Curriculum Vitae

Personal Data

Title:	Dr.
First Name:	Johannes Christoph
Last Name:	Müller
Current Position:	Postdoctoral Researcher, TU Berlin (until 03/2030)
Institution / City:	Technische Universität Berlin, Germany
ORCID iD:	0000-0001-8729-0466

Education and Career

Period	Position / Institution / Details
Since 2025	Postdoctoral Researcher, Mathematical Institute, TU Berlin
2023–2024	Scientific Employee, Chair for Mathematics of Information Processing, RWTH Aachen University
2020–2024	PhD in Mathematics (Dr. rer. nat.), Leipzig University; Advisors: Prof. N. Ay, Prof. G. Montúfar; Thesis: *Geometry of Optimization in Markov Decision Processes and Neural Network-Based PDE Solvers*; Summa cum laude
2016–2019	M.Sc. in Mathematics, Freiburg University; Thesis: *Universal flow approximation with deep residual networks*; Grade: 1.0
2017–2018	M.Sc. in Interdisciplinary Mathematics, Warwick University, United Kingdom; Thesis: *Parameter estimation and consistency for discrete determinantal point processes*; With Distinction
2013–2016	B.Sc. in Mathematics, Freiburg University, Germany; Grade: 1.1

Service and Academic Engagement

Organization

- Mini-workshop *Geometric Methods in Scientific Machine Learning*
  Mathematisches Forschungsinstitut Oberwolfach 2026
- Minisymposium *Learning Scientific Models from Data*
  2026 SIAM Conference on Optimization (OP26), Edinburgh 2026
- Minisymposium *Geometric Optimization Methods for Scientific Machine Learning*
  ENUMATH, Heidelberg 2025
- Workshop *Algebraic Geometry, Combinatorics and Machine Learning*, Leipzig 2022

Non-scientific Services

- Member of the Nationwide council of PhD scholarship holders 2021–2023

- PhD representative, Max Planck Institute for Mathematics in the Sciences 2021–2022
- Summer school student organisational committee, Ev. Studienwerk e.V. 2018–2019

Outreach

- Panel discussion on *Excellence and Ethics in Science and Academia* 2023
  75-th anniversary ceremonial act of the Evangelisches Studienwerk Villigst e.V.
- One-week Seminar *Alpha Go – oder: Vom besiegten Menschen* 2019
  Annual Summer School of the Evangelisches Studienwerk Villigst e.V.

Reviewing Services

- Science Advances
- Neural Information Processing Systems (NeurIPS)
- International Conference on Machine Learning (ICML)
- International Conference on Learning Representations (ICLR)
- Transactions on Machine Learning Research (TMLR)
- IEEE Transactions on Automatic Control
- SIAM Journal on Mathematical Analysis
- Information Geometry
- Neural Networks
- Engineering Applications of Artificial Intelligence

Teaching

Supervision of Early-Career Researchers

- Reza Zolnouri, Master thesis in Mathematics 2024
  The Role of the Geometry in Policy Mirror Descent
  Now PhD Student at RWTH Aachen University
- Jonas Nießen, Master thesis in Mathematics 2023/2024
  Optimization guarantees for Physics-Informed Neural Networks
  Now PhD Student at RWTH Aachen University
- Friedrich Wicke, Undergraduate intern in Mathematics 2022
  State-Action Geometry of Multi-Agent Problems
  Now Master Student at ETH Zurich

Teaching

- Assistant for *Mathematik I für Wirtschaftswissenschaften* 2025/26
- Assistant for *Mathematik für Physiker:innen IV* 2025
- Seminar on *Neural network approximation theory* 2024
- Assistent for *Mathematical Foundations of Deep Learning* 2023/2024

Key Publications

Category A (up to 10 peer-reviewed articles)

