

Curriculum Vitae

A.-L. Sattelberger, Dr. rer. nat.

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Contact

Institute Max Planck Institute for Mathematics in the Sciences (MPI MiS), Leipzig, Germany
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Education and academia

09/26 – 12/28 **Group leader** in algebraic analysis
Max Planck Institute for Mathematics in the Sciences, Leipzig

04/26 – 08/26 **Deputy professor (W2) in geometry**
Otto von Guericke University of Magdeburg

07/24 – 03/26 **Group leader** in algebraic analysis within the ERC synergy grant
UNIVERSE+: Positive Geometry in Particle Physics and Cosmology
Max Planck Institute for Mathematics in the Sciences, Leipzig

10/22 – 06/24 **Postdoctoral researcher** with Prof. Kathlén Kohn in the multidisciplinary project
3D Scene Perception, Embeddings and Neural Rendering
KTH Royal Institute of Technology, Stockholm

09/21 – 12/21 **Research stay** in topological data analysis with Prof. Wojciech Chachólski
Brummer & Partners MathDataLab, KTH Royal Institute of Technology, Stockholm

07/19 – 09/22 **Postdoctoral researcher** in applied algebraic analysis with Prof. Bernd Sturmfels
Research group in nonlinear algebra, MPI MiS, Leipzig

10/15 – 05/19 **Doctoral studies** in mathematics in the field of algebraic analysis
Thesis: *Topological Computation of Stokes Data of Weighted Projective Lines*
Advisors: Prof. Marco Hien and Prof. Maxim Smirnov
University of Augsburg

10/13 – 07/15 **Master of Science with Honors** in mathematics within the program *TopMath*
Thesis: *From Turrittin–Levelt to the lower semi-continuity of families of $\mathcal{D}$ -modules*
Technical University of Munich

10/12 – 09/13 **Additional certificate: Elite Bachelor** in the program *TopMath* of the *Elite Network of Bavaria*
University of Augsburg/Technical University of Munich

10/10 – 08/13 **Bachelor of Science** in mathematics, minor subject: philosophy
Thesis: *Irregularity and spectral norm of differential modules*
University of Augsburg

09/08 – 06/10 **Abitur**, intensive courses: Mathematics and French
Werner-von-Siemens-Gymnasium Weißenburg, Germany

Publications and preprints

arXiv, Google Scholar, ORCID

- [18] **Border Bases in the Rational Weyl Algebra** (with C. Rodriguez). *Advances in Applied Mathematics*, 177:103065, 2026.
- [17] **Connection Matrices in *Macaulay2*** (with P. Görlach, J. Koefer, M. Sayrafi, H. Schroeder, N. Weiss, and F. Zaffalon). Preprint arXiv:2504.01362. To appear in the *Journal of Software for Algebra and Geometry*.
- [16] **Algebraic and Positive Geometry of the Universe: from Particles to Galaxies** (with C. Fevola). *Notices of the American Mathematical Society*, 72(8):808–817, 2025.
- [15] **Differential Equations for Moving Hyperplane Arrangements** (with A. Pfister). Special volume on Positive Geometry, *Le Matematiche*, 80(1):409–429, 2025.
- [14] **Algebraic Approaches to Cosmological Integrals** (with C. Fevola, G. L. Pimentel, T. Westerdijk). Special volume on Positive Geometry, *Le Matematiche*, 80(1):303–324, 2025.
- [13] **Geometry of Linear Neural Networks: Equivariance and Invariance under Permutation Groups** (with K. Kohn and V. Shahverdi). *SIAM Journal on Matrix Analysis and Applications*, 46(2):1378–1415, 2025.
- [12] **D-Module Techniques for Solving Differential Equations in the Context of Feynman Integrals** (with J. Henn, E. Pratt, and S. Zoia). *Letters in Mathematical Physics*, 114(87), 2024.
- [11] **D-Algebraic Functions** (with R. Ait El Manssour and B. Teguia Tabuguia). *Journal of Symbolic Computation*, 128(102377), 2025.
- [10] **Vector Spaces of Generalized Euler Integrals** (with D. Agostini, C. Fevola, and S. Telen). *Communications in Number Theory and Physics*, 18(2):327–370, 2024.
- [9] **Bayesian Integrals on Toric Varieties** (with M. Borinsky, B. Sturmfels, and S. Telen). *SIAM Journal on Applied Algebra and Geometry*, 7(1):77–103, 2023.
- [8] **The Shift-Dimension of Multipersistence Modules** (with W. Chachólski and R. Corbet). *Journal of Applied and Computational Topology*, 8(3):643–667, 2024.
- [7] **Nonlinear Algebra and Applications** (with P. Breiding, T. Çelik, T. Duff, A. Heaton, A. Maraj, L. Venturello, and O. Yürük). *Numerical Algebra, Control and Optimization*, 13(1):81–116, 2023.
- [6] **Combinatorial Differential Algebra of x^p** (with R. Ait El Manssour). *Journal of Symbolic Computation*, 114:193–208, 2023.
- [5] **Maximum Likelihood Estimation from a Tropical and a Bernstein–Sato Perspective** (with R. van der Veer). *International Mathematics Research Notices*, 2023(6):5263–5292, 2023.
- [4] **Algebraic Analysis of the Hypergeometric Function ${}_1F_1$ of a Matrix Argument** (with P. Görlach and C. Lehn). *Beiträge zur Algebra und Geometrie*, 62:397–427, 2021.
- [3] **Algebraic Analysis of Rotation Data** (with M. F. Adamer, A. C. Lörincz, and B. Sturmfels). *Algebraic Statistics*, 11(2):189–211, 2020.
- [2] **D-Modules and Holonomic Functions** (with B. Sturmfels). In *Varieties, polyhedra, computation*. Volume 22 of *EMS Series of Congress Reports*, pp. 251–293, EMS Press, Berlin, 2025.
- [1] **Topological Computation of Stokes Matrices of some Weighted Projective Lines**. *Manuscripta mathematica*, 164(3):327–347, 2021.

