Dmitrii Pavlov

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EMPLOYMENT

Max Planck Institute for Physics

- Senior postdoctoral researcher (E14), Quantum Field Theory group — Oct 2025 – present
  - Position funded by the ERC Synergy Grant UNIVERSE+

Technische Universität Dresden

- Postdoctoral researcher, Real Algebraic Geometry group — Oct 2024– Sep 2025
  - Mentor: Jun.-Prof. Dr. Mario Kummer

Max Planck Institute for Mathematics in the Sciences

- Postdoctoral researcher, Numerical Algebraic Geometry group — Aug 2024– Sep 2024
  - Mentor: Dr. Simon Telen

EDUCATION

Max Planck Institute for Mathematics in the Sciences

- Dr. rer. nat., Mathematics (degree awarded by Universität Leipzig) — Aug 2022 – Aug 2024
  - Thesis title: Real Algebraic Geometry for Physics and Optimization
  - Advisors: Prof. Dr. Bernd Sturmfels and Dr. Simon Telen

Moscow State University

- Specialist (B.Sc.+M.Sc.) in Fundamental Mathematics and Mechanics — Sep 2016 – Jun 2022
  - GPA: 5.00 / 5.00

PUBLICATIONS

[1] C. Brüser, M. Kummer, and D. Pavlov, "Adjoints of Polytopes: Determinantal Representations and Smoothness," *Int. Math. Res. Not.*, no. 2, 31p., 2026. doi.org/10.1093/imrn/rnaf386

[2] D. Pavlov and K. Ranestad, "Positive Polytopes with Few Facets in the Grassmannian," *Exp. Math.*, p. 1–14, 2026. doi.org/10.1080/10586458.2025.2595003

[3] Y. Mandelshtam, D. Pavlov, and E. Pratt, "Combinatorics of $m = 1$ Grasstopes," *Comb. Theory* 5, No. 2, Paper No. 9, 21 p., 2025. doi.org/10.5070/C65265411.

[4] E. Duarte, D. Pavlov, and M. Wiesmann, "Algebraic Geometry of Quantum Graphical Models,", *Adv. Appl. Math.* 170, Article ID 102930, 25 p, 2025. doi.org/10.1016/j.aam.2025.102930.

[5] S. De, D. Pavlov, M. Spradlin, and A. Volovich, "From Feynman Diagrams to the Amplituhedron: A Gentle Review," *Special volume on Positive Geometry, Matematiche (Catania)* 80, No. 1, 233-254, 2025. doi.org/10.4418/2025.80.1.9.

[6] E. Mazzucchelli, D. Pavlov, and K. Wang, "Hyperplane Arrangements in the Grassmannian", *Special volume on Positive Geometry, Matematiche (Catania)* 80, No. 1, 387-408, 2025. doi.org/10.4418/2025.80.1.16.

[7] S. Falkensteiner, D. Pavlov, and R. Sendra, "On Real and Observable Rational Realizations of Input-Output Equations", *Syst. Control Lett.* 198, 11 p., 2025. doi.org/10.1016/j.sysconle.2025.106059.

[8] D. Pavlov and S. Telen, "Santaló Geometry of Convex Polytopes," *SIAM J. Appl. Algebra Geom.* 9, No. 1, 58-82, 2025. doi.org/10.1137/24M1643566.

[9] D. Pavlov, B. Sturmfels, and S. Telen, "Gibbs Manifolds," *Inf. Geom.* 7, Suppl. 2, 691-717, 2024. doi.org/10.1007/s41884-023-00111-2.

[10] D. Pavlov, "Logarithmically Sparse Symmetric Matrices," *Beitr. Algebra Geom.* 65, No. 4, 907-922, 2024. doi.org/10.1007/s13366-024-00753-y.

