Dr. Lukas Heidemann

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Experience

Postdoctoral Researcher Apr 2026 - Present
University of Oxford

Research on geometric homotopy theory and topological quantum field theory.

Research Director Nov 2025 - Mar 2026
Zephram

Developed a research program on super-optimising compilers for AI inference kernels.
Sped up GPU based combinatorial optimisation solver by 1000x with novel technique.

Research Scientist Oct 2021 - Oct 2025
Quantinuum

Designed novel type system features for the quantum compiler HUGR.
Unified distinct subsystems of HUGR under one coherent semantics.
Improved circuit serialisation performance up to 100x with new binary format.
Proposed the jeff format, enabling collaboration with Xanadu and Unitary Foundation.
Integrated quantum computing with the Fugaku supercomputer together with RIKEN.

Doctoral Researcher Sep 2019 - Apr 2025
University of Oxford

Led the development of the homotopy.io proof assistant within the research group.
Developed new algorithms operating directly on compressed diagram data structures.
Optimised performance with Rust and WebAssembly implementation.

Research Assistant Apr 2023 - Jan 2024
University of Cambridge

Coordinated homotopy.io development with research team in Cambridge.

Software Engineering Intern May 2021 - Oct 2021
Quantinuum

Designed Tierkreis, a platform for hybrid quantum-classical distributed computing.
Created a type system for data flow graphs with a complete type-inference algorithm.
Implemented a distributed runtime system with async Rust, gRPC and OpenTelemetry.
Designed convenient Python bindings to the Rust core implementation.

Software Engineer Apr 2018 - Aug 2019
Fraunhofer FHR

Built the observability backend and UI for the GESTRA radar system.
Integrated data sources across devices built by different engineering teams.

Graduate Student Researcher Aug 2018 - Aug 2018
University of Birmingham

Created rendering pipeline for 3D diagrams in homotopy.io.
Devised a diagram layout algorithm using linear programming.
Developed smooth diagram rendering based on subdivision surfaces.

Software Engineer Apr 2016 - Aug 2016
Fraunhofer FHR

Education

DPhil in Computer Science 2019 - 2025
University of Oxford

MSc in Computer Science 2016 - 2017
University of Oxford

BSc in Computer Science 2012 - 2015
University of Bonn

MSc in Mathematics 2015 - 2019
University of Bonn

BSc in Mathematics 2012 - 2015
University of Bonn

Languages

German
native

English
C2

Miscellaneous

PhD scholarship 2019
Studienstiftung des deutschen Volkes

Cofounder 2016 - 2017
Oxford University Philosophy Society