Tensor Rank, *Proceedings 43rd Annual ACM Symposium on the Theory Of Computing (STOC 2011), 509–518, 2011*

[BCI11b] P. Bürgisser, M. Christandl, and C. Ikenmeyer. Even partitions in plethysms, *Journal of Algebra 328, 322–329, 2011*

[BCI11a] P. Bürgisser, M. Christandl and C. Ikenmeyer. Nonvanishing of Kronecker coefficients for rectangular shapes, *Advances in Mathematics 227, 2082–2091, 2011*

[BI09] P. Bürgisser and C. Ikenmeyer. A max-flow algorithm for positivity of Littlewood-Richardson coefficients, *FPSAC 2009, Hagenberg, Austria, DMTCS proc. AK, 267–278, 2009*

[BI08] P. Bürgisser and C. Ikenmeyer. The Complexity of Computing Kronecker Coefficients, *FPSAC 2008, Valparaiso-Viña del Mar, Chile, DMTCS proc. AJ, 357–368, 2008*

Publications under review

[IP23] C. Ikenmeyer, G. Panova. All Kronecker coefficients are reduced Kronecker coefficients, `https://arxiv.org/abs/2305.03003`

[HI21] L. Haas, C. Ikenmeyer. Young Flattenings in the Schur module basis, `https://arxiv.org/abs/2104.02363`

Talks

2023-Dec-2	3rd Warwick-Oxford-Imperial Complexity Network in-person meeting, Warwick, *Quantum complexity of the Kronecker coefficients*
2023-Nov-23	Algebra Seminar, University of Birmingham, *All Kronecker coefficients are reduced Kronecker coefficients*
2023-Oct-9	Algebra Seminar, Warwick, *All Kronecker coefficients are reduced Kronecker coefficients*
2023-Aug-16	Workshop on Algebra and Computation, Göteborg, Sweden, *Kronecker coefficients: Recent progress in algebraic combinatorics via computational complexity theory*
2023-Aug-7	The Copenhagen Summer of Counting & Algebraic Complexity, Copenhagen, Denmark, *Homogeneous algebraic complexity theory and constant constants*
2023-Aug-1	International Workshop on Operator Theory and its Applications (IWOTA) 2023, Special Session on Symmetries, Positivity, and Representations, Helsinki, Finland, *All Kronecker coefficients are reduced Kronecker coefficients*
2023-Jul-10	Algebraic Complexity Theory Workshop at ICALP 2023, Paderborn, Germany, *Introduction to Algebraic Complexity Theory – and how geometry enters*
2023-Jun-13	EPIT 2023: Le Kaléidoscope de la Complexité, Ile d'Oléron, France, *Geometric Complexity Theory*
2023-Jun-8	Warwick FoCS Theory Day 2023, *Homogeneous Algebraic Complexity*
2023-May-26	Warwick-Oxford-Imperial Complexity Network in-person meeting, Imperial College London, *Border Waring rank and Kumar's complexity*
2023-Jan-13	Warwick Combinatorics Seminar, *Characters of the symmetric group and combinatorial interpretations*
2022-Dec-8	Warwick-Oxford-Imperial Complexity Network in-person meeting, Imperial College London, *Hazard-free circuit complexity*
2022-Nov-14	Algebraic Geometry with Applications to TEnsors and Secants (AGATES), Algebraic geometry and complexity theory workshop, Warsaw, Poland, *Homogeneous algebraic computation*
2022-Nov-3	FOCS 2022, Denver, USA, *What is in #P and what is not?*