[11] D. Pavlov and G. Pogudin, "On Realizing Differential-Algebraic Equations by Rational Dynamical Systems," *Proceedings of the 47th International Symposium on Symbolic and Algebraic Computation, ISSAC '22*, Villeneuve-d'Ascq France, July 4–7, 2022. New York, NY: Association for Computing Machinery (ACM). 119-128, 2022. https://doi.org/10.1145/3476446.3535492.

[12] D. Pavlov, G. Pogudin, Yu. Razmyslov, "From algebra to analysis: new proofs of theorems by Ritt and Seidenberg", *Proc. Am. Math. Soc.* 150, No. 12, 5085-5095, 2022. doi.org/10.1090/proc/16065

PREPRINTS

[1] B. Hollering, D. Pavlov, and E. Pratt, "Log Canonical Models and Positive Geometries", *in preparation, to appear in July 2026*.

[2] V. Borovik, C. de Korte, N. Meurrens, and D. Pavlov, "Constraining Conformal Correlators", arXiv:2605.31491, 2026.

[3] J. Koefler, D. Pavlov, and R. Sinn, "Positive Genus Pairs from Amplituhedra," arXiv:2601.11142, 2026.

[4] B. Hollering and D. Pavlov, "Parke–Taylor varieties," arXiv:2509.09323, 2025.

TALKS AT CONFERENCES

- *Log Canonical Embeddings and Positive Geometries*, Combinatorial Coworkspace, Kleinwalsertal, Mar 2026.
- *What is UNIVERSE+*, MaScAmp Kick-off meeting, Les Diablerets, Oct 2025.
- *Gibbs Manifolds*, Numerical (Nonlinear) Algebra in the Sciences, Dresden, Feb 2025.
- *Santaló Geometry of Convex Polytopes*, Wachspress Geometry workshop, Leipzig, Sep 2024.
- *Gibbs Manifolds*, SIAM AG23, Minisimposium on Geometric and Algebraic Methods in Quantum Information, Eindhoven, Jul 2023.
- *Gibbs Manifolds*, New Directions in Real Algebraic Geometry, Mathematisches Forschungsinstitut Oberwolfach, Mar 2023.
- *What is a Gibbs manifold?*, Workshop on Algebra, Geometry and Computation, CWI Amsterdam, Mar 2023.

TALKS AT SEMINARS

- *Adjoints and canonical forms in Physics and beyond*, Seminar on Algebraic Geometry, Universität Göttingen, May 2026.
- *Determinantal representations of adjoints of polytopes*, UNIVERSE+ Online Seminar, Jun 2025.
- *Positive polytopes with few facets in the Grassmannian*, Nonlinear Algebra Seminar, MPI MiS, Leipzig, Apr 2025.
- *From Feynman diagrams to the amplituhedron*, Positive Geometry Seminar, MPI MiS, Leipzig, Nov 2024.
- *Hyperplane arrangements in the Grassmannian*, Statistics and Data Science Seminar, Technische Universität München, Nov 2024.
- *Santaló geometry of convex polytopes*, Geometry Seminar, Technische Universität Dresden, Nov 2024.
- *Santaló geometry of convex polytopes*, Algebra Seminar, Brown University, Apr 2024.
- *Santaló geometry of convex polytopes*, Informal Applied Mathematics Seminar, Harvard University, Apr 2024.
- *Santaló geometry of convex polytopes*, Discrete Mathematics and Discrete Geometry Seminar, Technische Universität Berlin, Apr 2024.
- *Combinatorics of* $m = 1$ *Grasstopes*, Quantum Field Theory Group Seminar, MPI for Physics, Munich, Jan 2024.
- *Combinatorics of* $m = 1$ *Grasstopes*, Geometry Seminar, Technische Universität Dresden, Dec 2023.
- *Algebraic geometry of quantum graphical models*, InterCity Seminar, Universität Konstanz, Nov 2023.
- *Realizations of input-output equations: rational, observable, and real*, Kolchin Seminar in Differential Algebra (online), Oct 2023.
- *Real realizations of algebraic differential equations*, Nonlinear Algebra Seminar, MPI MiS, Leipzig, May 2023.
- *Realizability of algebraic differential equations by rational dynamical systems*, Nonlinear Algebra Seminar, MPI MiS, Oct 2022.
- *Realizability of algebraic differential equations by rational dynamical systems*, Algebra and Model Theory Seminar, Moscow State University, Apr 2022.

