

Mariia Seleznova

DFG Emmy Noether Group Leader in Mathematical Foundations of Deep Learning

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Research Profile

Theory of deep learning, focusing on generalization, training dynamics, and signal propagation. Probabilistic and random matrix theory approaches to large-scale neural networks, with an emphasis on finite-width effects and joint scaling limits.

Academic Positions

Aug 2026 – Present	Junior Research Group Leader (DFG Emmy Noether Programme) Technische Universität Darmstadt, Germany
Jan 2025 – Present	Guest Scientist Attoworld – Data Science Group Max Planck Institute of Quantum Optics, Munich, Germany
Nov 2024 – Jul 2026	Postdoctoral Researcher Bavarian AI Chair for Mathematical Foundations of AI Ludwig-Maximilians-Universität München, Germany
Dec 2020 – Nov 2024	Research Assistant (PhD Candidate) Bavarian AI Chair for Mathematical Foundations of AI Ludwig-Maximilians-Universität München, Germany
Oct 2019 – Nov 2020	Research Assistant Technische Universität Berlin, Germany

Education

2020 – 2024	PhD (Dr. rer. nat.) Ludwig-Maximilians-Universität München, Germany Thesis: <i>Analyzing training dynamics of deep neural networks: insights and limitations of the neural tangent kernel regime.</i> Supervisor: Prof. Dr. Gitta Kutyniok Grade: <i>magna cum laude</i> (awarded Nov 2024)
2018 – 2019	MSc in Industrial and Applied Mathematics Université Grenoble Alpes, France Grade: 16.932/20 (highest honors)
2014 – 2018	BSc in Applied Mathematics and Physics Moscow Institute of Physics and Technology, Russia Grade: 4.84/5 (highest honors)

Third-Party Funding

2026 – 2032	DFG Emmy Noether "Methods in Artificial Intelligence", €1.58M Project: <i>RMT₄DL: Random Matrix Theory for Deep Learning</i> Role: Principal Investigator Host: TU Darmstadt
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Fellowships & Internal Funding

2026	LMU Postdoc Support Fund , €3,000 Funding for career development and research mobility.
2024 – 2026	LMU Mentoring Programm , ca. €4,500 Funding for travel and networking activities.

Honours and Awards

2026	Top 200 Reviewers Award , International Conference on Learning Representations (ICLR)
2025	Top Reviewer Award , Advances in Neural Information Processing Systems (NeurIPS)
2024	Magna cum laude distinction for PhD thesis, Ludwig-Maximilians-Universität München
2024	Selected Participant, Princeton Machine Learning Theory Summer School
2022	Spotlight Paper , International Conference on Machine Learning (ICML)
2022	Selected for Long Talk, Workshop on Theory of Overparameterized Machine Learning (TOPML)
2020	Best Paper Award, Bases de Données Avancées (BDA)
2018 – 2019	Persyval-lab Grant for Excellent Students, Université Grenoble Alpes
2018	Scholarship for Research Internship, Okinawa Institute of Science and Technology (OIST)
2017	OeAD-GmbH Scholarship for Research Internship, IST Austria

Teaching Experience

SoSe 2025, 2026	Lecturer , <i>Applied Machine Learning in Python</i> (2 SWS Lecture + 2 SWS Tutorial), MSc elective, Department of Mathematics, Ludwig-Maximilians-Universität München, Germany
WiSe 2025/26	Seminar Instructor , <i>The Modern Mathematics of Artificial Intelligence</i> (2 SWS), MSc Seminar, Department of Mathematics, Ludwig-Maximilians-Universität München, Germany
WiSe 2025/26	Lecturer , <i>Computational Mathematics</i> (1 SWS Lecture + 1 SWS Exercise), BSc course, Department of Mathematics, Ludwig-Maximilians-Universität München, Germany
2021 – 2024	Teaching Assistant , courses: <i>Mathematical and Statistical Machine Learning</i> ; <i>Convex Optimization</i> ; <i>Mathematical Signal and Image Processing</i> ; <i>Multivariate Analysis</i> ; <i>Linear Algebra</i> , Ludwig-Maximilians-Universität München, Germany

