

PERSONAL INFORMATION	Technische Universität Dresden Bereich Mathematik und Naturwissenschaften Fakultät Mathematik Institut für Geometrie D-01069 Dresden <i>Born:</i> 19th of July 1989 <i>Nationality:</i> German <i>E-mail:</i> mario.kummer@tu-dresden.de <i>Phone:</i> +49-351-463-35719 <i>Webpage:</i> https://tud.link/glo
EMPLOYMENT	Technische Universität Dresden, Dresden, Germany Junior Professor (W1TTW2) for “Real Algebraic Geometry”, since October 2020, positively evaluated 2025 Technische Universität Berlin, Berlin, Germany Junior Professor (W1) for “Computeralgebra”, January 2018 – September 2020 Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany Postdoctoral Research Assistant, August 2016 – December 2017
EXTENDED STAYS	Korea Institute for Advanced Study, Seoul, South Korea Visiting Scholar, February–March, 2024 • Host: June E Huh Simons Institute for the Theory of Computing, Berkeley, USA Invited Long Term Visitor, February–March, 2019 • Participation in the program “Geometry of Polynomials” Simons Institute for the Theory of Computing, Berkeley, USA Visiting Graduate Student, August–December, 2014 • Participation in the program “Algorithms and Complexity in Algebraic Geometry”
EDUCATION	Universität Konstanz, Konstanz, Germany Dr. rer. nat., Mathematics, July 2016 (summa cum laude) • Dissertation Topic: “From Hyperbolic Polynomials to Real Fibered Morphisms” • Advisor: Claus Scheiderer M.Sc., Mathematics with minor in Economics, April 2013 (1.0) B.Sc., Mathematics with minor in Psychology, September 2011 (1.0)
GRANTS	DFG grant 502861109 “Real algebraic geometry, convexity and topology”, 213.400€, November 2022 — November 2025 DFG grant 421473641 “Spectrahedra and Hyperbolic Polynomials”, 197.900€, October 2019 — September 2022 Ph.D. fellowship with the German National Academic Foundation, October 2013 — March 2016

STAFF	David Sawall, since April 2026
	Clemens Brüser, November 2022 – March 2026
	Dmitrii Pavlov, October 2024 – September 2025
	Christoph Schulze, October 2020 – September 2024
	Büşra Sert, October 2019 – December 2022
	Philipp di Dio, October 2018 – September 2020
FINISHED PHD STUDENTS	Clemens Brüser, 2026.
	Büşra Sert, 2023.
AWARDS	Best dissertation prize, awarded by the department for mathematics and statistics at the university of Konstanz, 2017
	Main prize of the DMV for my master’s thesis, titled “Real Polynomials with Definite Determinantal Representation”, 2013
	Prize of the Staatsanzeiger for my master’s degree, 2014
PUBLISHED ARTICLES	<i>A signed count of 2-torsion points on real abelian varieties.</i> Annali della Scuola Normale Superiore di Pisa , 27(1), 305–335, 2026. https://doi.org/10.2422/2036-2145.202303.003
	<i>Ulrich sheaves, the arithmetic writhe and algebraic isotopies of space curves</i> , with D. Agostini. Geometry & Topology , 30(3), 1155–1201, 2026. https://dx.doi.org/10.2140/gt.2026.30.1155
	<i>Spectrahedral Shadows and Completely Positive Maps on Real Closed Fields</i> , with M. Boudirsky and A. Thom, Journal of the European Mathematical Society , 28(5), 2233–2259, 2026. https://doi.org/10.4171/jems/1509
	<i>Adjoints of Polytopes: Determinantal Representations and Smoothness</i> , with C. Brüser and D. Pavlov, International Mathematics Research Notices , 2026(2), rnaf386, 2026. https://doi.org/10.1093/imrn/rnaf386
	<i>(Positive) Quadratic Determinantal Representations of Quartic Curves and the Robinson Polynomial</i> , with C. Brüser, Linear Algebra and its Applications , 728, 232–262, 2026. https://doi.org/10.1016/j.laa.2025.09.006
	<i>Two results on the Convex Algebraic Geometry of sets with continuous symmetries</i> , with R. Bettiol and R. Mendes, Bulletin of the London Mathematical Society , 57(5), 1388–1408, 2025. https://doi.org/10.1112/blms.70035
	<i>Three results related to the half-plane property of matroids</i> , with D. Sawall, Algebraic Combinatorics , 8(1), 1–15, 2025.

