Raphael **Leu**

MSc Physics ETH · PhD Researcher in Numerical Analysis

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Summary

Open-minded, well-organised, and proactive person driven by a curiosity about finding and implementing solutions. Currently pursuing a doctoral degree in mathematics in the field of Numerical Analysis. Worked as a research assistant for scientific computing and engineering in the field of Computational Fluid Dynamics and as a software developer (C++/Python) for a weather company. Finished a Master's degree programme in Physics at ETH with a focus on computational physics and scientific computing. Comfortable with and used to pressure or high responsibilities as a team player: Played over 100 concerts throughout Switzerland and published a music album with a record contract during his studies at ETH.

Education

University of Bern — *Bern, Switzerland*

PH.D. IN MATHEMATICS — *September 2023 - September 2026*

Discrete Energy Minimization Techniques for Variational Partial Differential Equations

Eastern Switzerland University of Applied Sciences — *Rapperswil, Switzerland*

CAS COMPUTATIONAL FLUID DYNAMICS — *February 2023 - October 2023*

- Application of a CFD simulation to a real problem (Ventilated Tunnels with OpenFOAM)
- The physics of flows (Fluid Dynamics and Heat Transfer)
- The mathematical basis for simulations (Mathematics and Computational Methods)

ETH Zurich — *Zurich, Switzerland*

MSc Physics — *September 2019 - October 2021*

- Thesis in the High Performance Computational Physics group: "Taming Uncertainties in the Leading Hadronic Contribution to the Muon Magnetic Moment" supervised by Prof. Marina Krstic Marinkovic
  - Simulation of Lattice Quantum Field Theory on Linux clusters using Monte Carlo Sampling techniques
  - CSCS-USI Summer School in July 2021 on "Effective High-Performance Computing & Data Analytics with GPUs"
  - Reducing systematic errors on theoretical predictions from first principles by removing approximations in existing software (OpenQxD)
- Major courses:
  - Programming Techniques for Scientific Simulations (C++/Python/CMake/Make/Bash)
  - Computational Quantum Physics (Python)
  - Introduction to Machine Learning for the Sciences (Python, TensorFlow)
  - Quantum Field Theory, General Relativity, and Proseminar Theoretical Physics on "Supersymmetry in field theory"

ETH Zurich — *Zurich, Switzerland*

BSc Physics — *September 2016 - September 2019*

Curriculum involved: Numerical Methods (Python), taking and analysing measurements (Python), and an Introduction to C++.

Cantonal School of Graubünden — *Chur, Switzerland*

MATURA — *June 2015*

Core subject Physics and applied Mathematics and minor subject Informatics.

Skills

Programming	advanced: Python, C++ | intermediate: LaTeX, Bash
Data Handling/Analysis	advanced: Numpy, Scipy | intermediate: Jupyter Notebook | basics: Pandas
Machine Learning	intermediate: theory (reinforcement learning, supervised and unsupervised learning) | basics: Tensorflow
Languages	German (native), English (C1), Italian (basics)

Work Experience

OST – Ostschweizer Fachhochschule — *Rapperswil*

RESEARCH ASSISTANT — *December 2022 - present*

- Setup and Analysis of Computational Fluid Dynamics (CFD) simulations (STAR-CCM+, OpenFOAM, and Ansys CFX)
- Teaching Assistant for a Physics Course
- Maintenance of job submission scripts on the in-house cluster (Python)
- Writing of scientific reports

METEOMATICS AG

St. Gallen

Software Developer

November 2021 - November 2022

- Development and optimization of the processing of weather data (both in C++ and Python)
- Working in a team using Agile Software Development (Scrum) and Git
- Implementing new weather parameters and making them available through a Web-API

INFICON

Balzers, Liechtenstein

Intern in the department Evolution of Vacuum Control

January 2016 - July 2016

- Gained a variety of insights into the research, development, and simulation (COMSOL Multiphysics) of pressure and vacuum sensors in a physics laboratory
- Combined two measurement techniques in one single vacuum sensor and thereby enhanced the pressure range covered by current sensors without sacrificing much accuracy in (ultra) high vacuum regimes
- Presented results from the lab in written format (report and poster)

Extracurricular Activity

Band "KAUFMANN"

Switzerland

Musician (Drums)

2017 - present

- Record contract with Switzerland's well-known publisher "Zytglogge Verlag"
- Winner of several awards and contests
- Played over 100 Concerts throughout Switzerland

Band "HAPPY FOR REAL"

Switzerland

Musician (Drums)

2023 - present

- Drummer for live shows

Switzerland

Private Tutor

2017 - 2021

- Tutored a student for a whole year to help her pass the physics part of her Matura
- Tutored four people in total as a side job while studying

Other interests:

Running, cycling, gardening, and reading classic as well as modern literature.