STEFAN ZETZSCHE

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EXPERIENCE

Amazon Web Services, Applied Scientist   Dec 2022 - Present

- Contribute to the design of the Dafny programming language and formally verify probabilistic algorithms in the Lean theorem prover for AWS Clean Rooms.
- Improve generative AI models' ability to reason about code and verify proofs.
- Integrate formal methods with generative AI to reduce hallucinations in Amazon Bedrock and enhance automated code generation workflows in Kiro, Amazon's agentic IDE.

Meta, Software Engineer Intern   Jul 2022 - Sep 2022

- Enhanced a static analyzer for the Hack programming language, improving code reliability in Meta's core infrastructure.

Amazon Web Services, Applied Scientist Intern   Aug 2021 - Nov 2021

- Implemented a formally verified quantum circuit optimizer in the Dafny programming language, in collaboration with Braket, Amazon's quantum computing service.

EDUCATION

PhD Computer Science, University College London   2018 - 2023

- Conducted research on automata learning, Kleene algebra, and category theory, culminating in the thesis *Canonical Algebraic Generators in Automata Learning*.
- Funded by VeTTs and ERC grants; member of the Programming Principles, Logic, and Verification (PPLV) Group. Advised by Alexandra Silva and Matteo Sammartino.

MSc Mathematics, University of Hamburg   2016 - 2018

- Thesis on category theory (*Generalised Duality Theory for Monoidal Categories and Applications*), awarded top mark (1.0); graduated with highest distinction (overall grade 1.0).

BSc Mathematics, University of Hamburg   2014 - 2016

- Thesis on group and graph theory (*Isomorphism Classes of Vertex-Transitive Tournaments*), awarded top mark (1.0); minor in Computer Science.

PUBLICATIONS

Conferences

[C1] **CLEVER: A Curated Benchmark for Formally Verified Code Generation**   2025
A. Thakur, J. Lee, G. Tsoukalas, M. Sistla, M. Zhao, <u>S. Zetzsche</u>, G. Durrett, Y. Yue, S. Chaudhuri
Conference on Neural Information Processing Systems (NeurIPS)

[C2] **Verified Foundations for Differential Privacy**   2025
M. Medeiros, M. Naveed, T. Lepoint, T. Kahsai, T. Ravitch, <u>S. Zetzsche</u>, A. Joshi, J. Tassarotti,
A. Albarghouthi, J. Tristan
<u>Distinguished Artifact Award</u>
Conference on Programming Language Design and Implementation (PLDI)

[C3] **Compiler Fuzzing in Continuous Integration: a Case Study on Dafny**   2025
K. Boonriong, <u>S. Zetzsche</u>, A. F. Donaldson
International Conference on Software Testing, Verification and Validation (ICST)

[C4] **Well-Behaved (Co)algebraic Semantics of Regular Expressions in Dafny**   2024
<u>S. Zetzsche</u>, W. Różowski
International Colloquium on Theoretical Aspects of Computing (ICTAC)

[C5] **Generators and Bases for Monadic Closures**   2023
<u>S. Zetzsche</u>, A. Silva, M. Sammartino
Conference on Algebra and Coalgebra in Computer Science (CALCO)

[C6] **Guarded Kleene Algebra with Tests: Automata Learning** 2022
S. Zetzsche, A. Silva, M. Sammartino
Conference on Mathematical Foundations of Programming Semantics (MFPS)

[C7] **Canonical Automata via Distributive Law Homomorphisms** 2021
S. Zetzsche, G. v. Heerdt, M. Sammartino, A. Silva
Conference on Mathematical Foundations of Programming Semantics (MFPS)

Workshops

[W1] **ATLAS: Automated Toolkit for Large-Scale Verified Code Synthesis** 2026
M. Bakšys, S. Zetzsche, O. Bouissou, S. Kong, R. Delmas
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W2] **MiniF2F-Dafny: LLM-Guided Mathematical Theorem Proving via Auto-Active Verification** 2026
M. Bakšys, S. Zetzsche, O. Bouissou
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W3] **DafnyPro: LLM-Assisted Automated Verification for Dafny Programs** 2026
D. Banerjee, O. Bouissou, S. Zetzsche
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W4] **CLEVER: A Curated Benchmark for Formally Verified Code Generation** 2025
A. Thakur, J. Lee, G. Tsoukalas, M. Sistla, M. Zhao, S. Zetzsche, G. Durrett, Y. Yue, S. Chaudhuri
AI for Math Workshop at the International Conference on Machine Learning (ICML)