Teaching and work experience

Summer 2026	Full lectures and a seminar for students of mathematics (Bachelor/Master/Educ.) Otto von Guericke University of Magdeburg
July 2025	Invited lecture series on <i>Algebraic Aspects of Linear PDEs</i> Domoschool2025, Domodossola
Spring 2025	Reading group on <i>Geometric Representation Theory and D-Modules</i> Scientific organizer together with Veronica Calvo Cortes MPI MiS, Leipzig
Autumn 2024	Lecture: <i>Introduction to Algebraic Analysis</i> Teaching assistant: Carlos Gustavo Rodriguez Fernandez MPI MiS, Leipzig
Autumn 2023	PhD course on <i>D-Modules and Holonomic Functions</i> KTH Royal Institute of Technology and Stockholm University
08/2023	Invited lecture series on <i>Algebraic and Holonomic Statistics</i> Hypergeometric School 2023, Kobe University
Spring 2023	Lecturer of the undergraduate course <i>Calculus in One Variable</i> KTH Royal Institute of Technology, Stockholm
12/20 – 08/22	Equal Opportunity Officer Max Planck Institute for Mathematics in the Sciences, Leipzig
09/2019	Fall School: Varieties, Polyhedra, Computation Exercise session for the lecture series on <i>D-Modules and Holonomic Functions</i> Berlin Mathematics Research Center
09/15 – 06/19	Research assistant of Prof. Marco Hien at the University of Augsburg ◊ Tutoring diverse lectures in Mathematics ◊ Tutoring and organizing a help desk for students of Mathematics ◊ Tutoring and organizing a study program for pupils
08/13 – 08/15	Scientific assistant in the project <i>Best MINT</i> of the Bavarian State Ministry for Education, Science and the Arts at the University of Augsburg
08/12 – 09/12	Intern at <i>SGL Carbon</i> in Meitingen Mathematical modeling of the extrusion of ceramic materials
10/11 – 07/13	Student assistant at the University of Augsburg Tutoring lectures on Linear Algebra and Commutative Algebra

Selected talks and scientific organizing

12/2026	Research Seminar on Algebraic Geometry Invited talk: <i>Border Bases in the Rational Weyl Algebra</i> University of Mannheim
12/2026	Women in Algebra and Symbolic Computation IV Talk: <i>TBA</i> Bad Dürkheim
09/2026	Annual Meeting of the CRC/TRR 195 “Symbolic Tools in Mathematics and their Application” Invited talk: <i>Border Bases in the Rational Weyl Algebra</i> RWTH Aachen University

