

Kevin Steiner

PHYSICS-INFORMED MACHINE LEARNING FOR COMPOSITE MATERIALS · PH.D. ASSISTANT AT EPFL

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Research Interests

Machine Learning	Graph neural networks, physics-informed machine learning, surrogate modeling, inverse problems
Composites	Progressive damage, multiscale modeling, higher-order structural theories, finite element method

Education

École Polytechnique Fédérale de Lausanne (EPFL)

Lausanne, Switzerland

PH.D. SCHOOL OF ROBOTICS

Sept. 2025 - Dec. 2028 (Expected)

- **Topics:** Physics-informed machine learning, structural health monitoring, and simulation of composite materials.
- **Advisor:** Prof. Olga Fink, olga.fink@epfl.ch.
- **Courses:** Dynamic Programming and Optimal Control, Optimization and Simulation, Graph Representations for Biology and Medicine.
- Part of HORIZON Europe, Marie Skłodowska-Curie Actions: ASSESS.

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

MASTER OF SCIENCE IN PHYSICS

Apr. 2022 - May 2025

- **GPA:** 1.1, from 1 (best) to 4 (worst).
- **Thesis:** Machine Learning-Based Exploration of Potential Energy Surfaces of Atomistic Systems.
- **Advisor:** Prof. Pascal Friederich, pascal.friederich@kit.edu.
- **Related coursework:** Machine Learning and Deep Learning, Computational Condensed Matter Physics, High Performance Computing (MPI C++), Quantum Field Theory, Asymptotic Methods for Theoretical Physics.

Instituto Superior Técnico (IST)

Lisbon, Portugal

MASTER OF SCIENCE IN ENGINEERING PHYSICS, ERASMUS

Feb. 2023 - Jun. 2023

- **Related coursework:** HPC and Parallel Programming, Time Series Analysis, Fusion Reactors.

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

BACHELOR OF SCIENCE IN PHYSICS

Oct. 2018 - Apr. 2022

- **GPA:** 1.9, from 1 (best) to 4 (worst).
- **Thesis:** Anharmonic Oscillator: Perturbation Theory at High Orders.
- **Advisor:** Prof. Kirill Melnikov, kirill.melnikov@kit.edu.

Research Experience

Intelligent Maintenance and Operations Systems (IMOS) Lab

Lausanne, Switzerland

DOCTORAL RESEARCH ASSISTANT (**SUPERVISOR:** PROF. OLGA FINK)

Sept. 2025 - present

- Designing physics-informed machine learning methods for structural health monitoring and damage localization
- Proposing new graph neural network architectures for surrogate modeling of composite materials

Artificial Intelligence for Materials Sciences (AiMat) Group

Karlsruhe, Germany

RESEARCH ASSISTANT (**SUPERVISOR:** PROF. PASCAL FRIEDERICH)

Apr. 2024 - Apr. 2025

- Studied the application of active learning for the discovery of chemical reaction transition states
- Applied equivariant graph neural networks (MACE) for prediction of molecular forces and Hessians

Publications

- [1] Olga Fink, Ismail Nejjar, Vinay Sharma, Keivan Faghieh Niresi, Han Sun, Hao Dong, Chenghao Xu, Amaury Wei, Arthur Bizzi, Raffael Theiler, Yuan Tian, Leandro Von Krannichfeldt, Zhan Ma, Sergei Garmaev, Zepeng Zhang, Mengjie Zhao, **Kevin Steiner**, and Yusuf Kesmen. *From Physics to Machine Learning and Back: Part II - Learning and Observational Bias in Prognostics and Health Management (PHM)*. In: *Reliability Engineering & System Safety* 274 (Oct. 2026), p. 112376. DOI: 10.1016/j.ress.2026.112376.