Supervision

2025 – Present	PhD Co-Supervisor , Niklas Kerschbaumer, <i>Optimizing Multi-Modal Health Screening for Cost-Effective Biomarker Measurement Selection</i> , Max Planck Institute of Quantum Optics, Germany
2023	BSc Supervisor , Martin Wagner, <i>Investigating the Effects of Differential Privacy on Neural Tangent Kernel Alignment</i> , Ludwig-Maximilians-Universität München, Germany
2023	MSc Co-Supervisor , Elisabeth Wille, <i>Variational Autoencoder — Suitable to improve the modelling of counterparty credit risk?</i> , Ludwig-Maximilians-Universität München, Germany
2021	BSc Supervisor , Miriam Kranzlmüller, <i>Two Notions of Expressivity in Deep Neural Networks</i> , Ludwig-Maximilians-Universität München, Germany

Research Visits and Academic Stays

2024	Research Visit, Prof. Mikhail Belkin's Group, Halicioglu Data Science Institute, UC San Diego, USA
2024	Princeton Machine Learning Theory Summer School, USA
2019	Internship, CNRS and SAP SE, France
2018	Internship, Okinawa Institute of Science and Technology, Japan
2017	Internship, IST Austria

Selected Talks and Presentations

Jun 2026	Invited Talk, ELLIS Mathematics & Efficiency of Deep Learning Seminar, Online
Jan 2026	Invited Talk, group of Prof. Dr. Gabriele Steidl, Technical University of Berlin, Germany
Dec 2025	CFE-CMStatistics Conference, London, United Kingdom
Dec 2025	Invited Talk, One World MINDS Seminar (1W-MINDS), Online
Dec 2025	Neural Information Processing Systems (NeurIPS), San Diego, USA
Oct 2025	Oberwolfach Workshop: <i>Probabilistic Perspectives in Neural Network-Based Machine Learning</i>
Sep 2025	Conference on Mathematics of Machine Learning, Hamburg, Germany
Oct 2024	Invited Talk, group of Prof. Dr. Gian Paolo Leonardi, University of Trento, Italy
Apr 2024	Oberwolfach Workshop: <i>Applied Harmonic Analysis and Data Science</i> , Germany
Dec 2023	Neural Information Processing Systems (NeurIPS), New Orleans, USA
Jul 2022	International Conference on Machine Learning (ICML), Baltimore, USA
Apr 2022	Workshop on Theory of Overparameterized Machine Learning (TOPML), Online
Aug 2021	Mathematical and Scientific Machine Learning (MSML), Online

Academic Service

Conference Reviewer	ICLR (2026; top 200 reviewers award), NeurIPS (2026, 2025; top reviewer award), ICML (2022), TOPML (2022), MSML (2022)
Journal Reviewer	TMLR (2026), EJSN (2026), JSPI (2026), JMLR (2025), Neural Networks (2024)

Selected Publications

- **M. Seleznova**, H. H. Chou, C. M. Verdun, G. Kutyniok. GradPCA: Leveraging NTK Alignment for Reliable Out-of-Distribution Detection. *International Conference on Learning Representations (ICLR)*, 2026.
- N. Bar*, **M. Seleznova***, Y. Alexander, G. Kutyniok, R. Giryes. Revisiting Glorot Initialization for Long-Range Linear Recurrences. *Advances in Neural Information Processing Systems (NeurIPS)*, 2025 (*Equal contribution).
- **M. Seleznova**, D. Weitzner, R. Giryes, G. Kutyniok, H. H. Chou. Neural (Tangent Kernel) Collapse. *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.
- **M. Seleznova**, G. Kutyniok. Neural Tangent Kernel Beyond the Infinite-Width Limit: Effects of Depth and Initialization. *International Conference on Machine Learning (ICML)*, 2022 (Spotlight).
- **M. Seleznova**, G. Kutyniok. Analyzing Finite Neural Networks: Can We Trust Neural Tangent Kernel Theory? *Mathematical and Scientific Machine Learning (MSML)*, 2022.