<https://doi.org/10.5802/alco.399>

Maximal Mumford Curves from Planar Graphs, with B. Sturmfels and R. Vlad,
Pure and Applied Mathematics Quarterly, 21(4), 1689–1719, 2025. <https://dx.doi.org/10.4310/PAMQ.250402030514>

Higher Dimensional Fourier Quasicrystals from Lee-Yang Varieties, with L. Alon, P. Kurasov and C. Vinzant,
Inventiones mathematicae, 239, 321–376, 2025.
<https://doi.org/10.1007/s00222-024-01307-8>

Equivariant algebraic and semi-algebraic geometry of infinite affine space, with C. Riener,
Journal of Algebra, 666, 28–46, 2025.
<https://doi.org/10.1016/j.jalgebra.2024.11.016>

Geography of pinched four-manifolds, with R. Bettiol and R. Mendes,
Communications in Analysis and Geometry, 32(5), 1255–1310, 2024.
<https://dx.doi.org/10.4310/CAG.241120233719>

Some thoughts and experiments on Bergman’s compact amalgamation problem, with M. Joswig, A. Thom and C. Yun,
Beiträge zur Algebra und Geometrie, 65, 789–807, 2024.
<https://doi.org/10.1007/s13366-023-00709-8>

Positive Ulrich Sheaves, with C. Hanselka,
Canadian Journal of Mathematics, 76(3), 881–914, 2024.
<https://doi.org/10.4153/S0008414X23000263>

Bounding the signed count of real bitangents to plane quartics, with S. McKean,
Manuscripta Mathematica, 173, 1003–1013, 2024.
<https://doi.org/10.1007/s00229-023-01493-4>

Linear Principal Minor Polynomials: Hyperbolic Determinantal Inequalities and Spectral Containment, with G. Blekherman, R. Sanyal, K. Shu and S. Sun,
International Mathematics Research Notices, 2023(24), 21346–21380, 2023.
<https://doi.org/10.1093/imrn/rnac291>

Matroids on Eight Elements with the Half-plane Property and Related Concepts, with B. Sert,
SIAM Journal on Discrete Mathematics, 37(3), 2208–2227, 2023.
<https://doi.org/10.1137/22M1490648>

Real-fibered morphisms of del Pezzo surfaces and conic bundles, with C. Le Texier and M. Manzaroli,
Discrete & Computational Geometry, 69, 849–872, 2023.
<https://doi.org/10.1007/s00454-022-00427-3>

Hyperbolic Secant Varieties of M -Curves, with R. Sinn.
Journal für die reine und angewandte Mathematik, 787, 125–162, 2022.
<https://doi.org/10.1515/crelle-2022-0012>

Iso Edge Domains, with M. Dutour Sikirić.
Expositiones Mathematicae, 40(2), 302–314, 2022.
<https://doi.org/10.1016/j.exmath.2021.09.004>

Nodes on quintic spectrahedra, with T. Brysiewicz and K. Kozhasov.

Le Matematiche, 76(2), 415–430, 2021.
<https://doi.org/10.4418/2021.76.2.8>

A generalization of the space of complete quadrics, with A. Al Ahmadi and M.-S. Sorea.
Le Matematiche, 76(2), 431–446, 2021.
<https://doi.org/10.4418/2021.76.2.9>

On Huisman’s conjectures about unramified real curves, with D. Manevich.
Advances in Geometry, 21(4), 545–549, 2021.
<https://doi.org/10.1515/advgeom-2021-0032>

Deformations of Hyperbolic Varieties, with E. Shamovich.
Moscow Mathematical Journal, 21(3), 593–612, 2021.
<http://dx.doi.org/10.17323/1609-4514-2021-21-3-593-612>

The multidimensional truncated Moment Problem: Carathéodory Numbers from Hilbert Functions, with Philipp J. di Dio.
Mathematische Annalen, 380(1), 267–291, 2021.
<http://dx.doi.org/10.1007/s00208-021-02166-x>

Convex Algebraic Geometry of Curvature Operators, with R. Bettiol and R. Mendes.
SIAM Journal on Applied Algebra and Geometry, 5(2), 200–228, 2021.
<https://doi.org/10.1137/20M1350777>

Spectral linear matrix inequalities.
Advances in Mathematics, 384, 107749, 2021.
<http://doi.org/10.1016/j.aim.2021.107749>

Generalized Eigenvalue Methods for Gaussian Quadrature Rules, with G. Blekherman, C. Riener, M. Schweighofer, and C. Vinzant.
Annales Henri Lebesgue, 3, 1327–1341, 2020.
<http://doi.org/10.5802/ahl.62>

The Separating Semigroup of a Real Curve, with K. Shaw.
Annales de la Faculté des Sciences de Toulouse, 29(1), 79–96, 2020.
<http://doi.org/10.5802/afst.1624>

Real Fibered Morphisms and Ulrich Sheaves, with E. Shamovich.
Journal of Algebraic Geometry, 29, 167–198, 2020.
<http://dx.doi.org/10.1090/jag/735>

Spectrahedral Representations of Plane Hyperbolic Curves, with S. Naldi and D. Plaumann.
Pacific Journal of Mathematics, 303(1), 243–263, 2019.
<http://dx.doi.org/10.2140/pjm.2019.303.243>

Totally Real Theta Characteristics.
Annali di Matematica Pura ed Applicata, 198(6), 2141–2150, 2019.
<http://dx.doi.org/10.1007/s10231-019-00858-5>

The Chow Form of a Reciprocal Linear Space, with C. Vinzant.
Michigan Mathematical Journal, 68(4), 831–858, 2019.
<http://dx.doi.org/10.1307/mmj/1571731287>

Schottky Algorithms: Classical meets Tropical, with L. Chua and B. Sturmfels.

