Felix Koehler

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PhD candidate at TUM specializing in deep learning for physical simulations, with publications at NeurIPS and ICLR. Expertise in adjoint methods, numerical simulators, fluid/solid mechanics and neural emulators. Creator of the largest SciML YouTube channel with >30k subs.

Experience

Technical University of Munich

PhD Student in Computer Science — September 2022 - August 2026 (expected)
supervised by Nils Thuerey

- Coordinated annual lecture in *GamePhysics* (applied numerical methods + mechanical modeling) for >200 students.
- Supervised multiple students, e.g., Unrolled vs. Implicit Autodiff for Linear System Solves by Kanishk Bhatia.
- Instructed a lecture on *Autodiff and Adjoints in Differentiable Physics* for our *Physics-Based DL* master course (Recording, Slides).

Meta Reality Labs

Research Scientist Intern — June 2025 - October 2025
supervised by Ryan Goldade

- Developed Graph Neural Network emulators to accelerate 3D softbody physics-based simulation for contact and collision.

Siemens Corporate Technology

Research Student — March 2020 - April 2022
supervised by Dirk Hartmann

- Researched explainable & efficient explicit approximations to model predictive control strategies with patent filed (US20240176310).

Volkswagen

Research Intern — October 2018 - March 2019

- Enhanced topology optimization with adjoint-based sensitivities for up to 40% weight reduction; results presented at 13th WCSMO (Paper).

Publications

Neural Emulator Superiority: When Machine Learning for PDEs Surpasses its Training Data. (ArXiv, Project Page) — NeurIPS 2025
PRDP: Progressively Refined Differentiable Physics. (Shared First-Authorship). (ArXiv, Project Page) — ICLR 2025
APEBench: A Benchmark for Autoregressive Neural Emulators of PDEs. (ArXiv, Code, Project Page) — NeurIPS 2024

Education

M.Sc. Computational Science & Engineering (CSE)

Technical University of Munich — October 2019 - April 2022
GPA: 1.2 *(German system: 1.0 (best) to 6.0 (worst))*, best 2%

- Relevant course work:
  - Numerical Analysis, Scientific Computing, Nonlinear Finite Element Method, Computational Plasticity.
  - ML for Graphs & Sequential Data, Uncertainty Quantification, Machine Learning, Probabilistic Machine Learning, Visualization.
  - Parallel Programming, High-Performance Computing, Parallel Numerics.
- Honors: Scholarship by *Studienstiftung des Deutschen Volkes* (most prestigious national scholarship program in Germany).
- Exchange semester at *KTH Stockholm* (August 2020 - January 2021).
- Activities: Electrodynamical Simulations of magnetic lift and drag with *ANSYS Maxwell* for TUMHyperloop.

B.Sc. Mechanical Engineering

Technical University of Braunschweig — October 2015 - January 2019
GPA: 1.1 *(German system: 1.0 (best) to 6.0 (worst))*

Skills

- Python: JAX, Tensorflow 2, PyTorch, Matplotlib, Pandas, Seaborn, Scikit-Learn, SciPy, NumPy, FEniCs
- C++: OpenMP, MPI, Eigen
- Other programing languages: Julia, bash, FORTRAN, MATLAB
- Tools/Platforms: Linux (Ubuntu & Arch), Git, Docker, OpenFoam, Paraview, ANSYS Maxwell, Siemens Amesim
- Spoken languages: English (professional, IELTS 8.5/9.0), German (native), French & Swedish (elementary)

Projects & Open Source

- Founder and producer of the Machine Learning & Simulation YouTube channel; created more than 200 videos on AI for Science and adjacent topics (autodiff, optimization, probability, neural networks etc.), e.g., FNO, DeepONet, Adjoint ODEs, Variational Inference.
- Exponax: I designed and maintain a JAX-based Fourier-spectral PDE solvers library based on ETDRK methods (Docs).
- Co-Organizer of *Differentiable Systems and SciML Workshop* at EurIPS 2025.