2022-Sep-28	Colloquium Logicum, Konstanz, *Algebraic combinatorics in geometric complexity theory*
2022-Sep-21	Conference Geometry in Complexity and Computations, Konstanz, Germany, *Geometric Complexity Theory*
2022-Sep-19	Algebraic Geometry with Applications to TEnsors and Secants (AGATES) kickoff workshop, Warsaw, Poland, *De-bordering symmetric border rank, and other open problems*
2022-Sep-12	Dagstuhl Seminar on algebraic and analytic methods in computational complexity, Dagstuhl, Germany, *The algebraic geometry of the closure properties of #P*
2022-Aug-29	Oberwolfach workshop on Character Theory and Categorification, Oberwolfach, Germany, *Positivity of the symmetric group characters is as hard as the polynomial time hierarchy: Squares of the characters of the symmetric group*
2022-Jul-4	Mathematical Approaches to Lower Bounds: Complexity of Proofs and Computation, ICMS, Bayes Centre, Edinburgh, UK, *Multiplicities in GCT: What is in #P and what is not?*
2022-Apr-25	Workshop on geometry and complexity theory, Toulouse Mathematics Institute, Toulouse, France, *GCT, de-bordering, computations, and combinatorics*
2022-Jan-28	University of York, Algebra Seminar, *Plethysms, power sums, and Young tableaux*
2022-Jan-25	gct2022: School and Conference on Geometric Complexity Theory (online) – Conference, *Implementing geometric complexity theory: On the separation of orbit closures via symmetries*
2022-Jan-21	gct2022: School and Conference on Geometric Complexity Theory (online) – Workshop, *Highest weight vectors, power sums, and Young tableaux*
2021-Nov-18	Oberwolfach meeting on complexity theory, *Dense subsets of VNP: Beyond border complexity*
2021-Aug-24	gct2022: School and Conference on Geometric Complexity Theory (online), *Geometric complexity theory - GCT1 and GCT2 and newer insights*
2021-May-17	IPAM workshop on Efficient Tensor Representations for Learning and Computational Complexity (online), *Minrank: On the Complexity of Orbit Closures*
2021-Apr-12	Paderborn University Theoretical Computer Science Seminar (online), *Geometric Complexity Theory*
2021-Jan-18	Oxford University, Geometry and Analysis Seminar, (online), *Representation theory in geometric complexity theory*
2020-Nov-30	Universität Konstanz, Oberseminar "Complexity Theory, Model Theory, Set Theory" (online), *The Computational Complexity of Plethysm Coefficients*
2020-Oct-15	Oxford-Warwick complexity meeting (online), *Recent progress on Geometric Complexity Theory*
2020-Oct-6	Los Angeles Combinatorics and Complexity Seminar (online), *The Computational Complexity of Plethysm Coefficients*
2020-Sep-18	Dagstuhl meeting 20385 Algebraic and Other Aspects of Complexity Theory, Dagstuhl, Germany,, *Algebraic Branching Programs, Border Complexity, and Tangent Spaces*
2020-Sep-17	Dagstuhl meeting 20385 Algebraic and Other Aspects of Complexity Theory, Dagstuhl, Germany,, *Tutorial on Geometric Complexity Theory Part II*
2020-Jul-1	Algorithms, Complexity Theory, and Optimisation (ACTO) seminar, University of Liverpool (online), *Implementing geometric complexity theory: On the separation of orbit closures via symmetries*
2020-Jun-24	Symposium on the Theory of Computing (STOC), Chicago (online), *Implementing geometric complexity theory: On the separation of orbit closures via symmetries*
2020-May-26	Nonlinear Algebra Seminar Online, Max Planck Institute for Mathematics in the Sciences, Leipzig (online), *Group varieties of polynomials and computational complexity*
2020-May-20	Kolloquium on algorithmic mathematics and complexity theory, TU Berlin (online), *Implementing Geometric Complexity Theory: On the Separation of Orbit Closures via Symmetries*
2020-May-13	CMI Webinar series on Recent Connections to GCT and Progress in GCT, Chennai Mathematical Institute (online), *Implementing Geometric Complexity Theory: On the Separation of Orbit Closures via Symmetries*
2020-Feb-28	Oberwolfach Mini-Workshop "Kronecker, Plethysm, and Sylow Branching Coefficients and their Applications to Complexity Theory", Oberwolfach, Germany, *Implementing geometric complexity theory: On the separation of orbit closures via symmetries*
2020-Feb-24	Oberwolfach Mini-Workshop "Kronecker, Plethysm, and Sylow Branching Coefficients and their Applications to Complexity Theory", Oberwolfach, Germany, *Introduction to geometric complexity theory, part II* (Greta Panova presented part I)

