Curriculum Vitae

Anna-Laura Sattelberger, Dr. rer. nat.   April 2024

Contact

Office address	Department of Mathematics, KTH Royal Institute of Technology, Lindstedtsvägen 25, 114 28 Stockholm, Sweden
E-mail	mail@alsattelberger.de and alsat@kth.se
Website	www.alsattelberger.de and www.kth.se/profile/alsat

Education and academia

From 07/24	**Research 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 the field of applied algebraic analysis Research group in nonlinear algebra of Prof. Bernd Sturmfels Max Planck Institute for Mathematics in the Sciences, 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

Publications and preprints   arXiv, Google Scholar, ORCİD

[13] **Geometry of Linear Neural Networks: Equivariance and Invariance under Permutation Groups** (with K. Kohn and V. Shahverdi). Preprint arXiv:2309.13736, 2023. Submitted.

[12] **D-Module Techniques for Solving Differential Equations in the Context of Feynman Integrals** (with J. Henn, E. Pratt, and S. Zoia). Preprint arXiv:2303.11105. Submitted.

[11] **D-Algebraic Functions** (with R. Ait El Manssour and B. Teguia Tabuguia). Preprint arXiv:2301.02512. Submitted.

[10] **Vector Spaces of Generalized Euler Integrals** (with D. Agostini, C. Fevola, and S. Telen). To appear in *Communications in Number Theory and Physics*, 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). Preprint arXiv:2112.06509. Accepted for publication in the ATMCS10 special issue of *Journal of Applied and Computational Topology*.

[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** $\mathbf{{}_1F_1}$ **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. Lőrincz, and B. Sturmfels). *Algebraic Statistics*, 11(2):189–211, 2020.

[2] **D-Modules and Holonomic Functions** (with B. Sturmfels). Preprint arXiv:1910.01395. To appear in the volume *Varieties, polyhedra, computation* of *EMS Series of Congress Reports*.

[1] **Topological Computation of Stokes Matrices of some Weighted Projective Lines**. *Manuscripta mathematica*, 164(3):327–347, 2021.

Teaching and work experience

09/2024	**Invited lecture series** on algebraic analysis Scuola Normale Superiore, Pisa
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

Early 2025	**Program on Cohomological Aspects of Quantum Field Theory** Invited participant Mittag Leffler Institute, Stockholm
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
09/2024	**Conference: Integral Structures in Geometry and Representation Theory** Invited talk: *TBA* Paderborn University
08/2024	**Elliptics and Beyond '24** Invited talk: *TBA* Max Planck Institute for Astrophysics, Garching
08/2024	**Program on Special Functions: from Geometry to Fundamental Interactions** Invited participant Munich Institute for Astro-, Particle and BioPhysics (MIAPbP)
07/2024	**9th European Congress of Mathematics (ECM)** Minisymposium on D-modules Invited talk: *TBA* University of Seville
04/2024	**Mathematics and Applied Mathematics (MAM) seminar** Invited talk: *TBA* 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*
	◇ Minisumposium: *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	**AlToGeLiS 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
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	**AlToGeLiS seminar** Talk: *Algebraic Tools for Topological Data in a Multiparameter Setting* MPI MiS, Leipzig

02/2022	**Nonlinear Algebra Seminar Online** Talk: *Linear Differential Operators in the Sciences* 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: $\mathcal{D}$-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

Scholarships and achievements

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**

Further qualifications

Language	**German** (native language) **English** (fluent) **French** (advanced; level C1) **Italian** (upper intermediate; level B2) **Swedish** (elementary; level A2)
Teaching	**Acquisition of the "Certificate for Teaching in Higher Education of the Bavarian Universities"** Diverse soft skill courses on rhetoric, voice training, moderation, team heading, consulting students, and many more in the program ProfiLehre
Interests	◇ **Music** ◇ **Sports** ◇ **Painting** ◇ **Espresso**