Viktor Stein
PhD student, Applied Mathematics

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https://viktorajstein.github.io/

Education

04/2021 – 05/2023 **Mathematics Master's** (Technical University Berlin. Final grade: 1.1. Focus on further Functional Analysis topics as well as Topology, Differential Geometry, Complex Analysis and Statistics. Master's thesis: Wasserstein gradient flows - with an eye towards positive matrix-valued measures. Supervised by Prof. Gabriele Steidl and Dr. Robert Beinert.)

10/2017 – 04/2021 **Mathematics Bachelor's** (Technical University Berlin. Final grade: 2.0. Focus on Functional Analysis and Differential Equations with a minor in Machine Learning. Bachelor's thesis: Atomic Norm Minimisation for Superresolution. Supervised by Prof. Gabriele Steidl and Dr. Robert Beinert.)

Positions

08/2024 – 09/2024 **Research visit (Wuchen Li at the University of South Carolina)** (Accelerated Stein metric gradient flows with general bilinear kernels on Gaussian families.)

In the Applied Mathematics group at Technical University Berlin.

01/2024 – **PhD candidate** (With teaching responsibilities.)

04/2023 – 12/2023 **PhD candidate** (Funded by a stipend and by the German Federal Ministry of Education and Research under the project "VI-Screen".)

06/2021 – 03/2023 **Student research assistant** (Research on Wasserstein gradient flows, writing a script for the lecture "Approximation theory", rewriting the script for the lecture "Convex Analysis" in the setting of infinite-dimensional spaces, and proofreading manuscripts.)

At the Department of Mathematics, Technical University Berlin.

10/2019 – 03/2021 **Tutor** (Giving tutorials and correcting homework for the lectures "Functional Analysis I", "Differential Equations I" and "Linear Algebra for Engineers".)

Publications

07/2025 **R. Duong, V. Stein, R. Beinert, J. Hertrich, G. Steidl: Wasserstein Gradient Flows of MMD Functionals with Distance Kernel and Cauchy Problems on Quantile Functions** (Accepted subject to minor modifications in ESAIM: Control, Optimisation and Calculus of Variations.)

06/2025 **V. Stein, W. Li: Accelerated Stein Variational Gradient Flow** (Accepted for publication in the Springer LNCS proceedings of GSI'25: Geometric Science of Information in Information Geometry.)

06/2025 **R. Duong, N. Rux, V. Stein, G. Steidl: Wasserstein Gradient Flows of MMD Functionals with Distance Kernels under Sobolev Regularization** (Philosophical Transactions of the Royal Society A, vol. 383, issue 0243 "Partial differential equations in data science".)

04/2025 **V. Stein, S. Neumayer, N. Rux, G. Steidl: Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces** (Accepted for publication in Analysis and Applications.)

Preprints

09/2025	**Towards understanding Accelerated Stein Variational Gradient Flow - Analysis of Generalized Bilinear Kernels for Gaussian target distributions** (With Wuchen Li, University of South Carolina.)
04/2024	**Interpolating between Optimal Transport and KL regularized Optimal Transport using Rényi Divergences** (With Jonas Bresch, TU Berlin. Submitted in revised form to the Journal Results in Mathematics.)

Talks

03/2026	**tbd** (MFO Workshop 2613 - Flows on Measure Spaces and Applications in Machine Learning.)
10/2025	**Accelerated Stein Variational Gradient Flow** (GSI'25: Geometric Structures of Statistical & Quantum Physics, Information Geometry, and Machine Learning (Saint-Malo, France), fully funded by the DAAD.)
09/2025	**Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces** (MML'25: Conference on Mathematics of Machine Learning 2025 in Hamburg, Germany.)
04/2025	**Accelerated Stein Variational Gradient Flow** (Stan Osher's UCLA level set seminar)
09/2024	**Interpolating between Optimal Transport and KL regularized Optimal Transport using Rényi Divergences.** (University of South Carolina Mathematics Graduate Colloquium)
08/2024	**Wasserstein Gradient Flows of MMD Functionals with Distance Kernel and Cauchy Problems on Quantile Functions.** (Joint Applied and Computational Mathematics (Changhui Tan & Siming He) and RTG data science seminar (Wuchen Li), University of South Carolina.)
08/2024	**Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces** (Stan Osher's UCLA level set seminar)

Poster Presentations at Conferences

08/2025	**Mathematical and Scientific Machine Learning in Naples, Italy.** (Accelerated Stein Variational Gradient Flow)
10/2024	**SIGMA (Signal - Image - Geometry - Modelling - Approximation) Workshop at the CIRM in France.** (Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces)
06/2024	**LOL: Learning and Optimization in Luminy at the CIRM, France.** (Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces)
03/2024	**Workshop on Optimal transport from theory to applications - Interfacing dynamical systems, optimization and machine learning in Berlin, Germany.** (Wasserstein Gradient Flows for Moreau Envelopes of f-Divergences in Reproducing Kernel Hilbert Spaces)

Teaching

Winter 2025/26	**Harmonic Analysis** (Lecture assistant. Elective BMS advanced module in the Mathematics program.)
Winter 2025/26	**Numerical Mathematics I** (Tutor. Third-semester compulsory module (in German) in the Mathematics Bachelor's program.)
Summer 2025	**Mathematical Physics II - Statistical Mechanics** (Lecture assistant. Advanced BMS module for Master's students in the Mathematics program.)

Summer 2025	**Probability Theory I** (Tutor. Compulsory fourth-semester undergraduate course in the Mathematics program.)
Winter 2024/25	**Analysis II for Mathematicians** (Tutor. Compulsory module in the Mathematics program, covering multidimensional differentiation.)
Winter 2024/25	**Harmonic Analysis** (Lecture assistant)
Summer 2024	**Convex Analysis** (Lecture assistant. Elective advanced module in the Mathematics program.)
01/2024 - 02/2024	**Numerical Mathematics I** (Lecture assistant)

Supervised Thesis

03/2025	**Roxane Leitheiser, Technical University Berlin** (Wasserstein Gradient Flows of the MMD with Riesz Kernels on the Real Line. Bachelor's thesis.First supervisor: Gabriele Steidl.)

Journal and Conference Refereeing

I have reviewed for the Journal of Optimization Theory and Applications (JOTA), Transactions on Machine Learning Research (TMLR) as well as for the Bayesian Decision-making and Uncertainty Workshop at NeurIPS 2024.

Awards

At the 17th annual Dies Mathematicus (TU Berlin, 2022), I received the prize for the Best Bachelor's Thesis Talk.

IT Skills

I have strong knowledge of Python (including PyTorch) and experience using HPC clusters. Furthermore, I am comfortable with MATLAB and well versed in LaTeX.

Volunteer Work

In the school year 2022/23 I have been tutoring around fourteen seventh-graders in weekly sessions discussing mathematical puzzles and questions from the German Mathematical Olympiad. I have also served as corrector at the team competition at the Tag der Mathematik 2022 (Mathematics Day) organized by the three Berlin universities, where sixty-nine teams of high schoolers participated.

Language Skills

German: native. English: fluent (spoken and written). French: beginner.

References

Prof. Dr. Gabriele Steidl
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Wuchen Li, Associate Professor
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University of South Carolina, USA
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