2020-Jan-7	Quantitative Logics and Automata Research Seminar, Leipzig, *Geometric complexity theory and fast matrix multiplication*
2019-Dec-11	Lower Bounds in Computational Complexity Reunion, Simons Institute, Berkeley, California, *Algebraic Branching Programs, Border Complexity, and Tangent Spaces*
2019-Nov-29	The Algebra, Geometry, and Topology Seminar, University of Kent, *Plethysm and Kronecker coefficients: Positivity and complexity*
2019-Nov-28	Algorithms and Complexity Theory Seminar, Oxford University, *Geometric Complexity Theory*
2019-Nov-19	Laboratory for Foundations of Computer Science (LFCS) Seminar, University of Edinburgh, *Geometric Complexity Theory*
2019-Oct-2	Algorithm, Complexity Theory, and Optimisation (ACTO) seminar, University of Liverpool, *On the complexity of hazard-free circuits*
2019-Sep-17	The 4th AlgoUK Workshop at the University of Warwick, invited talk, *Geometric Complexity Theory*
2019-Aug-20	Geometric Complexity Theory Mini Workshop, University of Tokyo, Toyko, Japan, *Border Complexity in GCT*
2019-Aug-21	Geometric Complexity Theory Mini Workshop, University of Tokyo, Toyko, Japan, *Multiplicity Obstructions are stronger than Occurrence Obstructions*
2019-Jun-3	Workshop on Dynamical Systems and Computation, Gump Research Station, Moorea, French Polynesia, *Open problems in algebraic and geometric complexity theory*
2019-Apr-30	Seminar at the Laboratoire de Mathématiques, Reims, France, *The continuant polynomial in geometric complexity theory*
2019-Mar-27	Workshop on Algebraic Complexity Theory (WACT 2019), Bangalore, India, *Multiplicity obstructions are stronger than occurrence obstructions*
2019-Mar-27	Workshop on Algebraic Complexity Theory (WACT 2019), Bangalore, India, *Invited tutorial: Introduction to Geometric Complexity Theory*
2019-Mar-19	Journée-séminaire de combinatoire, Laboratoire d'Informatique de Paris Nord, *Inequalities between plethysm coefficients and Kronecker coefficients via geometric complexity theory*
2019-Mar-13	Séminaire at the Laboratoire d'Informatique de Paris Nord, *Introduction to Geometric Complexity Theory*
2018-Dec-4	Lower Bounds in Computational Complexity, Algebraic Methods Workshop, Simons Institute, Berkeley, California, *Recent Progress on Representation Theoretic Multiplicities in GCT*
2018-Nov-20	Seminar at the Politecnico di Torino, DISMA, Turin, Italy, *Geometry, Computational Complexity, and Representation Theory*
2018-Oct-30	Texas A&M Geometry Working Seminar, College Station, Texas, *The Saxl Conjecture and the Dominance Order*
2018-Oct-29	Texas A&M Geometry Seminar, College Station, Texas, *On Algebraic Branching Programs of Small Width*
2018-Oct-25	Simons Fellows Talk, Simons Institute, Berkeley, California, *Width 2 Algebraic Branching Programs and Continued Fractions*
2018-Oct-23	Algebraic and Geometric Complexity Theory Reading Group, Simons Institute, Berkeley, California, *Young flattenings*
2018-Oct-2	Algebraic and Geometric Complexity Theory Reading Group, Simons Institute, Berkeley, California, *No occurrence obstructions in geometric complexity theory*
2018-Sep-12	Lower Bounds in Computational Complexity, Boolean Devices workshop, Short Communications, Simons Institute, Berkeley, California, *The Complexity of Hazard-Free Circuits*
2018-Sep-4	Algebraic and Geometric Complexity Theory Reading Group, Simons Institute, Berkeley, California, *Introduction to the representation theory of the general linear group*
2018-Aug-22	Lower Bounds in Computational Complexity Boot Camp, Simons Institute, Berkeley, California, *Geometric Complexity Theory: Complexity Lower Bounds Using Algebraic Geometry and Representation Theory*
2018-Aug-15	19th Max Planck Advanced Course on the Foundations of Computer Science, Saarbrücken, Germany, *Some geometric ideas in algebraic complexity theory*
2018-Jun-27	STOC 2018, 50th ACM Symposium on Theory of Computing, Los Angeles, California, *On the complexity of hazard-free circuits*

