

Marie-Charlotte Brandenburg

Curriculum Vitæ

Max Planck Institute for Mathematics in the Sciences
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Education and Professional Experience

2023 – today	Max Planck Institute for Mathematics in the Sciences , Postdoctoral Researcher Research Group: Mathematical Machine Learning (Guido Montúfar)
2020 – 2022	Max Planck Institute for Mathematics in the Sciences , Ph.D. Student Ph.D. Thesis: <i>Tropical Positivity and Semialgebraic Sets from Polytopes</i> Advisor: Rainer Sinn Research Group: Non-Linear Algebra (Bernd Sturmfels)
2019 – 2020	Berlin Mathematical School Freie Universität Berlin , Ph.D. Student Advisor: Rainer Sinn Research Groups: Discrete Geometry and Topological Combinatorics (Günter M. Ziegler, Rainer Sinn, Matthias Beck) and Discrete Methods in Algebraic Geometry (Christian Haase)
2019	Freie Universität Berlin , M.Sc. Mathematics Master Thesis: <i>Competitive Equilibrium and Lattice Polytopes</i> Advisor: Christian Haase
2016 – 2017	Minodes GmbH , Data Analyst, Business Intelligence
2016	Freie Universität Berlin , B.Sc. Mathematics Bachelor Thesis: <i>A 4-Simple 4-Simplicial 8-Polytope</i> . Advisor: Günter M. Ziegler

Publications

2023	Tropical Positivity and Determinantal Varieties with Georg Loho and Rainer Sinn To appear in <i>Algebraic Combinatorics</i> . arXiv:2205.14972
2023	Competitive equilibrium always exists for combinatorial auctions with graphical pricing schemes with Christian Haase and Ngoc Mai Tran <i>La Matematica (Official Journal of the Association for Women in Mathematics)</i> , 2:1–30, March 2023 doi:10.1007/s44007-022-00038-7
2023	Multivariate Volume, Ehrhart and h^*-Polynomials of Polytopes with Sophia Elia and Leon Zhang <i>Journal of Symbolic Computation</i> , 114:209–230, January 2023. doi:10.1016/j.jsc.2022.04.011

- 2022 **Intersection Bodies of Polytopes**
with Katalin Berlow, Chiara Meroni and Isabelle Shankar
Contributions to Algebra and Geometry, 63(2):419–439, June 2022.
[doi:10.1007/s13366-022-00621-7](https://doi.org/10.1007/s13366-022-00621-7)
- 2021 **Investigation of hydro-mechanical processes in fluid-saturated fractured rock based on numerical model generation**
with Nele Pollmann, Julia Gallas, Lucas Witte and Tobias Backers
IOP Conference Series: Earth and Environmental Science, 833(1):012107, August 2021.
[doi:10.1088/1755-1315/833/1/012107](https://doi.org/10.1088/1755-1315/833/1/012107)

Preprints

- 2023 **The Best Ways to Slice a Polytope**
with Jesús A. de Loera and Chiara Meroni
[arXiv:2304.14239](https://arxiv.org/abs/2304.14239)
- 2023 **Intersection Bodies of Polytopes: Translations and Convexity**
with Chiara Meroni
[arXiv:2302.11764](https://arxiv.org/abs/2302.11764)
- 2022 **Combinatorics of Correlated Equilibria**
with Benjamin Hollering and Irem Portakal
[arXiv:2209.13938](https://arxiv.org/abs/2209.13938)

Published Conference Contributions

- 2022 **Extended Abstract: Competitive equilibrium always exists for combinatorial auctions with graphical pricing schemes**
with Christian Haase and Ngoc Mai Tran
In: L.F. Tabera Alonso (ed.), *Discrete Mathematics Days 2022*, pp. 64 – 70. Editorial Universidad de Cantabria, Santander, June 2022
[doi:10.22429/Euc2022.016](https://doi.org/10.22429/Euc2022.016)

Invited Conference Talks

- February 2023 **Tropical Geometry and Neural Networks**, *Tropical Geometry in Applications* at Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
- September 2022 **Tropical Positivity and Determinantal Varieties**, *Geometry meets Combinatorics in Bielefeld* at Universität Bielefeld, Germany
- July 2022 **Tropical Positivity and Determinantal Varieties**, *Matroids, Ordered Structures, Arrangements in Combinatorics (MOSAIC)* at University of Manchester, England
- March 2022 **Intersection Bodies of Polytopes**, *Combinatorial Coworkspace* at Goethe-Universität Frankfurt, Germany
- March 2022 **The Positive Tropicalization of Low Rank Matrices**, *Discrete and Convex Day* at Freie Universität Berlin, Germany
- March 2022 **Competitive Equilibrium and Lattice Polytopes**, *Mini-Symposium on Lattice Polytopes* at KTH Royal Institute of Technology in Stockholm, Sweden and University of Nottingham, England

