

Marie-Charlotte Brandenburg

Curriculum Vitæ

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

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| 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

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| 2023 | Tropical Positivity and Determinantal Varieties
with Georg Loho and Rainer Sinn
To appear in <i>Algebraic Combinatorics</i> .
arXiv:2205.14972 |
| 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 | 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> , December 2022
doi:10.1007/s44007-022-00038-7 |

- 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

- 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

- 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

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

Organization

Summer 2022	Nonlinear Algebra Seminar Research Seminar of the Nonlinear Algebra Group at MPI MiS (Leipzig)
2022	AlToGeLiS Consortium for revealing structures of data with algebra, topology, and geometry
2019	MATH+ Algebraic Geometry Research Retreat Workshop within the MATH+ Thematic Einstein Semester 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