POSTER PRESENTATIONS

- *Santaló geometry of convex polytopes*, Computations in Algebraic Geometry: Complex, Real and Tropical, ETH Zürich, Aug 2025.
- *Santaló geometry of convex polytopes*, Effective Methods in Algebraic Geometry (MEGA), Leipzig, Jul 2024.

TEACHING EXPERIENCE

- **Nonlinear Algebra for Physics** (in English), ICTS Bengaluru — Feb 2025
  - Mini-course for graduate students during the special program Positive Geometry in Scattering Amplitudes and Cosmological Correlators.
- **Funktionentheorie** (in German), TU Dresden — Summer Semester 2025
  - Course assistant. Preparing exercise and exam materials. Conducting exercise sessions, substitute lectures and the exam. Grading homework and the exam.
- **Differentialgleichungen und Mannigfaltigkeiten** (in German), TU Dresden Winter Semester 2024/25
  - Course assistant. Same tasks as for Funktionentheorie.

OUTREACH

- **Mathematical Circle of Moscow State University** — Mar 2018–May 2019
  - Tutor for middle school students, aged 11 to 14.
- **Moscow Center for Continuous Mathematical Education** — Oct 2019 – Jun 2021
  - Editor of interactive courses and textbooks in middle and high school mathematics.

EVENTS ORGANIZED

- **Positive Geometry beyond Physics**, MPI MiS Leipzig — Oct 2026
  - Co-organizer: Simon Telen
- **Quantum Field Theory group seminar**, MPI for Physics — May 2026–present
- **Geometry in Physics Day**, MPI for Physics — Dec 2025
- **Mini-symposium "Combinatorial and Computational Aspects of Positive Geometry"** — Jul 2025
  - SIAM conference on Applied Algebraic Geometry 2025, University of Wisconsin–Madison
  - Co-organizer: Elizabeth Pratt (UC Berkeley)
- **Summer School "Combinatorial Algebraic Geometry from Physics"**, MPI MiS Leipzig — May 2024
  - Invited lecturers: Michael Borinsky (ETH Zürich) and Thomas Lam (University of Michigan)
  - Co-organizers: Bernd Sturmfels and Simon Telen
- **Lectures on Positive Geometry**, MPI MiS Leipzig — Dec 2023
  - An introductory lecture series by local speakers, including myself
- **First IMPRS COMBO Autumn School**, MPI MiS Leipzig — Nov 2023
  - A school organized by PhD Students for PhD students
  - Co-organizers: Barbara Betti, Konstantin Kalinin, Sandra Ried

EXTENDED STAYS

- **Program on Amplitudes and Algebraic Geometry** — Mar 2026
  - Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria
- **Program on Positive Geometry in Scattering Amplitudes and Cosmological Correlators** Mar 2025
  - International Center for Theoretical Sciences, Bengaluru, India
- **Program on Mathematical Aspects of Scattering Amplitudes** — Apr 2024–May 2024
  - Center of Mathematical Sciences and Applications, Harvard University, USA

COMMITTEE WORK

- **Member of the Postdoc Selection Committee for the Theory Department**, MPI for Physics 2025/26

PEER REVIEW

- **Referee** for *Journal of Symbolic Computation*, *Set-valued and Variational Analysis*, *SIAM Journal on Applied Algebra and Geometry*, *SIAM Journal on Scientific Computing*.

LANGUAGES Russian (native), English (C2), German (B2/C1), French (B2)

SOFTWARE Julia, Mathematica, Macaulay2, Python.