2018-Mar-20	Seminar on Nonlinear Algebra, Max Planck Institute for Mathematics in the Sciences, Leipzig, *Implicit construction of polynomials by symmetrization of Young tableaux*
2018-Mar-12	Lie Groups and Representation Theory Seminar at the University of Tokyo, Japan, *Plethysms and Kronecker coefficients in geometric complexity theory*
2018-Mar-8	Workshop on Mathematics in Computation Theory "Geometric Complexity Theory and Related Topics", Tohoku University, Sendai, Japan, *Two topics in geometric complexity theory: The continuant and matrix multiplication*
2018-Mar-7	Workshop on Mathematics in Computation Theory "Geometric Complexity Theory and Related Topics", Tohoku University, Sendai, Japan, *Geometric Complexity Theory: An ambitious approach towards P versus NP*
2018-Mar-6	Geometric complexity seminar at the University of Tokyo, Japan, *Representation theory and algebraic geometry in geometric complexity theory*
2018-Jan-16	Algorithms and complexity noon seminar at the Max-Planck Institute for Informatics, Saarbrücken, Germany, *On algebraic branching programs of small width*
2017-Dec-8	Complexity Theory Seminar, Saarland University, Germany, *Strassen's* 2×2 *matrix multiplication algorithm: A conceptual perspective*
2017-Nov-16	Kolloquium Algorithmische Mathematik und Komplexitätstheorie, TU Berlin, Germany, *Width 2 algebraic branching programs and the continuant*
2017-Oct-20	31st International Symposium on Distributed Computing (DISC 2017), Workshop on Hardware Design and Theory (HDT), Vienna, Austria, *Three-valued Logic, Hazards, and Monotone Circuits*
2017-Sep-6	MPI-INF/SWS Joint Lecture Series, Saarbrücken, Germany, *Geometric Complexity Theory: An ambitious approach towards P versus NP*
2017-Jun-8	Oberseminar Algebraische Geometrie, Universität des Saarlandes, Germany, *Formula size, iterated matrix multiplication, and algebraic geometry*
2017-Feb-7	Workshop on metastability, Technische Universität Vienna, Austria, *Metastability containing circuit complexity*
2016-Nov-28	Oberseminar zur Algebra und Algebraischen Kombinatorik, Leibniz Universität Hannover, Germany, *Kronecker coefficients, plethysm coefficients, and geometric complexity theory*
2016-Oct-10	FOCS 2016, 57th Annual IEEE Symposium on Foundations of Computer Science, New Brunswick, New Jersey, Two papers: *No Occurrence Obstructions in Geometric Complexity Theory and Rectangular Kronecker Coefficients and Plethysms in Geometric Complexity Theory*
2016-Sep-25	Special Session on Plethysm and Kronecker Products in Representation Theory, AMS Fall Eastern Sectional Meeting, Brunswick, Maine, *Kronecker coefficients and plethysms in geometric complexity theory*
2016-Sep-6	Kronecker Coefficients Conference 2016, City University London, *Positivity of Kronecker coefficients, geometry, and geometric complexity theory*
2016-Sep-2	17th Max Planck Advanced Course on the Foundations of Computer Science, Saarbrücken, Germany, *New matrix multiplication algorithms*
2016-Aug-11	Algorithms and complexity noon seminar at the Max-Planck Institute for Informatics, Saarbrücken, Germany, *No occurrence obstructions in geometric complexity theory*
2016-Jul-21	7th European congress of Mathematics, Berlin, Germany, *Rectangular Kronecker coefficients, plethysms, and the non-existence of occurrence obstructions in geometric complexity theory*
2016-Jul-12	Differential Geometry and its Applications, Brno, Czech Republic, *Matrix multiplication algorithms with symmetry*
2016-May-5	Texas A&M Geometry Working Seminar, College Station, Texas, *The geometry of* 2×2 *matrix multiplication*
2016-Mar-3	Texas A&M Graduate Student Seminar, College Station, Texas, *Introduction to geometric complexity theory*
2016-Feb-18 and 2016-Feb-25	Texas A&M Geometry Working Seminar, College Station, Texas, *Homogeneous Iterated Matrix Multiplication, Determinants, and Algebraic Branching Programs*
2016-Feb-7	Workshop on Algebraic Complexity Theory (WACT 2016), Tel Aviv, Israel, *Rectangular Kronecker coefficients and plethysms in geometric complexity theory*
2016-Jan-21	Texas A&M Geometry Working Seminar, College Station, Texas, *The Mahajan-Vinay construction for the determinant*