Mathematics of Computation, 88, 2541–2558, 2019.
<http://dx.doi.org/10.1090/mcom/3406>

Sixty-Four Curves of Degree Six, with N. Kailhnsa, D. Plaumann, M. Sayyary Namin and B. Sturmfels.

Experimental Mathematics, 28(2), 132–150, 2019.
<http://dx.doi.org/10.1080/10586458.2017.1360808>

On the Connectivity of the Hyperbolicity Region of Irreducible Polynomials.

Advances in Geometry, 19(2), 231–233, 2019.
<http://dx.doi.org/10.1515/advgeom-2017-0055>

Interlacing Ehrhart Polynomials of Reflexive Polytopes, with A. Higashitani and M. Michałek.

Selecta Mathematica, 23(4), 2977–2998, 2017.
<http://dx.doi.org/10.1007/s00029-017-0350-6>

On the Real Rank of Monomials, with E. Carlini, A. Oneto, and E. Ventura.

Mathematische Zeitschrift, 286(1–2), 571–577, 2017.
<http://dx.doi.org/10.1007/s00209-016-1774-y>

The Geometry of Rank-one Tensor Completion, with T. Kahle, K. Kubjas, and Z. Rosen.

SIAM Journal on Applied Algebra and Geometry, 1(1), 200–221, 2017.
<http://dx.doi.org/10.1137/16M1074102>

Determinantal Representations and Bézoutians.

Mathematische Zeitschrift, (285), 445–459, 2017.
<http://dx.doi.org/10.1007/s00209-016-1715-9>

Eigenvalues of Symmetric Matrices over Integral Domains.

Journal of Algebra, (466), 195–203, 2016.
<http://dx.doi.org/10.1016/j.jalgebra.2016.07.024>

Two Results on the Size of Spectrahedral Descriptions.

SIAM Journal on Optimization, 26(1), 589–601, 2016.
<http://dx.doi.org/10.1137/15M1030789>

A Note on the Hyperbolicity Cone of the Specialized Vámos Polynomial.

Acta Applicandae Mathematicae, 144(1), 11–15, 2016.
<http://dx.doi.org/10.1007/s10440-015-0036-z>

Hyperbolic Polynomials, Interlacers, and Sums of Squares, with D. Plaumann and C. Vinzant.

Mathematical Programming, 153(1, Ser. B), 223–245, 2015.
<http://dx.doi.org/10.1007/s10107-013-0736-y>

PREPRINTS

Ulrich sheaves and determinantal representations for higher secant varieties of curves, with D. Agostini and J. Park. Submitted, 2026.

<https://arxiv.org/abs/2607.22247>

Lorentzian polynomials and matroids over triangular hyperfields 2: Analytic aspects, with M. Baker, J. Huh and O. Lorscheid. Submitted, 2026.

<https://arxiv.org/abs/2607.15375>

Totally real divisors on curves, with L. Baldi and D. Plaumann. Submitted, 2025.

<https://arxiv.org/abs/2509.07544>

Non-negative polynomials on generalized elliptic curves, with A. Zalar. Submitted, 2025.
<https://arxiv.org/abs/2508.13850>

Lorentzian polynomials and matroids over triangular hyperfields 1: Topological aspects, with M. Baker, J. Huh and O. Lorscheid. Submitted, 2025.
<https://arxiv.org/abs/2508.02907>

Periodic Hypersurfaces and Lee–Yang Polynomials, with L. Alon. Submitted, 2025.
<https://arxiv.org/abs/2507.16029>

Representation theory for polymatroids, with M. Baker, J. Huh und O. Lorscheid. Submitted, 2025.
<https://arxiv.org/abs/2507.14718>

GRADUATE SCHOOL COURSES Summer school on Positivity in K-theory and lattice points, Bernoulli Center at EPFL, 2025. *Course on Lorentzian polynomials*.

Winter School on Moments, Non-Negative Polynomials, and Algebraic Statistics, Universität Konstanz, 2025. *Course on Non-Negative Polynomials*.

CONFERENCE PRESENTATIONS Geometric Methods in Optimization and Numerical Analysis, Mathematisches Forschungsinstitut Oberwolfach, 2021. *Some Algebraic Geometry in Optimization*.

Foundations of Computational Mathematics 2026, University of Vienna, 2026. *Fourier quasicrystals* (semi-plenary talk).

Foundations of Computational Mathematics 2026, University of Vienna, 2026. *Spaces of Lorentzian polynomials* (semi-plenary talk).

