Curriculum Vitae

A.-L. Sattelberger, Dr. rer. nat. November 2026

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. Koefler, 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] **$\mathbf{D}$-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 $\mathbf{x^p}$** (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 ${}_1\mathbf{F}_1$ 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. Lőrincz, and B. Sturmfels). *Algebraic Statistics*, 11(2):189–211, 2020.

[2] **$\mathbf{D}$-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 *Algebraic Aspects of Linear PDEs* Domoschool2025, Domodossola
Spring 2025	**Reading group** on *Geometric Representation Theory and D-Modules* Scientific organizer together with Veronica Calvo Cortes MPI MiS, Leipzig
Autumn 2024	**Lecture:** *Introduction to Algebraic Analysis* Teaching assistant: Carlos Gustavo Rodriguez Fernandez MPI MiS, Leipzig
Autumn 2023	**PhD course** on *D-Modules and Holonomic Functions* KTH Royal Institute of Technology and Stockholm University
08/2023	**Invited lecture series** on *Algebraic and Holonomic Statistics* Hypergeometric School 2023, Kobe University
Spring 2023	**Lecturer** of the undergraduate course *Calculus in One Variable* 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 *D-Modules and Holonomic Functions* 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 *Best MINT*** of the Bavarian State Ministry for Education, Science and the Arts at the University of Augsburg
08/12 – 09/12	**Intern** at *SGL Carbon* 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

02/2027	**Workshop on Tropical Methods in Quantum Field Theory** Invited talk: *TBA* Perimeter Institute for Theoretical Physics, Waterloo
12/2026	**Research Seminar on Algebraic Geometry** Invited talk: *Border Bases in the Rational Weyl Algebra* University of Mannheim
12/2026	**Women in Algebra and Symbolic Computation IV** Talk: *Symbolic Computations with Left Ideals of Differential Operators* Bad Dürkheim

10/2026 – today **New Arrivals Seminar**
Scientific organizer with Dr. İrem Portakal
MPI-MiS Leipizg

09/2026 **Annual Meeting of the CRC/TRR 195 "Symbolic Tools in Mathematics and their Application"**
Invited talk: *Border Bases in the Rational Weyl Algebra*
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*
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 Koefler 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 – 03/26 **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*

Invt. 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

05/2023 **A Hypergeometric Day**
Invited lecture: *Introduction to D-Modules and GKZ systems*
MPI MiS, Leipzig

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-Ștefana 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: $\mathcal{D}$*-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:* $\mathcal{D}$*-Modules and PDEs*
MPI MiS, Leipzig

04/2019 **Workshop:** $\mathcal{D}$**-modules and the Riemann–Hilbert correspondence**
Invited talk: *Riemann–Hilbert for* $\mathcal{D}$*-modules arising from weighted projective lines*
Humboldt University of Berlin

10/2018 **Séminaire de géometrie 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) **English** (fluent)
French (advanced; level C1) **Italian** (upper intermediate; level B2)
Swedish (elementary; level A2)

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**