Davide Staub

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Education

Ph.D. in Earth Science and Engineering, Imperial College London   **Oct 2025 – Present**

Scalable Scientific Machine Learning Lab (supervisor: Dr. Ben Moseley).

PhD project: developing a single differentiable pipeline that combines all available JWST observations of a hot Jupiter into a unified 3D temperature field $T(\lambda, \phi, p)$, using physically motivated regularisation.

M.Sc. Computational Science and Engineering, ETH Zurich   **Sep 2021 – Mar 2024**

Grade: 5.9/6 with distinction, Specialization: Scientific Machine Learning.

Awarded the Willi Studer Prize for the best Master's degree in the programme.

Thesis title: *Solving the Elastic Wave Equation with Physics-informed Neural Networks: A Robust and Critical Assessment.*

Semester Thesis, University of Oxford   **Apr 2023 – Jun 2023**

2-month research project focusing on applying deep learning, using Pytorch and JAX, to seismology at the Department of Earth Sciences.

B.Sc. Computational Science and Engineering, ETH Zurich   **Sep 2017 – Aug 2020**

Grade: 5.14/6, Specialization: Robotics, Thesis title: *A C++ Simulation of Micron-scale Robots,*

Employment History

Lecturer & Research Assistant, D-EAPS, ETH Zurich   **Aug 2024 – Present**

Developing the core course *Space Data* for the new M.Sc. in Space Systems in collaboration with Prof. Thomas Zurbuchen and Dr. Simon Stähler. Since May 2025 I teach the final block of the course, introducing convolutional neural networks and deep learning (MLPs & CNNs) for denoising lunar images from permanently shadowed regions as a step toward resource mapping and landing-site planning.

Research Assistant, Homan Lab, University of Zurich   **Aug 2024 – Sep 2025**

Researched machine learning techniques featuring LLM-based encoding to explore how language is processed in the human brain across healthy and psychotic subjects, mentored undergraduate students, and contributed to multiple research papers, including one targeting publication in a high-impact journal.

Software Engineer, Blueocean Semantic Web Solutions GmbH   **Jan 2017 – Aug 2024**

Designed and executed a large-scale, high-performance crawling system using Python and OpenMPI. Managed the entire crawling pipeline, ensuring seamless operation from server and database management to client communications.

Machine Learning Engineer, UREGO AG   **Oct 2021 – Aug 2022**

Developed a comprehensive data processing pipeline, integrating ML techniques (CNNs, LSTMs, YOLO) for user data analysis. This system provided personalized activity recommendations by processing and analyzing large-scale user location and image data.

Machine Learning Internship, 42Matters AG   **Nov 2020 – Apr 2021**

Engineered an innovative pipeline for automatic app-icon matching, processing millions of app icons with advanced preprocessing techniques and employing CNNs for cross-platform matching. This project automated a previously time-consuming task.

Private Tutor, Self-employed   **Jan 2016 – Aug 2020**

Provided tutoring in Mathematics, Physics, and Python to high-school and undergraduate students.

Conferences and Publications

British Seismology Meeting   **Mar 2024**

Invited speaker presenting my Master's thesis on physics-informed neural networks for the elastic wave equation.

Manuscript in preparation   **2025**

Staub, D., Rabe, F., Misra, A., Pauli, Y., Hüppi, R., Lang, N., Michels, L., Edkins, V., & Homan, P.

How meaning unfolds in the brain: A model-based approach to drift and shift in narrative comprehension [o].

Awards & Honours

Willi Studer Prize, ETH Zurich   **2024**

Awarded for the best Master's degree in Computational Science and Engineering.

Projects

Master Thesis
Enhanced Physics-Informed Neural Networks (PINNs) for the elastic wave equation by integrating wave physics knowledge into novel network designs, achieving up to 5x more accuracy than conventional PINNs. Introduced a conditioning on the source location, reducing inference time from days to seconds compared to traditional numerical methods. The work is currently transitioning into a published paper.

Student Project: Physically-Based Snow Simulation
Implemented a material point method-based snow simulation using Taichi, with a custom octree data structure to enhance efficiency beyond traditional approaches significantly.

Student Project: Fractured Object Reassembly
Developed a PyTorch-based pipeline for 3D feature point learning to reassemble fractured objects. Adapted the SuperGlue Graph Neural Network for 3D applications, enhancing key point and descriptor quality over existing methods