2015-Dec-14	Algorithms and Complexity in Algebraic Geometry Reunion, Simons Institute, Berkeley, California, *On Vanishing of Kronecker Coefficients*
2015-Dec-9	Texas A&M Geometry Working Seminar, College Station, Texas, *Rectangular Kronecker coefficients and plethysms in geometric complexity theory*
2015-Nov-11	Texas A&M Geometry Working Seminar, College Station, Texas, *Fundamental invariants of orbit closures*
2015-Oct-1	Philadelphia Area Combinatorics and Alg. Geometry Seminar (CAGE), Philadelphia, Pennsylvania, *Plethysms and Kronecker coefficients*
2015-Sep-7	Texas A&M Geometry Seminar, College Station, Texas, *Plethysms and Kronecker coefficients*
2015-Aug-7	Applied Algebraic Geometry AG15, Geometric Complexity Theory, Daejeon, South Korea, *Permanent versus determinant: not via saturations*
2015-Aug-3	Applied Algebraic Geometry AG15, Geometry of Matrix Multiplication, Daejeon, South Korea, *Deciding Positivity of Kronecker Coefficients is NP-hard*
2015-Jun-25	Algebraic Complexity Meeting, ENS Lyon, France, *Isotypic components in coordinate rings of orbit closures*
2015-May-29	Workshop on NonLinear Algebra: Interactions among Algebraic Geometry, Combinatorics, Commutative Algebra, Convexity, Statistics, Optimization and Computational Biology, Berlin, Germany, *Complexity of Matrix Multiplication*
2015-May-21	Computer Science Department Seminar, University of Chicago, Illinois, *Geometric Complexity Theory and Tensor Rank of Matrix Multiplication*
2015-Apr-2	Mathematics Colloquium, Dartmouth College, Hanover, New Hampshire, *Geometric Complexity Theory*
2015-Mar-25 and 2015-Mar-31	Texas A&M Geometry Working Seminar, College Station, Texas, *McKay's propagation theorem for the Hermite-Hadamard-Howe map*
2015-Jan-6	Quantum Mathematics Group Seminar, University of Copenhagen, Denmark, *Kronecker and plethysm coefficients in Geometric Complexity Theory*
2014-Dec-12	Foundations of Computational Mathematics, Montevideo, Uruguay, *Geometric Complexity Theory, Tensor Rank, and Representation Theory*
2014-Dec-4	Geometry Working Seminar at the Simons Institute, Berkeley, California, *Plethysms, Gay's Theorem, and the Foulkes-Howe map*
2014-Nov-3	AIM Workshop: Combinatorics and complexity of Kronecker coefficients, Palo Alto, California, *Geometric Complexity Theory and Kronecker Coefficients*
2014-Sep-17	Geometric Complexity Theory Workshop, Algorithms and Complexity in Algebraic Geometry, Simons Institute, Berkeley, California, *Geometric Complexity Theory and Tensor Rank*
2014-Sep-2 and 2014-Sep-5	Algebraic Geometry Boot Camp, Algorithms and Complexity in Algebraic Geometry, Simons Institute, Berkeley, California, *Writing down polynomials via representation theory*
2014-Jul-14	An Interdisciplinary Approach to Tensor Decomposition, Trento, Italy, *16051 formulas for Ottaviani's invariant of cubic threefolds*
2014-May-26	Graduiertenkolleg: Methods for Discrete Structures, Colloquium, TU/FU/HU Berlin, Germany, *Introduction to Geometric Complexity Theory*
2014-May-22	Oberseminar Algorithmische Mathematik und Komplexitätstheorie, TU Berlin, Germany, *Hypergraph colorings and explicit formulas for Ottaviani's invariant of cubic threefolds*
2014-May-10	Symposium Diskrete Mathematik, Frankfurt, Germany, *16051 formulas for Ottaviani's invariant of cubic threefolds*
2014-Apr-13	2014 AMS Central Sectional Meeting, Lubbock, Texas, *16051 formulas for Ottaviani's invariant of cubic threefolds*
2014-Apr-5	(poster) Texas Algebraic Geometry Symposium, Houston, Texas, *16051 formulas for Ottaviani's invariant of cubic threefolds*
2014-Mar-28	Texas A&M Geometry Working Seminar, College Station, Texas, *Graph-theoretical construction of invariants*
2014-Mar-2	Southwest Local Algebra Meeting, College Station, Texas, *Explicit formulas for Ottaviani's invariant of cubic threefolds*
2013-Oct-8	Postdoc colloquium, College Station, Texas, *Geometric Complexity Theory*
2013-Oct-1	Texas A&M Geometry Working Seminar, College Station, Texas, *Comparing two approaches for analyzing the Foulkes-Howe map*