SIAM Conference on Optimization (OP26), The University of Edinburgh, 2026. *Some convex algebraic geometry of sets with continuous symmetries*.

SIAM Conference on Applied Algebraic Geometry (AG25), University of Wisconsin-Madison, 2025. *High-dimensional Fourier Quasicrystals, Lighthouse Manifolds and Lee–Yang Varieties*.

The geometry of polynomials in combinatorics and sampling, American Institute of Mathematics (AIM), 2025. *Spaces of Lorentzian Polynomials*.

Geometry without Geometry, Goethe-Universität Frankfurt, 2024. *Spaces of Lorentzian Polynomials*.

Geometry of Matroids Workshop, Institute for Advanced Study (IAS), 2024. *Spaces of Lorentzian Polynomials*.

Discrete Mathematics and Biology: the legacy of Andreas Dress, Max Planck Institute for Mathematics in the Sciences (MPI-MIS), 2024. *Spaces of Lorentzian polynomials*.

Real Geometry and Algebra (RGA) Seminar in Honor of Claus Scheiderer’s 65th Birthday, Universität Konstanz, 2024. *Spectrahedral Shadows and Completely Positive Maps on Real Closed Fields*.

AlToGeLiS meeting, Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG), 2024. *Fourier quasicrystals*.

Combinatorial Coworkspace: a session in algebraic and geometric combinatorics, Haus Bergkranz,

Kleinwalsertal, 2024. *New results on combinatorics of stable polynomials.*

Symmetry, Stability, and interactions with Computation,
Centre International de Rencontres Mathématiques (CIRM), 2023. *Fourier quasicrystals.*

IWOTA 2023, University of Helsinki, 2023. *Quadratic determinantal representations.*

SIAM-AG23, Eindhoven University of Technology, 2023. *Operations preserving spectrahedrality.*

Journées de géométrie algébrique réelle du Centre Henri Lebesgue, University of Nantes, 2023. *Ulrich sheaves and degrees of morphisms.*

ILAS2023, Technical University of Madrid, 2023. *Spectrahedral Shadows and Completely Positive Maps on Real Closed Fields.*

Saxonian Geometry Day, University of Leipzig, 2023. *Convex algebraic geometry and Riemannian geometry.*

Joint Mathematics Meeting, Boston, 2023. *A signed count of 2-torsion points on real abelian varieties.*

AGATES kickoff workshop, Warsaw University, 2022. *Secant varieties of real curves.*

MTNS2022, Universität Bayreuth, 2022. *Spectrahedral Shadows and Completely Positive Maps on Real Closed Fields.*

A day on K3 surfaces, Max Planck Institute for Mathematics in the Sciences, Leipzig, 2022. *A signed count of 2-torsion points on real abelian varieties.*

Combinatorial Coworkspace: a session in algebraic and geometric combinatorics, Haus Bergkranz, Kleinwalsertal, 2022. *Realrooted, hyperbolic, and Lorentzian polynomials* (with L. Solus).

Real Polynomials: Counting and Stability (Online), Casa Matemática Oaxaca, 2021. *Matroids with the half-plane property and related concepts.*

Real algebraic geometry in Saint Petersburg (Online), 2021. *Viro's writhe and Ulrich sheaves.*

MFO-RIMS Tandem Workshop: Symmetries on Polynomial Ideals and Varieties (Hybrid), Mathematisches Forschungsinstitut Oberwolfach, 2021. *Symmetric spectrahedra with respect to the permutation and orthogonal group.*

SIAM Conference on Applied Algebraic Geometry (Online), 2021. *Computational Real Algebraic Geometry in Riemannian Geometry.*

Real algebraic and convex geometry (Hybrid), TU Braunschweig, 2021. *Positive Ulrich sheaves.*

AMS Spring Southeastern Sectional Meeting (Online), 2021. *Carathéodory numbers of high dimensional moment problems.*

Geometry of Polynomials Reunion Workshop (Online), Simons Institute for the Theory of Computing, Berkeley, 2020. *Spectral sets and derivatives of the psd cone.*

Symmetry, Randomness, and Computations in Real Algebraic Geometry (Online), Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, 2020. *Spectral*

sets and derivatives of the psd cone.