- 09/2026 **QM Research Seminar**
Invited talk: *Encoding Holonomic D-Modules*
Centre for Quantum Mathematics, Southern University of Denmark
- 09/2026 **Annual Meeting 2026 of the German Mathematical Society**
Minisymposium: *D-Modules: Bridging Theory and Applications*
Scientific organizer with Dr. Andreas Hohl
University of Konstanz
- 08/2026 **MaScAmp Annual Workshop**
Invited talk: *D-Modules for Physics*
Lejondals Slott, Bro
- 06/2026 **Lecture series by Stephen Melczer: An Invitation to Analytic Combinatorics**
Scientific organizer with Dr. Maximilian Wiesmann
MPI MiS, Leipzig
- 03/2026 **Seminar Algebra, Representations, Topology**
Invited talk: *Border Bases in the Rational Weyl Algebra*
Institut de Recherche Mathématique Avancée, Strasbourg
- 02/26 – 03/26 **ESI thematic program: Amplitudes and Algebraic Geometry**
Scientific organizer with Prof. Daniele Agostini, Prof. Lara Bossinger, Prof. Ruth Britto, Prof. Johannes Henn, Dr. Jianrong Li , and Prof. Oliver Schlotterer
Erwin Schrödinger International Institute for Mathematics and Physics, Vienna
- 10/2025 **Workshop on Algebraic Models in Data Science and Quantum Systems**
Invited talk: *Algebraic computations with linear PDEs behind functions in the sciences*
University of Augsburg
- 10/2025 **Chow Lectures 2025: Nima Arkani-Hamed**
Scientific organizer together with Joris Koefer and Dr. Simon Telen
MPI MiS, Leipzig
- 09/2025 **Workshop on Singularities, D-modules, and Connections to Physics**
Invited participant
Banff International Research Station for Mathematical Innovation and Discovery
- 07/2025 **Chemnitz Mathematical Colloquium**
Invited talk: *An Algebraic Treatment of Linear PDEs*
Technical University of Chemnitz
- 06/2025 **Amplitudes 2025**
Invited talk: *Writing Systems of Linear PDEs in Matrix Form via Gröbner Bases*
Seoul National University
- 01/2025 **Oberseminar on Data Science**
Invited talk: *Geometry of Equivariant Linear Neural Networks*
Technical University of Munich
- 10/2024 **UNIVERSE+ workshop: Holonomic Techniques for Feynman Integrals**
Scientific organizer together with Hofie Hannesdóttir, PhD, and Prof. Johannes Henn
Max Planck Institute for Physics, Garching near Munich
- 09/2024 **Conference: Integral Structures in Geometry and Representation Theory**
Invited talk: *Combinatorial Correlators*
Paderborn University

- 08/2024 **Elliptics and Beyond '24**
Invited talk: *D-Module Tricks for Solving Differential Equations*
Max Planck Institute for Physics, Garching near Munich
- 08/2024 **Program on Special Functions: from Geometry to Fundamental Interactions**
Invited participant
Munich Institute for Astro-, Particle and BioPhysics (MIAPbP)
- 07/24 – today **Positive Geometry Seminar**
Scientific organizer
Max Planck Institute for Mathematics in the Sciences, Leipzig
- 07/2024 **9th European Congress of Mathematics (9ECM)**
Minisymposium: *D-Modules and Applications*
Invited talk: *D-Module Techniques for Solving Differential Equations*
University of Seville
- 04/2024 **Mathematics and Applied Mathematics (MAM) seminar**
Invited talk: *Geometry of Equivariant Linear Neural Networks*
Mälardalen University, Västerås
- 03/2024 **MATHEXP-POLSYS seminar**
Invited talk: *D-Module Techniques for Solving Differential Equations in the Context of Feynman Integrals*
Inria Saclay, Palaiseau
- 02/2024 **Workshop: Positive Geometry in Particle Physics and Cosmology**
Invited talk: *Shift relations among Feynman integrals via s-parametric annihilators*
MPI MiS, Leipzig
- 02/2024 **Reading Group on Positive Geometry**
Presentation: *Yoga with Polylogarithms*
MPI MiS, Leipzig
- 01/2024 **Augsburger Mathematisches Kolloquium**
Invited talk: *Geometry of Equivariant Linear Neural Networks*
University of Augsburg
- 10/2023 **Applied CATS Seminar**
Invited talk: *Geometry of Linear Neural Networks: Equivariance and Invariance under Permutation Groups*
KTH Royal Institute of Technology, Stockholm
- 09/2023 **DMV Annual Meeting 2023**
Section: *Mathematics of Data Science*
Invited talk: *Algebraic Geometry of Equivariant Neural Networks*
TU Ilmenau
- 08/2023 **ICIAM 2023**
Minisymposium: *Hypergeometric functions in statistics and particle physics*
Inv. talk: *D-Module Techniques for Solving DEs in the Context of Feynman Integrals*
Waseda University, Tokyo
- 08/2023 **Hypergeometric School 2023**
Invited talk: *Bayesian Integrals on Toric Varieties*
Kobe University