2013-Jun-2	STOC 2013, 45th ACM Symposium on Theory of Computing, Palo Alto, California, *Explicit Lower Bounds via Geometric Complexity Theory*
2013-Mar-7	Texas A&M Student/Postdoc Geometry Working Seminar, College Station, Texas, *A proof of Weintraub's Conjecture on $Sym^d Sym^n V$*
2013-Feb-22	UNC Geometric Methods in Representation Theory Seminar, Chapel Hill, North Carolina, *Explicit Lower Bounds via Geometric Complexity Theory*
2013-Feb-1	Texas A&M Algebra and Combinatorics Seminar, College Station, Texas, *Small Littlewood-Richardson Coefficients*
2013-Jan-25	Texas A&M Geometry Seminar, College Station, Texas, *Explicit Lower Bounds via Geometric Complexity Theory*
2013-Jan-17	(coauthor) Dagstuhl Seminar on Computational Counting, Dagstuhl, Germany, *Geometric Complexity Theory and Counting*
2013-Jan-10	(with Ryan Kinser) Organizer of the AMS Special Session on Geometric Complexity Theory, San Diego, California
2013-Jan-10	Joint Mathematics Meetings 2013, Geometric Complexity Theory, San Diego, California, *Geometric Complexity Theory and Tensor Rank*
2012-Jun-20	Mathematics Research Community: Geometry and Representation Theory Related to Geometric Complexity and Other Variants of P v NP, Snowbird, Utah, *What is known about Kronecker coefficients?*
2012-Mar-3	Quantum Information Theory Group Seminar, ETH Zürich, Switzerland, *A max-flow algorithm for positivity of Littlewood-Richardson coefficients*
2011-Jun-16	Doktorandentagung Darstellungstheorie, Bonn, Germany, *Representation Theory in Geometric Complexity Theory*
2011-Jun-7	STOC 2011, 43rd ACM Symposium on Theory of Computing San Jose, California, *Geometric Complexity Theory and Tensor Rank*
2011-May-13	AG-Seminar Logik, TU Darmstadt, Germany, *Introduction to Geometric Complexity Theory and Tensor Rank*
2011-Apr-12	Discrete Optimization Group Disopt, Lausanne, Switzerland, Seminar "Combinatorial Geometry and Optimization", *Introduction to Geometric Complexity Theory*
2011-Mar-23	Oberseminar Codes und Kryptographie, Paderborn, *Introduction to Geometric Complexity Theory*
2010-Oct-7	Summer School "Geometry and Combinatorics in Representation Theory of Lie Algebras — Crystals, Path-Model, Quiver Varieties", Cologne, Germany, *A max-flow algorithm for positivity of Littlewood-Richardson coefficients*
2010-Jul-10	DIMACS and The Princeton Center for Computational Intractability Joint Workshop on Geometric Complexity Theory (GCT), *A max-flow algorithm for positivity of Littlewood-Richardson coefficients*
2010-Jul-8	DIMACS and The Princeton Center for Computational Intractability Joint Workshop on Geometric Complexity Theory (GCT), *GCT: Littlewood-Richardson coefficients, Kronecker coefficients and algorithms*
2010-Jan-26	LMU Munich, Germany, *Introduction to Geometric Complexity Theory*
2009-Nov-26	"Mathematical Foundations of Quantum Information", School and Workshop organized by the Mathematical Research Institute of the University of Sevilla (IMUS) and the Department of Algebra of the Universidad de Sevilla, *A max-flow algorithm for positivity of Littlewood-Richardson coefficients*
2009-Jul-22	21st International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Hagenberg, Austria, *A max-flow algorithm for positivity of Littlewood-Richardson coefficients*
2008-Jul-2	Discrete Optimization Group Disopt, Lausanne, Switzerland, Seminar "Combinatorial Geometry and Optimization", *A combinatorial polynomial time algorithm for deciding the positivity of Littlewood Richardson coefficients*
2008-Jun-24	20th Annual International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Valparaiso Viña del Mar, Chile, *The complexity of computing Kronecker coefficients*