- [2] Olga Fink, Vinay Sharma, Ismail Nejjar, Leandro Von Krannichfeldt, Sergei Garmaev, Zepeng Zhang, Amaury Wei, Gaetan Frusque, Florent Forest, Mengjie Zhao, Chi-Ching Hsu, Keivan Faghii Niresi, Han Sun, Hao Dong, Chenghao Xu, Raffael Theiler, Arthur Bizzi, **and Kevin Steiner**. *From Physics to Machine Learning and Back: Part I - Learning with Inductive Biases in Prognostics and Health Management (PHM)*. In: *Reliability Engineering & System Safety* 271 (July 2026), p. 112213. DOI: 10.1016/j.ress.2026.112213.
- [3] Houssam Metni, Laura Ruple, Lauren N. Walters, Luca Torresi, Jonas Teufel, Henrik Schopmans, Jona Östreicher, Yumeng Zhang, Marlen Neubert, Yuri Koide, **Kevin Steiner**, Paul Link, Lukas Bär, Mariana Petrova, Gerbrand Ceder, and Pascal Friederich. *Generative Models for Crystalline Materials*. In: *Advanced Materials* 38.18 (Mar. 2026), e23620. DOI: 10.1002/adma.202523620.

Teaching Experience

École Polytechnique Fédérale de Lausanne (EPFL)

Lausanne, Switzerland

TEACHING ASSISTANT

Sept. 2025 - present

- Introduction to Machine Learning for Engineers (Spring 2026)
- Machine Learning for Predictive Maintenance Applications (Fall 2025)

Karlsruhe Institute of Technology (KIT)

Karlsruhe, Germany

TEACHING ASSISTANT

Sept. 2022 - Mar. 2025

- Classical Electrodynamics (Spring 2022)

Professional Experience

GFT

Frankfurt, Germany

STRATEGY AND PORTFOLIO WORKING STUDENT

Apr. 2023 - May 2024

- Planned a strategy project for the German branch of GFT in a team of five managing directors.
- Analyzed the competitive landscape of tech consulting in Germany to develop a strategic direction for the future product portfolio.
- Identified strategic partnerships with research centers to facilitate networking and foster collaboration between research and industry.

GFT

Stuttgart, Germany

AI CONSULTING INTERN

Oct. 2023 - Mar. 2024

- Developed autonomous LLM agents using LangChain, OpenAI API, and prompt engineering for customer use cases.
- Reduced weekly meeting time by 50% after introducing Scrum and working as Scrum Master for a team of 7 developers.

Archives of Data Science

Karlsruhe, Germany

JOURNAL L^AT_EX EDITOR

Apr. 2020 - Jul. 2023

- Corrected and edited data science papers together with the main journal editor.
- Assisted 15 international groups in publishing their scientific articles.
- Optimized the publication process to reduce compilation of proceedings from a few hours to a few minutes.

Skills and Expertise

Machine Learning

PyTorch, PyTorch Geometric, JAX, scikit-learn, pandas, polars, SciPy

Scientific Computing

Graph Neural Networks, Active Learning, Parallelization, Dynamic Programming, Time Series Analysis

Infrastructure

Docker, MongoDB, Redis, Azure, Terraform

Programming

Python, C++, Mathematica, L^AT_EX

Honors & Awards

2025 **Scholarship**, Karl-Schlecht Foundation

Germany

2022 **German National Scholarship**, Heinrich-Hertz Society

Germany

Academic Service

Student Supervision (Co-advised with Prof. Olga Fink at EPFL):

- Jacopo Senoner, *Inductive Biases for Learning of Structural Dynamics*, Semester Project, EPFL, Spring 2026.
- Aleksandra Zawadzka, *Prediction of Bottle Buckling with Graph Neural Networks*, Semester Project, EPFL, Spring 2026.
- Tomas Jouven, Alexandre Vallet, and Gaspard Lafon, *Surrogate Stress Prediction in 3D Finite Element Meshes Using Graph Neural Networks*, Student Project, EPFL, Fall 2025.

- Emanuele Durante, Jacopo Senoner, and Tommaso Basile, *Predicting Rollout of a Physical System with Graph Neural Networks*, Student Project, EPFL, Fall 2025.

Conference Organizer:

Intelligent Maintenance Conference (IMC) (2026, 2025)

Languages and Hobbies

Languages

German & Italian (Native), English (Bilingual), Portuguese (B2), Spanish (B2), French (B1)

Hobbies

Chess, Salsa dancing, Swimming