- 08/2023 **Amplitudes 2023**
 Invited talk: *D-Module Techniques for Solving Differential Equations in the Context of Feynman Integrals*
 CERN, Geneva
- 07/2023 **SIAM Conference on Applied Algebraic Geometry (AG23)**
 Minisymposium: *Algebraic Invariants of Data*
 Invited minisymposium talk: *Bayesian Integrals on Toric Varieties*
 Eindhoven University of Technology
- 11/2022 **Uppsala/NORDITA amplitudes group meeting**
 Invited talk: *Algebraic Analysis of Feynman Integrals*
 Uppsala universitet
- 08/2022 **EWM General Meeting 2022**
 ♦ Invited talk: *Toric Varieties as Probability Spaces*
 Minisymposium: *Real algebraic geometry in action with a view toward optimization*
 ♦ Minisymposium: *Algebra and Geometry behind Data*
 Scientific organizer together with Miruna-Ştefana Sorea, PhD
 Aalto University, Helsinki
- 07/2022 **MIAPbP 2022 program: Novel Developments in Scattering Amplitudes**
 Invited talk: *Vector Spaces of Generalized Euler Integrals*
 Munich Institute for Astro-, Particle and BioPhysics, Garching
- 06/2022 **Algebraic Topology: Methods, Computation and Science (ATMCS10)**
 Talk: *The Shift-Dimension: An Algebraic Invariant of Multipersistence Modules*
 University of Oxford
- 06/2022 **AIToGeLiS Day**: one-day meeting with moderated problem sessions
 Scient. organizer w. Prof. Sandra Di Rocco, Prof. Liam Solus, and Francesca Tombari
 KTH Royal Institute of Technology
- 06/2022 **Workshop on Differential Algebra**
 Invited talk: *Vector Spaces of Generalized Euler Integrals*
 MPI MiS, Leipzig
- 05/2022 **Seminar on Statistics and Data Science**
 Invited talk: *Bayesian Integrals on Toric Varieties*
 TU Munich
- 05/2022 **Applied Topology Seminar**
 Invited talk: *The Shift-Dimension: An Algebraic Invariant of Multiparameter Persistence Modules*
 TU Munich
- 04/2022 **Special ITS Seminar on structures of Feynman integrals**
 Invited talk: *D-Module Techniques in Physics*
 ETH-ITS Zürich
- 03/2022 **Feynman Integrals and Nonlinear Algebra**
 Talk: *Linear Differential Operators in the Study of Feynman Integrals*
 MPI MiS, Leipzig
- 02/2022 **AIToGeLiS seminar**
 Talk: *Algebraic Tools for Topological Data in a Multiparameter Setting*
 MPI MiS, Leipzig