Program committees and organization

2024 Program committee member of *Symposium on the Theory of Computing* (STOC 2024)

2023 with Pranjal Dutta and Vladimir Lysikov: Organizer of the *Algebraic Complexity Theory Workshop at ICALP 2023*, Paderborn, Germany
`https://www.dcs.warwick.ac.uk/~u2270030/act2023icalp`

2023 Organizer of the *7th Workshop on Algebraic Complexity Theory (WACT)*, Warwick
`https://www.dcs.warwick.ac.uk/~u2270030/wact`

2022 with Austin Conner: Organizer of the "Computational Methods" working group at the *Workshop on geometry and complexity theory*, Toulouse Mathematics Institute
`https://indico.math.cnrs.fr/event/7161`

2021 with Thomas Seiller, K. V. Subrahmanyam, Neeraj Kayal, Visu Makam, and Michael Walter: Organizer for the online lecture series for the *School and Conference on Geometric Complexity Theory* (gct2022)
`https://gct2022.sciencesconf.org`

2020 Program committee member of the *Symposium on Theoretical Aspects of Computer Science* (STACS 2020)
`https://stacs2020.sciencesconf.org`

2019 with Mateusz Michałek: Organizer of the MPI-INF and MPI-MiS joint workshop on *Theoretical Computer Science and Algebraic Geometry* (TCS+AG)
`http://people.mpi-inf.mpg.de/~cikenmey/tcsag/`

2018 Program committee member of *Innovations in Theoretical Computer Science* (ITCS 2018)
`https://projects.csail.mit.edu/itcs`

2017 with Michael Sagraloff: Organizer of the 18th Max Planck Advanced Course on the Foundations of Computer Science (ADFOCS 2017) on *Algebraic Complexity Theory and Computer Algebra* `https://conferences.mpi-inf.mpg.de/adfocs-17`

