

MARVIN KOSS

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RESEARCH EXPERIENCE

Accrue (accrue.build) — Independent Research

Feb 2026 – Apr 2026

FR8 Cohort 2.s, Helsinki

- Reimplemented and extended SLAO (arXiv:2512.23017) with Elastic Weight Consolidation. Achieved +1% BWT with Llama-2-7B-Chat on the Long Sequence Benchmark vs. previous SotA of -2.9% BWT.
- Built an LLM agent that learns across sessions via *weight-level* continual learning without RAG or context management.
- Ongoing Research, paper in preparation.

Section Cognitive Neuropsychiatry, UK Heidelberg — Research Assistant

Aug 2025 – Jan 2026

Supervisor: Dr. Mike Schmitgen

- Built a preprocessing pipeline for fMRI data on 30 subjects in aging study; used by the group for downstream analysis.

StatNLP Group, Heidelberg — Research Assistant

Nov 2024 – May 2025

Supervisor: Prof. Dr. Stefan Riezler

- Mathematically proved model collapse for ML models trained on deterministic decision rules in sepsis data; verified with empirical data.

IWR, Heidelberg — Research Assistant

Jan 2023 – Sep 2024

Supervisors: Prof. Dr. Jakob Zech, Prof. Dr. Simon Weißmann

- Mean-field analysis of consensus-based optimization: compactness argument for solubility of the associated Fokker-Planck equation; resulted in publication (see Publications).
- Designed and implemented a novel particle-based optimizer with improved exploration over CBO; code.

ZITI, Heidelberg — Research Assistant

Nov 2020 – Oct 2022

DeepChip project: NN quantization & uncertainty quantification

- Built a PyTorch framework for sub-INT8 quantization of arbitrary NNs; used it to fully quantize one-block transformers to < 8-bit at low accuracy loss.
- Developed a UQ tool for Bayesian neural networks (slides).

PUBLICATIONS

Marvin Koss, Simon Weissmann and Jakob Zech, *On the Mean-Field Limit of Consensus-Based Methods* (2026), *Mathematical Methods in the Applied Sciences*, 49(5), 4214-4240 10.1002/mma.70343.

EDUCATION

Heidelberg University

2024 – Present

M.Sc. Scientific Computing (GPA 1.7 (German)) — in progress

Heidelberg University

2022 – 2024

B.Sc. Mathematics (GPA 2.1 (German))

Heidelberg University

2017 – 2024

B.A. Computational Linguistics (GPA 1.3 (German))

SELECTED PROJECTS

Swarms

2025

Particle-based optimisers in PyTorch — code

SimoSS

2022

3D Optimiser visualisation in C++ — code

TEACHING

TA, *Formal and Computational Semantics*, Heidelberg, WS 2018 — ran tutorials, designed Python assignments, gave some lectures.

TA, *Formal Mathematical Foundations for Computational Linguists*, Heidelberg, SS 2018.

SKILLS

Programming: Python (9 years; PyTorch, NumPy, Transformers, Pyro, scikit-learn); C++

ML: transformers, continual learning, PEFT, optimization (gradient & particle-based), mechanistic interpretability.

Math: probability theory, SDEs, mean-field analysis, optimal transport.

Languages: German (native), English (fluent, C1), Russian (basic).