- 01/2022 **Mørketidens Mattemøte**
Invited talk: *The Shift-Dimension of Multipersistence Modules*
UiT – The Arctic University of Norway
- 11/2021 **Seminar Applied Combinatorics, Algebra, Topology & Statistics**
Invited talk: *Algebraic Aspects of Multiparameter-TDA*
KTH Royal Institute of Technology, Stockholm
- 08/2021 **SIAM Conference on Applied Algebraic Geometry (AG21)**
Session: Differential Equations in Algebraic Geometry and Beyond
Invited talk: *D-Modules in (Algebraic) Statistics*
Texas A&M University
- 07/2021 **Workshop on Math of Data**
Talk: *Stable Invariants for Multipersistence Modules*
MPI MiS, Leipzig
- 07/2021 **Mathematical Congress of the Americas**
Session: Differential operators in algebraic geometry and commutative algebra
Invited talk: *D-Modules in (Algebraic) Statistics*
University of Buenos Aires
- 06/2021 **Seminar on Nonlinear Algebra**
Talk: *How does an algebraic geometer interpret Taylor series?*
MPI MiS, Leipzig
- 06/2021 **MEGA 2021**
Talk: *Combinatorial Differential Algebra of x^p*
UiT – The Arctic University of Norway, Tromsø
- 04/2021 **Seminar on the Mathematics of Amplitudes**
Invited Talk: *MLE from a Tropical and a Bernstein–Sato Perspective*
IAS Princeton, MPI MiS Leipzig, and MPP Munich
- 02/2021 **Onlineseminar on Applied Algebra and Analysis**
Invited Talk: *MLE from a Tropical and a Bernstein–Sato Perspective*
TU Braunschweig and Osnabrück University
- 01/2021 **OSCAR rings in the new year**
Software presentation: Singular in OSCAR
MPI MiS, Leipzig
- 11/2020 **Workshop Computational Algebra 2020**
Invited talk: *Algebraic Analysis of the Hypergeometric Function ${}_1F_1$ of a Matrix Argument*
TU Kaiserslautern
- 09/2020 **Seminar on Nonlinear Algebra**
Talk: *Algebraic Tools for Topological Data Analysis*
MPI MiS, Leipzig
- 07/2020 **ICMS 2020 Session: Computational Algebraic Analysis**
Scientific organizer together with Dr Christoph Koutschan
TU Braunschweig
- 03/2020 **Seminar Number Theory and Algebraic Geometry**
Invited talk: *D-modules: Linear PDEs from an algebraic perspective*
KU Leuven

- 11/2019 **Seminar on Symbolic Computation**
Invited talk: *Computational Algebraic Analysis*
RICAM, Linz
- 11/2019 **Geometric Analysis Seminar**
Invited talk: *D-modules and applications*
Goethe University of Frankfurt
- 10/2019 **European Women in Mathematics: German Chapter Conference 2019**
Talk: *Computational Algebraic Analysis*
MPI MiS, Leipzig
- 09/2019 **Seminar: Computing with D-modules II**
Scientific organizer together with Prof. Christian Sevenheck
Talk: *Probability distributions as holonomic functions*
MPI MiS, Leipzig
- 08/2019 **Seminar: Computing with D-modules**
Talk: *How to compute? Part 2: Plural*
MPI MiS, Leipzig
- 05/2019 **Otto–Sturmfels Day**
Invited talk: *Algebraic Analysis: D-Modules and PDEs*
MPI MiS, Leipzig
- 04/2019 **Workshop: D-modules and the Riemann–Hilbert correspondence**
Invited talk: *Riemann–Hilbert for D-modules arising from weighted projective lines*
Humboldt University of Berlin
- 10/2018 **Séminaire de géométrie algébrique**
Invited talk: *Topological Computation of Stokes Data*
University of Angers
- 07/2018 **Oberseminar Algebra und Theoretische Mathematik**
Invited talk: *Topological Computation of Stokes Data of Weighted Projective Lines*
TU Chemnitz

Scholarships and achievements

- 04/2026 **Young Academy of the Academy of Sciences and Literature | Mainz**
Selected member for the duration of four years
- 02/2024 **Young Academy of the European Mathematical Society**
Selected member
- 11/2021 **Sign Up! Careerbuilding 2022** of the Max Planck Society and EAF Berlin
Selected candidate
- 09/16 – 05/19 **German Academic Scholarship Foundation**
Doctoral scholarship
- 11/2015 **Hurwitz Society of the Technical University of Munich**
Honoring for the Master's degree passed with distinction
- 10/12 – 09/15 **Max Weber-Program of the German Academic Scholarship Foundation**
Scholarship
- 04/11 – 03/13 **Deutschlandstipendium**
German public-private scholarship

Further qualifications

Language	German (native language) French (advanced; level C1) Swedish (elementary; level A2)	English (fluent) Italian (upper intermediate; level B2)
Softskills	◇ Planck Academy (2021–2022) various trainings on topics including gender equality, unconscious bias, sexualized discrimination, and guiding challenging conversations ◇ EAF Berlin Diversity in Leadership (2022) various trainings on topics including leadership & communication in academia, leadership presence, and vocational skills ◇ Certificate for Teaching in Higher Education of the Bavarian Universities (2015) diverse soft skill courses on rhetoric, voice training, moderation, team heading, consulting students, and many more in the program ProfiLehre	
Interests	◇ music ◇ abstract painting ◇ sports ◇ espresso	