

Christian Ikenmeyer

Contact Information

Address Max Planck Institute for Informatics
Group D1 – Algorithms and Complexity
Building E1 4, Campus, Stuhlsatzenhausweg, 66123 Saarbrücken, Germany

E-Mail cikenmey@mpi-inf.mpg.de

Website <http://people.mpi-inf.mpg.de/~cikenmey/>

Positions

Feb '19 – today **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

- 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

- [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.
- [BILR18] G. Ballard, C. Ikenmeyer, J.M. Landsberg and N. Ryder. The geometry of rank decompositions of matrix multiplication II: 3×3 matrices, accepted for publication in *Journal of Pure and Applied Algebra*, <https://www.sciencedirect.com/science/article/pii/S0022404918302548?via%3Dihub>
- [IL18] C. Ikenmeyer, V. Lysikov. Strassen’s 2×2 matrix multiplication algorithm: A conceptual perspective, 10th International Conference “Discrete models in Theory of Control Systems”, Moscow, full version online at arXiv:1708.08083
- [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, accepted for publication in the Journal of the ACM
- [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
- [CILO17] L. Chiantini, C. Ikenmeyer, J.M. Landsberg, G. Ottaviani. The geometry of rank decompositions of matrix multiplication I: 2×2 matrices, *Experimental Mathematics*, <https://doi.org/10.1080/10586458.2017.1403981>
- [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

- [DIP19] J. Dörfler, C. Ikenmeyer, G. Panova. On geometric complexity theory: Multiplicity obstructions are stronger than occurrence obstructions, *curr. being reviewed*, arXiv:1901.04576
- [BI18] M. Bläser, C. Ikenmeyer. Introduction to Geometric Complexity Theory, *preliminary lecture notes*, <https://people.mpi-inf.mpg.de/~cikenmey/teaching/summer17/introtogct/gct.pdf>
- [Ike15] C. Ikenmeyer. On McKay’s propagation theorem for the Foulkes conjecture, *curr. being reviewed*, arXiv:1509.04957

Highlights

STOC, FOCS,
JAMS, JACM

BIJL18, IKLLMS18, IP17, BIZ17, BIP19, BI13b, BI11

Talks

- 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

- 2019 with Mateusz Michałek: Organizer of the MPI-INF and MPI-MiS joint workshop on *Theoretical Computer Science and Algebraic Geometry* (TCS+AG)
- 2018 Program committee member for *Innovations in Theoretical Computer Science* (ITCS 2018)
- 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*
- 2013 with Ryan Kinser: Organizer of the AMS Special Session on *Geometric Complexity Theory*, Joint Mathematics Meetings 2013, San Diego, California

Peer review

External reviewer for Czech GACR funding at the Standard Project level

External reviewer for the Polish NCN funding at the SONATA level

Reviewer for conferences and journals in theoretical computer science and mathematics, including JACM, STOC, CCC, SODA, ICALP, RANDOM, MFCS, LICS, WAOA, MEGA, FPSAC, JPAA, JACO, ALCO, JSC, SICOMP, Comp Compl, ToC, Disc Math, Exp Math, J Alg, Europ J Comb, Beitr Alg Geom, J Exp Algor, Lin Multilin Alg, J Pure App Alg, Comptes Rendus Math

Teaching Experience

Universität des Saarlandes (summer and winter semesters)

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 (fall and spring semesters)

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

Saarbrücken, Germany, 2019-Feb-04