

# 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(2):419–439, June 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

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- 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

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- July 2022      **Tropical Positivity and Determinantal Varieties**  
 Matroids, Ordered Structures, Arrangements in Combinatorics (MOSAiC)  
*University of Manchester, England*
- 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

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- July 2022      **Competitive Equilibrium Always Exists**  
 Discrete Mathematics Days  
*University of Cantabria, Santander, Spain*
- 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

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

## Posters

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| December 2019 | <b>Multivariate Volume, Ehrhart and <math>h^*</math>-Polynomials of Polytopes</b><br>Conference for Women in Algebra and Symbolic Computation I<br><i>Technische Universität Kaiserslautern</i> |
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## Teaching

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| 2020 | <b>Linear Algebra II</b><br>Teaching Assistant<br>for a class for first-year math students<br><i>Freie Universität Berlin</i> |
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- 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            **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

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