

# Marie-Charlotte Brandenburg

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## Curriculum Vitæ

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[mariebrandenburg.github.io](https://mariebrandenburg.github.io)

## Education and Professional Experience

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| 2020 – today | <b>Max Planck Institute for Mathematics in the Sciences</b><br>Ph.D. Student<br>Research Group: Non-Linear Algebra<br>Advisor: Rainer Sinn  |
| 2019 – 2020  | <b>Berlin Mathematical School   Freie Universität Berlin</b><br>Ph.D. Student<br>Research Groups: Discrete Geometry, Discrete Methods in Algebraic Geometry<br>Advisor: Rainer Sinn |
| 2019         | <b>Freie Universität Berlin</b><br>M.Sc. Mathematics<br>Master Thesis: <i>Competitive Equilibrium and Lattice Polytopes</i><br>Advisor: Christian Haase                             |
| 2017 – 2019  | <b>Freie Universität Berlin</b><br>Student Assistant<br>Research Group: Discrete Geometry   |
| 2016 – 2017  | <b>Minodes GmbH</b><br>Data Analyst<br>Business Intelligence  |
| 2016         | <b>Freie Universität Berlin</b><br>B.Sc. Mathematics<br>Bachelor Thesis: <i>A 4-Simple 4-Simplicial 8-Polytope</i><br>Advisor: Günter M. Ziegler                                    |

## Publications

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| 2023 | <b>Multivariate Volume, Ehrhart and <math>h^*</math>-Polynomials of Polytopes</b><br>with Sophia Elia and Leon Zhang<br><i>Journal of Symbolic Computation</i> , 114:209–230, January 2023.<br><a href="https://doi.org/10.1016/j.jsc.2022.04.011">doi:10.1016/j.jsc.2022.04.011</a> |
| 2022 | <b>Intersection Bodies of Polytopes</b><br>with Katalin Berlow, Chiara Meroni and Isabelle Shankar<br><i>Contributions to Algebra and Geometry</i> , 63:419–439, January 2022.<br><a href="https://doi.org/10.1007/s13366-022-00621-7">doi:10.1007/s13366-022-00621-7</a>            |

- 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      **Tropical Positivity and Determinantal Varieties**  
 with Georg Loho and Rainer Sinn  
[arXiv:2205.14972](https://arxiv.org/abs/2205.14972)
- 2021      **Competitive equilibrium always exists for combinatorial auctions with graphical pricing schemes**  
 with Christian Haase and Ngoc Mai Tran  
[arXiv:2107.08813](https://arxiv.org/abs/2107.08813)

## Invited Conference Talks ---

- March 2022      **Intersection Bodies of Polytopes**  
 Combinatorial Coworkspace  
*Goethe-Universität Frankfurt*
- March 2022      **The Positive Tropicalization of Low Rank Matrices**  
 Discrete and Convex Day  
*Freie Universität Berlin*
- March 2022      **Competitive Equilibrium and Lattice Polytopes**  
 Mini-Symposium on Lattice Polytopes  
*KTH Royal Institute of Technology in Stockholm and University of Nottingham*

## Contributed Conference Talks ---

- June 2022      **The Positive Tropicalization of Low Rank Matrices**  
 VII Encuentro Colombiano de Combinatoria (ECCO)  
*Universidad de los Andes, Pontificia Universidad Javeriana and Universidad Sergio Arboleda. Bogotá, Colombia*
- December 2021      **Intersection Bodies of Polytopes**  
 Conference for Women in Algebra and Symbolic Computation II  
*Technische Universität Kaiserslautern*

## Research Seminar Talks ---

- May 2022      **The Positive Tropicalization of Low Rank Matrices**  
 Research Seminar Algebra  
*Friedrich-Schiller-Universität Jena*
- May 2022      **The Positive Tropicalization of Low Rank Matrices**  
 Research Seminar Algebra und Geometrie  
*Universität Osnabrück*

- March 2022      **Competitive Equilibrium and Lattice Polytopes**  
Research Seminar Discrete Mathematics and Geometry  
*Technische Universität Berlin*
- February 2022      **Intersection Bodies of Polytopes**  
Colloquium of the Graduate School “Facets of Complexity”  
*Freie Universität Berlin*
- November 2021      **Intersection Bodies of Polytopes**  
Research Seminar Nonlinear Algebra  
*Max Planck Institute for Mathematics in the Sciences, Leipzig*
- May 2021      **The Positive Tropicalization of Low Rank Matrices**  
Research Seminar Nonlinear Algebra  
*Max Planck Institute for Mathematics in the Sciences, Leipzig*
- July 2020      **Multivariate Volume, Ehrhart and  $h^*$ -Polynomials of Polytopes**  
Research Seminar Discrete Geometry  
*Freie Universität Berlin*
- October 2019      **Competitive Equilibrium and Lattice Polytopes**  
Research Seminar Algebra and Geometry  
*Otto-von-Guericke-Universität Magdeburg*
- December 2018      **Product-Mix Auctions, Competitive Equilibrium and Lattice Polytopes**  
Colloquium of the Graduate School “Facets of Complexity”  
*Freie Universität Berlin*

## Posters

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

## Teaching

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- 2020      **Linear Algebra II**  
Teaching Assistant  
for a class for first-year math students  
*Freie Universität Berlin*
- 2019      **Panorama der Mathematik**  
Teaching Assistant  
for a class for first-year math teachers in training  
*Freie Universität Berlin*
- 2018      **Geometry**  
Teaching Assistant  
for a class for advanced bachelor and early master students  
*Freie Universität Berlin*

## Organization

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| 2022 | <b>AlToGeLiS</b><br>Consortium for revealing structures of data with algebra, topology, and geometry                           |
| 2019 | <b>MATH+ Algebraic Geometry Research Retreat</b><br>Workshop within the MATH+ Thematic Einstein Semester on Algebraic Geometry |

## Extended Stays

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| June 2019 –<br>September 2019   | <b>Max Planck Institute for Mathematics in the Sciences</b><br>Leipzig, Germany<br>Research Group: Nonlinear Algebra |
| January 2019 –<br>February 2019 | <b>Simons Institute for the Theory of Computing</b><br>Berkeley, CA, USA<br>Program: Geometry of Polynomials         |