2013 with Ryan Kinser: Organizer of the AMS Special Session on *Geometric Complexity Theory*, Joint Mathematics Meetings 2013, San Diego, California
`https://www.jointmathematicsmeetings.org//meetings/national/jmm2013/2141_program_ss73.html`

Peer review

Reviewer for conferences and journals in mathematics and theoretical computer science, including (alphabetically):

- ACM-SIAM Symposium on Discrete Algorithms (SODA)
- ACM Symposium on Theory of Computing (STOC)
- Algebraic Combinatorics
- Applied Mathematics and Computation
- Beiträge zur Algebra und Geometrie / Contributions to Algebra and Geometry
- Communications in Mathematical Physics
- Comptes Rendus Mathématique
- computational complexity
- Computational Complexity Conference (CCC)
- Conference on Theory of Quantum Computation and Cryptography (TQC)
- Discrete Mathematics
- Effective Methods in Algebraic Geometry (MEGA)
- European Journal of Combinatorics
- Experimental Mathematics
- Formal Power Series and Algebraic Combinatorics (FPSAC)
- Forum of Mathematics, Pi
- Information Processing Letters
- Innovations in Theoretical Computer Science (ITCS)
- International Colloquium on Automata, Languages and Programming (ICALP)
- International Computing and Combinatorics Conference (COCOON)
- International Conference on Randomization and Computation (RANDOM)
- Internat. Symposium on Mathematical Foundations of Computer Science (MFCS)
- International Symposium on Symbolic and Algebraic Computation (ISSAC)
- Journal of Algebra
- Journal of Algebraic Combinatorics
- Journal of Experimental Algorithmics
- Journal of Pure and Applied Algebra
- Journal of Symbolic Computation
- Journal of the ACM
- Journal of the AMS
- Latin American Symposium on Theoretical Informatics (LATIN)
- Linear and Multilinear Algebra
- Representation Theory – An electronic journal of the AMS
- SIAM Journal on Computing
- Symposium on Foundations of Computer Science (FOCS)
- Symposium on Logic in Computer Science (LICS)
- Symposium on Theoretical Aspects of Computer Science (STACS)
- Theory of Computing
- Transactions of the American Mathematical Society
- Workshop on Approximation and Online Algorithms (WAOA)

Teaching

University of Warwick

2023/24	**Groups and Representations**, lecturer
2023/24	**Computer Science MSc projects**, coordinator
2023/24	**UKIEPC, NWERC**, programming contest coach
2022/23	**Computer Science MSc projects**, coordinator
2022/23	**UKIEPC, NWERC**, programming contest coach

University of Liverpool

Summer 2022	**MSc projects**, coordinator
First 2021	**Optimisation**, lecturer
Summer 2021	**MSc projects**, coordinator
First 2020	**Optimisation**, lecturer
First 2019	**Optimisation**, lecturer

Universität des Saarlandes

Summer 2018	**A first introduction to geometric complexity theory**, lecturer
Winter 2017/18	**Geometric complexity theory 2**, lecturer, joint with Prof. Markus Bläser
Summer 2017	**Introduction to geometric complexity theory**, lecturer, joint with Prof. Markus Bläser

Texas A&M University

Spring 2016	**Communications and Cryptography**, lecturer for two parallel lectures
Fall 2015	**Communications and Cryptography**, lecturer
Spring 2015	**Engineering Mathematics II**, lecturer for two parallel lectures
Spring 2014	**Discrete Mathematics**, lecturer for two parallel lectures
Fall 2013	**Discrete Mathematics**, lecturer

Universität Paderborn

2004–2013	Tutorials, grading homework, and stand-in lecturer for Foundations of Programming Languages, Linear Algebra 1, Practical Training in Linear Algebra, Computer Algebra, Introduction to Algebra, Complexity Theory 2, Mathematics for Computer Scientists, Introduction to Algebraic Geometry, Calculus for Computer Scientists, Linear Algebra for Computer Scientists, Representation Theory, Seminar on Discrete Mathematics, Elementary Geometry

Last updated: 2024-Apr-15