Mark Niklas **Müller**

M.Sc. Aerospace Engineering · PhD student · ETH Zurich

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Research Interests

Automated Reasoning · Machine Learning · Safe and Trustworthy AI

Education

10.2020–present	**Doctoral Student - Computer Science**, Prof. Martin Vechev, ETH Zurich	*Zurich, Switzerland*
09.2019–09.2020	**Visiting student - Computer Science**, ETH Zurich, Average grade: 6.0 – highest	*Zurich, Switzerland*
10.2018–09.2020	**M.Sc. Aerospace Engineering**, University of Stuttgart, Average grade: 1.0 / Rank: 1/167	*Stuttgart, Germany*
10.2014–04.2018	**B.Sc. Aerospace Engineering**, University of Stuttgart, Average grade: 1.0 / Rank: 1/233	*Stuttgart, Germany*
09.2006–07.2014	**German Abitur**, Dillmann-Gymnasium, Average grade: 1.0 – highest	*Stuttgart, Germany*

Awards and Scholarships

12.2023	**Top Reviewer Award**, NeurIPS'2023	*New Orleans, United States*
05.2023	**Spotlight**, ICLR'2023, Certified Training: Small Boxes are All You Need	*Kigal, Rwanda*
04.2022	**Spotlight**, ICLR'2022, Boosting Randomized Smoothing with Variance Reduced Classifiers	*virtual*
10.2021	**LRT Master Award – best Master's degree in Aerospace Eng.**, University of Stuttgart	*Stuttgart, Germany*
02.2015–09.2020	**Scholarship**, German Academic Scholarship Foundation (supports excellent students)	*Stuttgart, Germany*
10.2019	**AIRBUS Defence & Space Award – best Bachelor's degree in Aerospace Eng.**, University of Stuttgart	*Stuttgart, Germany*

Grant Writing

2022 **ELSA**, European Lighthouse on Secure and Safe AI

Leading ETH's participation and securing 850k USD in grant funding.

Academic Service

07.2023	**Head Organizer**, 2nd Workshop on Formal Verification of Machine Learning @ ICML	*Hawaii, United States*
2022	**Co-Organizer**, Verification of Neural Networks Competition 2022	*Haifa, Israel*
	Reviewer, JMLR, NeurIPS'23 (Top Reviewer), ICLR'24, TSRML@NeurIPS'22, WFVML@ICML'22	

Supervised Students

Master's Student	**Abra Ganz**,	Fine-tuning for Randomised Smoothing	
Master's Student	**Ahmed Bouhoula**,	Branching Strategies for Multi-Neuron-Constraint-Based Bounding	
Master's Student	**Claudio Ferrari**,	Complete Verification via Multi-Neuron Relaxation Guided Branch-and-Bound	*ICLR'2022*
Master's Student	**Franziska Eckert**,	Certified Training: Small Boxes are All You Need	*ICLR'2023 (Spotlight)*
Master's Student	**Miklós Z. Horváth**,	Robust and Accurate – Compositional Architectures for Randomized Smoothings	*SRML@ICLR'2022*
		Boosting Randomized Smoothing with Variance Reduced Classifiers	*ICLR'2022 (Spotlight)*
		(De-)Randomized Smoothing for Decision Stump Ensembles	*NeurIPS'2022*
Master's Student	**Mustafa Zeqiri**,	Efficient Robustness Verification of Neural Ordinary Differential Equations	*ICLR'2023*
Master's Student	**Robert Szasz**,	Focusing on Important Samples in Certified Training	
Master's Student	**Simone Barbaro**,	Out of Distribution Detection via Calibrated Confidence	
Master's Student	**Yuhao Mao**,	Connecting Certified and Adversarial Training	*NeurIPS'2023*
		Understanding Certified Training with Interval Bound Propagation	*under submission to ICLR'2024*
Researcher	**Stefan Balauca**,	ZonoTAPS: Precise Certified Training	*in progress*
		Gradient-free Optimizers for Certified Training	*in progress*

Invited Talks

11.2023	**Training and Verification of Robust Neural Networks**, University of Oxford	*Oxford, United Kingdom*
11.2023	**Training and Verification of Robust Neural Networks**, Google DeepMind	*London, United Kingdom*
11.2023	**Training and Verification of Robust Neural Networks**, VAS @ Imperial College London	*London, United Kingdom*
05.2023	**Realistic Neural Networks with Robustness Guarantees**, MobiliT.AI	*Tolouse, France*
02.2023	**Realistic Neural Networks with Guarantees**, RPL @ KTH	*Stockholm, Sweden*
08.2022	**Verification of Realistic Neural Networks**, LMML @ FLoC	*Haifa, Israel*
01.2021	**Scalable and Precise Certification of Neural Networks**, Workshop on Robust Artificial Intelligence	*Virtual*

