

Curriculum Vitae

Personal Data

Name	Matthias Himmelmann
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Education

03/2021 – 01/2025	Universität Potsdam , Potsdam, Germany Ph.D. in Mathematics, grade: Summa Cum Laude. Graduate student at the Berlin Mathematical School Thesis title: <i>Optimization in Geometric Materials</i> .
03/2024 – 04/2024	Research Stay at the RICAM , Linz, Austria in the context of the Special Semester on Rigidity and Flexibility.
07/2023 – 08/2023	Research Stay at the Fields Institute , Toronto, Canada in the context of the Focus Program on Geometric Constraint Systems.
04/2018 – 12/2020	Freie Universität , Berlin, Germany M.Sc. in Mathematics, grade: 1.1. Focus on Algebraic Geometry. Thesis: <i>Generalized PCA for Algebraic Varieties</i> .
10/2014 - 03/2018	Freie Universität , Berlin, Germany B.Sc. in Mathematics, grade 1.2. Minor in Computer Science. Thesis: <i>Galois Groups and Fundamental Groups on Riemann Surfaces</i> .
08/2017 - 12/2017	Semester abroad at Universitetet i Oslo , Oslo, Norway.
08/2004 - 06/2013	Otto Hahn Europaschule , Hanau, Germany Abitur, grade 1.3 <i>Advanced Courses</i> : Mathematics, Politics and Economics.

Professional Experience

Starting 01/2025	Postdoctoral Fellow ICERM, Brown University, Providence, Rhode Island, USA <ul style="list-style-type: none">Semester Program on the <i>Geometry of Materials, Packings and Rigid Frameworks</i>
03/2021 – today	Research Assistant Universität Potsdam, Germany <ul style="list-style-type: none">Researching the geometry and topology of biological and physical materialsLecturer for <i>Mathematical Problem Solving</i> and <i>Algorithmic Algebraic Geometry</i>
05/2018 – 02/2021	Student Assistant Fraunhofer-Institut FOKUS, Berlin, Germany <ul style="list-style-type: none">Programming of features for early warning systems using Java/-ScriptDesign of a machine learning model for geospatial applications
08/2013 – 08/2014	Federal Voluntary Service (Bundesfreiwilligendienst) Deutscher Turner-Bund e.V., Frankfurt a.M., Germany <ul style="list-style-type: none">Event management and public relations

Publications

- 2025, in preparation **H.**, Myfanwy E. Evans, Michael Klatt, Philipp Schönhöfer, Martin C. Pedersen and Gerd E. Schröder-Turk. *Gauss Curvature Heterogeneity of Minimal Surface Models for Amorphous Bicontinuous Phases*.
- 2025 Alex Heaton and **H.** *Computing Euclidean distance and maximum likelihood retraction maps for constrained optimization*. Computational Geometry 126.
- 2024 Birte Ostermann, **H.** and May Cai. *Empirically Exploring the Space of Monostationarity corresponding to the Dual Phosphorylation Chemical Reaction Network*. Journal of Mathematical Chemistry.
- 2024 **H.** and Myfanwy E. Evans. *Robust geometric modeling of 3-periodic tensegrity frameworks using Riemannian optimization*. SIAM Journal on Applied Algebra and Geometry 8.2.

Presentations

- 12/2024, invited talk “Optimization in Geometric Materials”. *Discrete Algebra and Geometry Seminar*, Technical University of Eindhoven, Netherlands.
- 11/2024, poster “Exploring the Homogeneity of Disordered Minimal Surfaces”. *Gyroid is Everywhere*, Kindai University, Osaka, Japan.
- 03/2024, invited talk “Homotopy Continuation Methods for Equilibration and the Computation of Deformation Paths”. *Code of Rigidity* during the *Special Semester on Rigidity and Flexibility*, RICAM, Linz, Austria.
- 02/2024, invited talk “Exploring Gaussian Curvature Heterogeneity by Modeling Disorder in Minimal Surfaces”. *NBLA Workshop: A Copenhagen afternoon on geometry and topology in soft materials*, Niels Bohr Institut, Copenhagen, Denmark.
- 02/2024, invited talk “Enhanced Geometrical Design for Cylinder Packings”. *Applied Algebra Seminar*, TU Braunschweig, Germany.
- 09/2023, poster “Riemannian Optimization and Algebraic Varieties – a Contradiction?” *Conference on Applied Algebra*, Universität Osnabrück, Germany.
- 08/2023, talk “Riemannian Optimization on Embedded Manifolds Using Homotopy Continuation.” *Workshop on Constraint Systems: Distance Geometry, Structured Polynomials, Matrix Completion and Kinematics*, Fields Institute, Toronto, Canada.
- 07/2023, talk “A Tetrahedral Tensegrity Model for Filament Packings.” *Workshop on Geometric Constraints: Materials, Graphs and Matroids, Rigidity and Packings*, Fields Institute, Toronto, Canada.
- 09/2022, poster “Towards a Robust Tensegrity Model for the Mechanics of Filament Packings.” *The Interdisciplinary World of Tangling conference*, Potsdam, Germany.
- 12/2020, talk “Generalized Principal Component Analysis for Algebraic Varieties.” *Facets of Complexity: Monday Lecture and Colloquium*, TU Berlin, Germany.

Software Projects

- 2024 PyRigi: A general-purpose Python package for bar-and-joint frameworks.
- 2023 DisorderedPointClusters.jl: Simulations for minimum energy point configurations.
- 2022 HomotopyOpt.jl: Riemannian optimization package for polynomial constraints.
- 2021 Implicit3DPlotting.jl: Plotting implicit space curves and surfaces.
- 2020 LearnVanishingIdeal.jl: Numerically derives polynomials describing a point cloud.

Teaching

10/2023 – 02/2024	Seminar in “Algorithmic Algebraic Geometry”
04/2022 – 09/2022	Lecturer in “Mathematisches Problemlösen”
02/2020	Tutor for “Computeralgebra”
04/2018 – 09/2018	Mentor for “Linear Algebra for Computer Scientists”
04/2016 – 09/2017	Tutor of “Computer-oriented Mathematics II” and “Mathematics for Geoscientists I and II”

Awards and Grants

2023	Fields Institute Travel Grant, \$ 1500
2018	Bachelor’s prize of the <i>Berlin Mathematical Association</i> for outstanding achievements.
2013	Book Prize of the German Physical Association for extraordinary achievements in the Abitur.

Berlin, February 27, 2025



Matthias Himmelmann