2TART Conference (Online), University of Florida, 2020. *Spectral sets and derivatives of the psd cone.*

Real Algebraic Geometry with a View Toward Hyperbolic Programming and Free Probability, Mathematisches Forschungsinstitut Oberwolfach, 2020. *Positive Ulrich sheaves.*

Workshop on “Discrete geometry with a view on symplectic and tropical geometry”, University of Cologne, 2019. *Tropical Schottky recovery.*

Workshop on “Tropical Methods in Real Algebraic Geometry”, Casa Matemática Oaxaca, 2019. *Some aspects of total reality.*

6th International Conference on Continuous Optimization, Technische Universität Berlin, 2019. *When is the conic hull of a curve a hyperbolicity cone?*

SIAM Conference on Applied Algebraic Geometry, University of Bern, 2019. *Orbit closures in the Zariski spectrum of the infinite polynomial ring.*

Plenary talk at the BMS – BGSMath Junior Meeting, Berlin, 2019. *Hyperbolic polynomials, matroid theory, and optimization.*

Workshop on “Geometry of Real Polynomials, Convexity and Optimization”, Banff International Research Station, 2019. *When is the conic hull of a curve a hyperbolicity cone?*

ASGARD Math 2018: Real algebraic geometry and tropical mathematics, Universitetet i Oslo, 2018. *Convex hulls of canonical curves.*

GDMV — Gemeinsamen Jahrestagung der Deutschen Mathematiker-Vereinigung (DMV) und der Gesellschaft für Didaktik der Mathematik (GDM), Universität Paderborn, 2018. *An algebro-geometric view on semidefinite programming.*

Workshop “Numerical methods for algebraic curves”, Centre Henri Lebesgue, Rennes, 2018. *Schottky Algorithms in Genus Four.*

Workshop “Recent advances on the geometry of valuations”, Goethe-Universität, Frankfurt am Main, 2017. *Tropical Schottky Recovery.*

Sums of Squares — Real Algebraic Geometry and its Applications, Leopold-Franzens-Universität, Innsbruck, 2017. *Eigenvalues of symmetric matrices over integral domains.*

XXII Coloquio Latinoamericano de Álgebra, Pontificia Universidad Católica del Ecuador, Quito, 2017. *Eigenvalues of symmetric matrices over integral domains.*

SIAM Conference on Applied Algebraic Geometry, Georgia Institute of Technology, Atlanta, 2017. *Reciprocal Linear Spaces.*

International Conference On Effective Methods in Algebraic Geometry, Université Nice Sophia Antipolis, Nice, 2017. *Interlacing Ehrhart Polynomials Arising from Graphs.*

Algebraic Statistics, Mathematisches Forschungsinstitut Oberwolfach, 2017. *Rank-one Tensor Completion.*

Real Algebraic Geometry With a View Toward Moment Problems and Optimization, Mathematisches Forschungsinstitut Oberwolfach, 2017. *Hyperbolicity in Higher Codimension*.

Saxonian Geometry Day, TU Chemnitz, 2016. *Hyperbolic Varieties*.

International Workshop on Operator Theory and Applications, Washington University, St. Louis, 2016. *On the Size of Spectrahedral Descriptions*.

22nd International Symposium on Mathematical Theory of Networks and Systems, University of Minnesota, Minnesota, 2016. *Hyperbolic Varieties and Ulrich Sheaves*.

Arbeitsgemeinschaft: The Kadison–Singer Conjecture, Mathematisches Forschungsinstitut Oberwolfach, 2015. *Multivariate Stable Polynomials*.

Classical Algebraic Geometry, Mathematisches Forschungsinstitut Oberwolfach, 2014. 5-Minute Talk on *Definite Determinantal Representations*.

Real Algebraic Geometry With A View Toward Systems Control and Free Positivity, Mathematisches Forschungsinstitut Oberwolfach, 2014. *Determinantal Representations of Hyperbolic Polynomials*.

Applications of Real Algebraic Geometry, Aalto University, Helsinki, 2014. *Determinantal Representations of Hyperbolic Polynomials*.

ÖMG/DMV-Studierendenkonferenz, Universität Innsbruck, 2013. *Real Polynomials with Definite Determinantal Representation*.

INVITED SEMINARS Universität Konstanz, Oberseminar Reelle Geometrie und Algebra, 2026. *Spaces of Lorentzian Polynomials*.

Center for Systems Biology Dresden, Math seminar, 2026. *Secant varieties of curves and algebro-geometric knot theory*.

KTH Stockholm, Combinatorics Seminar, 2026. *Spaces of Lorentzian polynomials*.

Stockholm University, Analysis Seminar, 2026. *Fourier quasicrystals and almost periodic sets of toral type*.

Friedrich-Schiller-Universität Jena, Oberseminar Algebra, 2025. *Spaces of Lorentzian Polynomials*.

Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG), Informal Seminar on positive geometry, 2025. *The real combinatorial rank*.

Institute for Advanced Study (IAS), Special Year 2024-25: Algebraic and Geometric Combinatorics - Seminar, 2024. *MM-curves*.

Universität Duisburg–Essen, Oberseminar Algebra, Geometrie und Zahlentheorie, 2024. *The arithmetic writhe*.

Korea Institute for Advanced Study, Mathematics Seminar, 2024. *Lee–Yang varieties and applications*.

Korea Institute for Advanced Study, Mathematics Seminar, 2024. *Stable polynomials and applications*.

Eberhard Karls Universität Tübingen, Oberseminar Kombinatorische Algebraische Geometrie, 2024. *Naive A^1 -knot theory*.