[W5] **Well-Behaved (Co)algebraic Semantics of Regular Expressions in Dafny** 2025
S. Zetzsche, W. Różowski
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W6] **Verifying the Fisher-Yates Shuffle Algorithm in Dafny** 2025
S. Zetzsche, T. Lepoint, J. Tristan, M. Mayer
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W7] **Dafny as Verification-Aware Intermediate Language for Code Generation** 2025
Y. C. Li, S. Zetzsche, S. Somayyajula
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W8] **Randomised Testing of the Dafny Compiler: Into the CI** 2025
K. Boonriong, A. F. Donaldson, S. Zetzsche
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

[W9] **VMC: a Dafny Library for Verified Monte Carlo Algorithms** 2024
F. Zaiser, S. Zetzsche, J. Tristan
Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)

SUPERVISION

Interns at Amazon Web Services

- Jonas Bayer (PhD Student at the University of Cambridge) 2025

- Mantas Bakšys (PhD Student at the University of Cambridge) 2025

- Debangshu Banerjee (PhD Student at the University of Illinois Urbana-Champaign) 2025

- Yue Chen Li (Undergraduate Student at MIT) 2024

- Wojciech Różowski (PhD Student at the University College London) 2024

- Fabian Zaiser (PhD Student at the University of Oxford) 2023

- Yann Herklotz (PhD Student at the Imperial College London) 2022

TEACHING

Teaching Assistant at University College London

- Logic and Database Theory 2020

- Discrete Mathematics for Computer Scientists 2020

- Computability and Complexity   2020
- Theory of Computation   2019
- Principles of Programming   2019
- Discrete Mathematics for Computer Scientists   2018

Teaching Assistant at University of Hamburg

- Analysis I   2017
- Linear Algebra and Analytic Geometry II   2016
- Linear Algebra and Analytic Geometry I   2015

TALKS

[T1]	COMP0010 Software Engineering module at the University College London	2025
[T2]	Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)	2025
[T3]	International Colloquium on Theoretical Aspects of Computing (ICTAC)	2024
[T4]	South of England Regional Programming Languages Seminar (SREPLS) at Jane Street	2024
[T5]	Theoretical Computer Science Seminar Series at the University of Birmingham	2023
[T6]	Oxford Advanced Seminar on Informatic Structures at the University of Oxford	2023
[T7]	Programming Languages Discussion Group at Cornell University	2023
[T8]	Lectures on Logic and its Mathematical Aspects Seminar at the University of Amsterdam	2023
[T9]	Programming Principles, Logic, and Verification Seminar at the University College London	2023
[T10]	Conference on Algebra and Coalgebra in Computer Science (CALCO)	2023
[T11]	Conference on the Mathematical Foundations of Programming Semantics (MFPS)	2022
[T12]	Programming Principles, Logic, and Verification Seminar at the University College London	2022
[T13]	Lectures on Logic and its Mathematical Aspects Seminar at the University of Amsterdam	2022
[T14]	Symposium on Compositional Structures (SYCO) at the Tallinn University of Technology	2021
[T15]	Conference on the Mathematical Foundations of Programming Semantics (MFPS)	2021
[T16]	Programming Principles, Logic, and Verification Seminar at the University College London	2021
[T17]	Programming Principles, Logic, and Verification Reading Group at the University College London	2020
[T18]	VeTSS Verified Software Workshop at the Isaac Newton Institute for Mathematical Sciences	2019
[T19]	Scottish Programming Languages and Verification Summer School	2019
[T20]	School of Computer Science at the University of Birmingham	2018

PROFESSIONAL SERVICES

Program Committee Chair

- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)   2026
- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)   2025
- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL)   2024

Program and (Sub-)Review Committee Member

- International Conference on Machine Learning (ICML)   2025
- International Conference on Computer-Aided Verification (CAV)   2025
- Conference on Algebra and Coalgebra in Computer Science (CALCO)   2023
- International Symposium on Model Checking of Software (SPIN)   2023

Mentor

- Symposium on Principles of Programming Languages (POPL) 2021
- Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH) 2020

Organizer

- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL) 2026
- South of England Regional Programming Languages Seminar (SREPLS) 2025
- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL) 2025
- Dafny Workshop at the Symposium on Principles of Programming Languages (POPL) 2024

Artifact Evaluator

- International Conference on Computer-Aided Verification (CAV) 2025
- Conference on Programming Language Design and Implementation (PLDI) 2025
- International Conference on Functional Programming (ICFP) 2025
- Symposium on Principles of Programming Languages (POPL) 2025
- Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH) 2025
- International Conference on Functional Programming (ICFP) 2024
- Conference on Programming Language Design and Implementation (PLDI) 2024
- Symposium on Principles of Programming Languages (POPL) 2024
- International Conference on Computer-Aided Verification (CAV) 2023
- International Conference on Computer-Aided Verification (CAV) 2022