Teaching Experience

2021 –2023 **Reliable and Trustworthy Artificial Intelligence**, ETH Zurich, Exercise TA — *Zurich, Switzerland*

- Designing exercises, lectures, and exams questions and holding exercises

2021 –2023 **Rigorous Software Engineering**, ETH Zurich, Exercise and Head TA — *Zurich, Switzerland*

- Exercise TA in 2021 and 2022 – Designing exercises and exams questions and holding exercises
- Head TA in 2023 – coordinate exercise sessions, lectures, and exam
- Holding selected lectures

2021 –2023 **Deep Learning for Big Code**, ETH Zurich, Seminar TA — *Zurich, Switzerland*

- Selecting papers and mentoring students

2016 –2017 **Matlab Ambassador**, University of Stuttgart — *Stuttgart, Germany*

- Designed, organized, and held Matlab/Simulink workshops for up to 200 participants in co-operation with MathWorks.
- Established a bi-weekly Matlab helpdesk for students.

2015 –2016 **Design Elements I & II**, University of Stuttgart, Exercise TA — *Stuttgart, Germany*

2013 –2016 **Tutor**, Mathematics and Physics — *Stuttgart, Germany*

Industry Experience

06.2023–09.2023 **Quantitative Research Intern**, G-Research — *London, United Kingdom*

- Time series forecasting for financial data.

11.2018–08.2019 **Working Student**, Dr. Ing. h.c. F. Porsche AG — *Weissach, Germany*

- Development of data analytics tools for resource and project management.
- Automatization of Excel process with VBA.

09.2018–10.2018 **Data Science Intern**, Bosch Rexroth AG — *Feuerbach, Germany*

- Development of a preprocessing pipeline for end-of-line test data.
- Evaluation of machine learning solutions in R.

07.2017–07.2018 **Industrial Placement as Aerodynamicist**, Mercedes-AMG Petronas Formula One Team — *Brackley, United Kingdom*

- Aerodynamic surface design in CAD, CFD simulations, wind tunnel experiments and data analysis.
- Development of data analysis and data mining tools.

Publications

An up-to-date list of publications is also available here.

2023

Understanding Certified Training with Interval Bound Propagation — *under submission to ICLR'24*
Yuhao Mao, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

Expressivity of ReLU-Networks under Convex Relaxations — *under submission to ICLR'24*
Maximilian Baader*, **Mark Niklas Müller***, Yuhao Mao, Martin Vechev

Prompt Sketching for Large Language Models — *under submission to ICLR'24*
Luca Beurer-Kellner, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

Connecting certified and adversarial training — *NeurIPS'23*
Yuhao Mao, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

Automated Classification of Model Errors on ImageNet — *NeurIPS'23*
Momchil Peychev, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

Abstract Interpretation of Fixpoint Iterators with Applications to Neural Networks — *PLDI'23*
Mark Niklas Müller, Marc Fischer, Robin Staab, Martin Vechev

Certified Training: Small Boxes are All You Need — *ICLR'23 (Spotlight)*
Mark Niklas Müller*, Franziska Eckert*, Marc Fischer, Martin Vechev

Efficient Certified Training and Robustness Verification of Neural ODEs — *ICLR'23*
Mustafa Zeqiri, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

2022

(De-)Randomized Smoothing for Decision Stump Ensembles — *NeurIPS'22*
Miklós Z. Horváth*, **Mark Niklas Müller***, Marc Fischer, Martin Vechev

Boosting Randomized Smoothing with Variance Reduced Classifiers — *ICLR'22 (Spotlight)*
Miklós Z. Horváth, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

Complete Verification via Multi-Neuron Relaxation Guided Branch-and-Bound — *ICLR'22*
Claudio Ferrari, **Mark Niklas Müller**, Nikola Jovanović, Martin Vechev

Robust and Accurate - Compositional Architectures for Randomized Smoothing — *SRML@ICLR'22*
Miklós Z. Horváth, **Mark Niklas Müller**, Marc Fischer, Martin Vechev

PRIMA: General and Precise Neural Network Certification via Scalable Convex Hull Approximations — *POPL'22*
Mark Niklas Müller*, Gleb Makarchuk*, Gagandeep Singh, Markus Püschel, Martin Vechev

First Three Years of the International Verification of Neural Networks Competition (VNN-COMP) — *STTT ExPLAIn*
Christopher Brix, **Mark Niklas Müller**, Stanley Bak, Taylor T. Johnson, Changliu Liu

The Third International Verification of Neural Networks Competition (VNN-COMP 2022): Summary and Results — *arXiv*
Mark Niklas Müller*, Christopher Brix*, Stanley Bak, Taylor T. Johnson, Changliu Liu

2021

Certify or Predict: Boosting Certified Robustness with Compositional Architectures — *ICLR'21*
Mark Niklas Müller, Mislav Balunovic, Martin Vechev