1. **J. Müller**, S. Çaycı, G. Montúfar, “Fisher-Rao Gradient Flows of Linear Programs and State-Action Natural Policy Gradients”, In: *SIAM Journal on Optimization*, vol. 35.2, pp. 1060–1088, 2025. DOI: 10.1137/24M1653422, Preprint: arXiv.2403.19448
2. F. Dangel, **J. Müller**, M. Zeinhofer, "Kronecker-Factored Approximate Curvature for Physics-Informed Neural Networks”, *Advances in Neural Information Processing Systems (NeurIPS)*, 2024. url: openreview.net/forum?id=jrNlWfor7q
3. **J. Müller**, G. Montúfar, “Geometry and Convergence of Natural Policy Gradient Methods”, In: *Information Geometry*, vol. 7.Suppl 1, pp. 485–523, 2024. DOI: 10.1007/s41884-023-00106-z
4. **J. Müller**, M. Zeinhofer, "Position: Optimization in SciML Should Employ the Function Space Geometry”, *International Conference on Machine Learning (ICML)*, 2024. URL: proceedings.mlr.press/v235/muller24d.html
5. M. Dressler, M. Garrote-López, G. Montúfar, **J. Müller**, K. Rose, Algebraic Optimization of Sequential Decision Problems", In: *Journal of Symbolic Computation*, vol. 121, pp. 213-233, 2024. DOI: 10.1016/j.jsc.2023.102241, Preprint: arXiv.2211.09439
6. **J. Müller**, M. Zeinhofer, Achieving High Accuracy with PINNs via Energy Natural Gradient Descen”, *International Conference on Machine Learning (ICML)*, 2023. URL: proceedings.mlr.press/v202/muller23b.html
7. **J. Müller**, M. Zeinhofer, "Notes on Exact Boundary Values in Residual Minimisation," *Proceedings of Mathematical and Scientific Machine Learning.*, 2022. URL: proceedings.mlr.press/v190/muller22b.html
8. **J. Müller**, M. Zeinhofer, "Error Estimates for the Deep Ritz Method with Boundary Penalty”, *Proceedings of Mathematical and Scientific Machine Learning.*, 2022. URL: proceedings.mlr.press/v190/muller22a.html
9. P. Dondl, **J. Müller**, M. Zeinhofer, "Uniform Convergence Guarantees for the Deep Ritz Method for Nonlinear Problems”, In: *Advances in Continuous and Discrete Models*, vol. 2022.49, 2022. DOI: 10.1186/s13662-022-03722-8

10. **J. Müller**, G. Montúfar, “The Geometry of Memoryless Stochastic Policy Optimization in Infinite-Horizon POMDPs”, *International Conference on Learning Representations (ICLR)*, 2022. URL: https://openreview.net/forum?id=1eW8WDTyGH

Category B (up to 10 other outputs)

1. N. Milosevic, **J. Müller**, N. Scherf, "Embedding Safety into RL: A New Take on Trust Region Methods”, Accepted at *International Conference on Machine Learning (ICML)*, 2025, URL: arXiv.2411.02957.
2. J. Nießen, **J. Müller**, "Non-Asymptotic Analysis of Projected Gradient Descent for Physics-Informed Neural Networks”, Accepted for the *Scientific Machine Learning, Emerging Topic* special volume in the *SEMA-SIMAI Springer Series*, 2025, URL: arXiv.2505.07311.
3. **J. Müller**, S. Çaycı, "Optimal Rates of Convergence for Entropy Regularization in Discounted Markov Decision Processes”, Under review, 2024, URL: arXiv.2406.04163.
4. N. Milosevic, **J. Müller**, N. Scherf, "Central Path Proximal Policy Optimization”, Under review, 2025, URL: arXiv.2506.00700.

Awards and Recognition

- SIAM Travel award ($800) 2022
- PhD Scholarship, Evangelisches Studienwerk Villigst e.V. (∼€50k) 2021–2023
- PhD Scholarship, Evangelisches Studienwerk Villigst e.V. (∼€50k) 2021–2023
- Full scholarship as a member of the *International Max Planck Research School for Mathematics in the Sciences* 2020–2023
- Scholarship, Evangelisches Studienwerk Villigst e.V. (∼€30k) 2015–2019

Academic Refernces

- Professor Dr. Guido Montúfar; contact: `montufar@math.ucla.edu`
- Professor Dr. Holger Rauhut; contact: `rauhut@math.lmu.de`
- Professor Dr. Benjamin Gess; contact: `benjamin.gess@tu-berlin.de`
- Professor Dr. Jürgen Jost; contact: `juergen.jost@mis.mpg.de`

Consent for Optional Data

☐ I consent to processing of the optional personal data provided above.