Universität Konstanz, Oberseminar Reelle Geometrie und Algebra, 2023. *Fourier quasicrystals*.

TU Dortmund, Oberseminar Algebra und Geometrie, 2022. *Spectrahedral Shadows and Completely Positive Maps on Real Closed Fields*.

LAGARTOS: Latin American Geometria Algebraica Real y TrOpical Seminar (Online), 2022. *A signed count of 2-torsion points on real abelian varieties*.

ZAG: Zoom Algebraic Geometry Seminar (Online), 2022. *Secant varieties of real curves*.

KTH Stockholm, Combinatorics Seminar (Online), 2022. *Matroids with the half-plane property and related concepts*.

IIT Bombay, Seminar on Facets of CACAAG (Online), 2021. *Matroids with the half-plane property and related concepts*.

Max-Planck-Institut für Mathematik in den Naturwissenschaften, Leipzig seminar on Algebra, Algebraic Geometry and Algebraic Topology (Online), 2021. *Determinantal representations, sums of squares and del Pezzo surfaces*.

TU Berlin, Seminar on Discrete Mathematics/Geometry (Online), 2021. *Iso Edge Domains*.

Universität Konstanz, Oberseminar Reelle Geometrie und Algebra, 2020. *Tropical abelian varieties*.

Humboldt-Universität zu Berlin, Forschungsseminar Algebraische Geometrie, 2019. *Positive Definite Ulrich Bundles*.

Simons Institute for the Theory of Computing, Weekly Seminar on Geometry of Polynomials, 2019. *Hyperbolicity cones and spectrahedra*.

TU Dortmund, Oberseminar Algebra und Geometrie, 2018. *Totally real theta characteristics*.

Universitetet i Oslo, Seminar in Algebra and Algebraic geometry, 2018. *Rational Representations of Plane Spectrahedra*.

Max-Planck-Institut für Mathematik in den Naturwissenschaften, Special Seminar, 2018. *Rational Representations of Plane Spectrahedra*.

Universität Konstanz, Oberseminar Reelle Geometrie und Algebra, 2018. *Rational Representations of Plane Spectrahedra*.

Leibniz Universität Hannover, Research Seminar Algebraic Geometry, 2018. *Spectrahedra and Ulrich Sheaves*.

Goethe Universität Frankfurt am Main, Oberseminar Diskrete Mathematik, Geometrie und Optimierung, 2018. *Rational representations of plane spectrahedra*.

Scuola Internazionale Superiore di Studi Avanzati, Trieste, 2018. *Hyperbolic Varieties*.

TU Berlin, Discretization in Geometry and Dynamics Seminar, 2018. *What is a tropical period matrix?*

FU Berlin, Discrete Geometry Seminar, 2018. *Interlacing Ehrhart Polynomials of Reflexive Polytopes*.

Berlin Mathematical School, “What is...?” Seminar Series, 2017. *What is... a spectrahedron?*.

TU Dresden, Seminar “Geometrie”, 2017. *Interlacing Ehrhart Polynomials of Reflexive Polytopes*.

TU Berlin, Oberseminar “Algorithmische Algebra”, 2017. *Eigenvalues of symmetric matrices over integral domains*.

Max-Planck-Institut für Mathematik in den Naturwissenschaften, Leipzig, Seminar on Non-Linear Algebra, 2017. *Separating Morphisms from Real Algebraic Curves*.

Universität Osnabrück, Oberseminar Algebra, 2017. *Separating Morphisms from Real Algebraic Curves*.

Universität Konstanz, Oberseminar Reelle Geometrie und Algebra, 2017. *Separating Morphisms from Real Algebraic Curves*.

TU Dortmund, Oberseminar Algebra und Geometrie, 2017. *Interlacing Ehrhart Polynomials of Reflexive Polytopes*.

Otto-von-Guericke Universität, Magdeburg, Seminar in Non-Linear Algebra, 2016. *The real rank of monomials*.

TU Berlin, Workshop on Discrete and Non-Linear Geometry, 2016. *Hyperbolic Varieties, Reciprocal Linear Spaces and their Chow Forms*.

Aalto University, Helsinki, Large Structures Seminar, 2015. *Real Fibered Morphisms and their Applications*.

TU Berlin, Kolloquium “Algorithmische Mathematik und Komplexitätstheorie”, 2015. *Real Fibered Morphisms*.

Universität Osnabrück, Oberseminar Algebra, 2015. *Determinantal Representations of Determinantal Varieties*.

UC Berkeley, Computational Algebraic Geometry Seminar, 2014. *Spectrahedra and Hyperbolic Polynomials*.

Max-Planck-Institut für Mathematik, Bonn, Seminar on Computational Algebraic Geometry, 2013. *Determinantal Representations of Hyperbolic Polynomials*.

Universität Leipzig, Seminar “Algebra und Geometrie”, 2013. *Determinantal Representations and the Bézout Matrix*.