Contributed Conference Talks

- July 2022 **Competitive Equilibrium Always Exists**, *Discrete Mathematics Days* at University of Cantabria, Santander, Spain
- June 2022 **The Positive Tropicalization of Low Rank Matrices**, *VII Encuentro Colombiano de Combinatoria (ECCO)* at Universidad de los Andes, Pontificia Universidad Javeriana, and Universidad Sergio Arboleda in Bogotá, Colombia
- December 2021 **Intersection Bodies of Polytopes**, *Conference for Women in Algebra and Symbolic Computation II* at Technische Universität Kaiserslautern, Germany

Research Seminar Talks

- June 2023 **The Best Ways to Slice a Polytope**, *Research Seminar Nonlinear Algebra* at Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
- May 2023 **Competitive Equilibrium and Lattice Polytopes**, *Postdoc and Graduate Student Seminar* at ICERM - Institute for Computational and Experimental Research in Mathematics, Providence, RI, USA
- October 2022 **Competitive Equilibrium and Lattice Polytopes**, *Mathematical Operations Research Seminar* at University of Twente, Netherlands
- August 2022 **Tropical Positivity and Determinantal Varieties**, *Copenhagen-Jerusalem Combinatorics Seminar* at University of Copenhagen, Denmark and Hebrew University of Jerusalem, Israel
- May 2022 **The Positive Tropicalization of Low Rank Matrices**, *Research Seminar Algebra* at Friedrich-Schiller-Universität Jena, Germany
- May 2022 **The Positive Tropicalization of Low Rank Matrices**, *Research Seminar Algebra and Geometry* at Universität Osnabrück, Germany
- March 2022 **Competitive Equilibrium and Lattice Polytopes**, *Research Seminar Discrete Mathematics and Geometry* at Technische Universität Berlin, Germany
- February 2022 **Intersection Bodies of Polytopes**, *Colloquium of the Graduate School "Facets of Complexity"* at Freie Universität Berlin, Germany
- November 2021 **Intersection Bodies of Polytopes**, *Research Seminar Nonlinear Algebra* at Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
- May 2021 **The Positive Tropicalization of Low Rank Matrices**, *Research Seminar Nonlinear Algebra* at Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
- July 2020 **Multivariate Volume, Ehrhart and h^* -Polynomials of Polytopes**, *Research Seminar Discrete Geometry* at Freie Universität Berlin, Germany
- October 2019 **Competitive Equilibrium and Lattice Polytopes**, *Research Seminar Algebra and Geometry* at Otto-von-Guericke-Universität Magdeburg, Germany
- December 2018 **Product-Mix Auctions, Competitive Equilibrium and Lattice Polytopes**, *Colloquium of the Graduate School "Facets of Complexity"* at Freie Universität Berlin, Germany

Posters

December 2019 **Multivariate Volume, Ehrhart and h^* -Polynomials of Polytopes**, *Conference for Women in Algebra and Symbolic Computation I* at Technische Universität Kaiserslautern, Germany

Teaching

2020 **Linear Algebra II**
Teaching Assistant for a class for first-year math students at Freie Universität Berlin, Germany

2019 **Panorama der Mathematik**
Teaching Assistant for a class for first-year math teachers in training at Freie Universität Berlin, Germany

2018 **Geometry**
Teaching Assistant for a class for advanced bachelor and early master students at Freie Universität Berlin, Germany

Services

Refereed for

SIAM Journal on Optimization
Scientific Reports
Linear and Multilinear Algebra
FPSAC– Formal Power Series and Algebraic Combinatorics

Conferences / Seminars organized

October 2023 **Chow Lectures**
Conference at MPI MiS (Leipzig) with June Huh as keynote speaker

September 2023 **Hodge and K-Theory meet Combinatorics**
Workshop at Bernoulli Center, EPFL (Lausanne)

Summer 2022 **Nonlinear Algebra Seminar**
Research Seminar of the Nonlinear Algebra Group at MPI MiS (Leipzig)

2019 **MATH+ Algebraic Geometry Research Retreat**
Workshop within the MATH+ Thematic Einstein Semester (Berlin) on Algebraic Geometry

Extended Stays

June 2019 – September 2019 **Max Planck Institute for Mathematics in the Sciences**, Leipzig, Germany
Research Group: Nonlinear Algebra

January 2019 – February 2019 **Simons Institute for the Theory of Computing**, Berkeley, CA, USA
Program: Geometry of Polynomials