TEACHING EXPERIENCE

TU Dresden, Dresden, Germany

Lectures:

Real Algebra, 2025.

Algebraic Geometry II, 2025.

Algebraic Geometry I, 2024.

Algebra II, 2024.

Algebra I, 2023.

Linear Algebra II, 2023.
Linear Algebra I, 2022.
Algebraic Geometry II, 2022.
Algebraic Geometry I, 2021.
Real algebraic geometry, 2021.
Convex Geometry, 2020.

Thesis supervision:

Master's thesis on *The $\mathbf{A}^1$ -Euler number of a vector bundle* (A. Ziegler, 2022).
 Bachelor's thesis on *Galois and Monodromy Groups in Algebraic Geometry* (Y. Fuhrmann, 2022).
 Bachelor's thesis on *Invarianten in der Knotentheorie* (J. Kruske, 2025).
 Staatsexamensarbeit on *Geometrische Konstruktionen mit Origami — Algebraische Grundlagen und ein Vergleich zu klassischen Methoden* (S. Heinrich, 2025)
 Bachelor's thesis on *Hilberts Syzygiensatz* (M. Loth, 2026).
 Bachelor's thesis on *Verallgemeinerte Dimensionsbegriffe in der Topologie* (L. Thiede, 2026).
 Bachelor's thesis on *Grassmann-Mannigfaltigkeiten* (M. Scheuermann, in progress).

TU Berlin, Berlin, Germany

Lectures:

Discrete Geometry I, 2020.
Real Algebra II, 2019.
Algebra IV: Representation Theory, 2019.
Algebra III: Real Algebra, 2019.
Algebraic Geometry I, 2018.
Algebra II: Algebraic Number Theory, 2018.
Algebra I, 2017.

Seminars:

Seminar on topics from algebra, 2019.

Thesis supervision:

Master's thesis on *Real Tropicalization of Semialgebraic Sets* (F. Blatt, 2020).
 Bachelor's thesis on *Der Satz von Riemann–Roch für Zahlkörper* (D. Spaulding, 2020).
 Bachelor's thesis on *Algebraische Gruppen* (J. Pauckert, 2020).
 Master's thesis on *Berechnung der Determinantendarstellungen ebener hyperbolischer Kurven* (A. Grigorieva, 2019).
 Bachelor's thesis on *Abelian Categories* (N. Brauch, 2019).
 Bachelor's thesis on *Der Satz von Quillen–Suslin* (R. Eiben, 2019).
 Bachelor's thesis on *Der Hilbertsche Syzygiensatz* (N. Waldau, 2019).
 Bachelor's thesis on *Der Satz von Kronecker–Weber* (M. Weckbecker, 2019).

Max-Planck-Institute for Mathematics in the Sciences, Leipzig, Germany

Lectures:

Introduction to Real Algebraic Geometry, 2016.

Universität Konstanz, Konstanz, Germany

Seminars:

Introductory Seminar Course on *Konvexe Mengen, Polytope und lineare Ungleichungen* - joint with C. Scheiderer and T. Kobert, 2015.

Thesis supervision:

Bachelor's thesis on *Freie Auflösung von Moduln* (P. Weise, 2016) - joint supervision with C. Scheiderer.

Bachelor's thesis on *Der LLL-Algorithmus und Faktorisierung von ganzzahligen Polynomen* (Y. Kreuzer, 2016) - joint supervision with C. Scheiderer.

Tutorials:

Calculus, Complex Analysis, Algebra, Number Theory, Algebraic Geometry.

Berlin Mathematical School, Berlin, Germany

Teaching Assistant

At the summer school on *Convex Geometry — Discrete and Computational*, for the course on *Convex Geometry of Nonnegative Polynomials* held by G. Blekherman, 2015.

COMMITTEE
WORK

Member of the School Committee of the School of Science at TU Dresden, since 2024.

Approvals committee for international applications for the mathematics Master's program at TU Dresden, since 2024.

Member of the postdoc selection committee for the research group in Applied Algebraic Geometry at the University of Tromsø, 2022.

Head of the committee for awarding the Deutschland-Stipendium (German public-private scholarship), TU Dresden, since 2021.

Member of the institute council of the institute for geometry, TU Dresden, since 2020.

Member of the habilitation committee of Henri Mühle (TU Dresden), 2021.

Member of the PhD committee of Ansgar Burchardt, Marcello De Donno, Stephanie Feilitzsch, Johannes Greiner, Lisa Nebel, Wladimir Scheck, Ruth Schöbel, Zaneta Semanisinova, Aaron Vollprecht, Zbigniew Wojciechowski (TU Dresden), Sima Mehri, Jan Techter (TU Berlin), Thorsten Jörgens (Uni Frankfurt), Christoph Schulze (Uni Konstanz).

Member of the postdoc selection committee for the research group in Nonlinear Algebra at the Max Planck Institute for Mathematics in the Sciences in Leipzig, 2017/18.

OTHER ACTIVITIES

Personal tutor for the German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes), since 2023.

Top 3 contributor to the ScienceBench project (<https://math.sciencebench.ai/>)

Contributor to the Nova-math project (by OneLineAI)

ORGANIZATION

Real Algebraic Geometry and Hodge Theory (summer school) — joint with Rainer Sinn, TU Dresden, September 2024.

Real Geometry and Algebra (RGA) Seminar in Honor of Claus Scheiderer's 65th Birthday — joint with Mateusz Michałek, Daniel Plaumann, Markus Schweighofer and Rainer Sinn, Universität Konstanz, 2024.

Chow Lectures with June E Huh — joint with Marie Brandenburg and Christian Haase, 2023.

Oberwolfach Workshop “New Directions in Real Algebraic Geometry” — joint with Saugata Basu, Tim Netzer and Cynthia Vinzant, 2023.

Organization of the local seminar on Seminar “Algebra–Geometry–Combinatorics” at TU Dresden, winter semester 2022/23.

Saxonian Seminar Day on Algebra and Geometry — joint with R. Sinn, B. Sturmfels, A. Thom, TU Dresden, May 2022.

Opening Conference for the Thematic Einstein Semester on Algebraic Geometry — joint with A. Ortega, A. Petracci and K. Schaller, FU Berlin, October 2019.

Workshop on “Real Applied Algebraic Geometry” — joint with R. Sinn and B. Sturmfels, TU Berlin, September 2019.

Dies Mathematicus (graduation celebration for the mathematical study programs), TU Berlin, November 2018.

Summer School on Numerical Computing in Algebraic Geometry — joint with P. Breiding, Y. Ren and E. Sertöz, MPI MIS Leipzig, August 2018.

Berlin–Leipzig Two-Day-Seminar on Algebra, Geometry and Combinatorics — joint with T. De Wolff, TU Berlin, December 2017.

Reading Group on Real Algebraic Geometry (summer school) — joint with K. Shaw and R. Sinn, MPI MIS Leipzig, July 2017.

Berlin–Leipzig Seminar on Non-Linear Algebra — joint with B. Sturmfels and K. Kohn, MPI MIS Leipzig, Fall 2016.

PEER REVIEWING

for the following journals: *Advances in Mathematics*, *Algebraic Combinatorics*, *Algebraic Geometry*, *Annals of Mathematics*, *Beiträge zur Algebra und Geometrie*, *Bulletin of the London Mathematical Society*, *Communications on Pure and Applied Mathematics*, *Confluentes Mathematici*, *Discrete & Computational Geometry*, *Documenta Mathematica*, *Épjournal de Géométrie Algébrique*, *European Journal of Mathematics*, *Functional Analysis and Its Applications*, *IEEE Symposium on Foundations of Computer Science*, *Indagationes Mathematicae*, *International Mathematics Research Notices*, *Iranian Journal of Science and Technology*, *Journal of Algebra*, *Journal of Combinatorial Theory (Series A)*, *Journal of Functional Analysis*, *Journal of Mathematical Imaging and Vision*, *Journal of Pure and Applied Algebra*, *Journal of Symbolic Computation*, *Journal of the European Mathematical Society*, *Linear Algebra and its Applications*, *Mathematische Zeitschrift*, *Open Mathematics*, *Publicationes Mathematicae Debrecen*, *Research in the Mathematical Sciences*, *SIAM Journal on Optimization*, *SIAM Journal on Applied Algebra and Geometry*, *Systems & Control Letters*.

for the following conferences: IEEE Annual Symposium on Foundations of Computer Science (FOCS), Effective Methods in Algebraic Geometry (MEGA), International Symposium on Symbolic and Algebraic Computation (ISSAC)

for the following funding organizations: *Alexander von Humboldt Stiftung*, *Deutsche Forschungsgemeinschaft*, *National Science Center (Poland)*

of the PhD theses of Thorsten Jörgens, David Sawall, Christoph Schulze and Büşra Sert

for *MathSciNet*

PARTICIPATION IN TRAINING PROGRAMS

Die Professur — Rechte und Pflichten (The Professorship — Rights and Responsibilities), 4 teaching units (45 minutes each), 2021

Lehren und Lernen in/als Veränderung. Hochschuldidaktische Perspektiven auf Übergänge, Krise und Transformation (Teaching and Learning in/as Change: Perspectives on Transitions, Crisis, and Transformation from the Field of Higher Education Pedagogy), 16 teaching units (45 minutes each), 2021

Leadership Skills für Professor:innen (Leadership Skills for Professors), 36 teaching units (45 minutes each), 2022

Die Regeln guter wissenschaftlicher Praxis im Forschungsalltag (The Rules of Good Scientific Practice in Everyday Research), 5 teaching units (45 minutes each), 2023

LANGUAGES

German (native)

English (fluent)

French (intermediate)