Diego Renner

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DiegoRenner
</> C++, Python, Rust

Date of Birth: 29.08.1995
Nationality: Swiss

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(Items relating to projects and papers are clickable.)

Education

- **Imperial College London** — London, England
  M.Sc. Mathematics — *May 2025 - now*
  - Development of GPU Compressible Flow Solver for Turbomachinery (C++).

- **ETH Zurich** — Zurich, Switzerland
  M.Sc. Mathematics — *September 2021 - December 2023*
  - Degree completed with a thesis on differentiable haemodynamics solver in JAX (Python).

- **ETH Zurich** — Zurich, Switzerland
  M.Sc. Computational Science and Engineering, Specialization Physics — *September 2018 - August 2021*
  - Degree completed with a thesis on solving the transmission scattering problem using BEM (C++).

- **Universität Basel** — Basel, Switzerland
  B.Sc. Computational Mathematics — *September 2014 - December 2017*
  - Completed extracurricular courses on Computer Architecture, Operating Systems and Quantum Mechanics.

- **Gymnasium Bäumlihof** — Basel, Switzerland
  Matura, Specialization Biology & Chemistry — *August 2009 - July 2014*

Projects & Thesis

- Parallelizing the Barnes-Hut Algorithm with MPI: Parallelized implementation of N-Body solver in C++ using the MPI framework. (Course Work)
- AiiDA Lab implementation of IR spectrum calculations for carbon based nanomaterials: An AiiDa workflow implemented in the Jupyter Notebooks based AiiDa lab interface. (Semesters Thesis, Computational Science)
- Near Resonances for Scattering Transmission Problems: A BEM based C++ solver for Scattering Transmission Problems, developed to investigate scatterer-dependent near resonances. (Master's Thesis, Computational Science)

- ML Based Game Simulation in a Finance Setting: Agents trained to trade or hold a stock taking into account real historical data on cash returns. Policies are learned via reinforcement learning. (Course Work)
- On differentiable simulations of haemodynamic systems: A 1D-haemodynamics solver written in Python using JAX. The differentiability of the solver aims to aid in the development of personalised medicine. (Master's Thesis, Mathematics)

Publications

- Detecting Near Resonances in Acoustic Scattering: Continued development of root finding algorithm from Master's Thesis using handcrafted optimization algorithm and state of the art computation of singular values. (Published)
- Accelerated Patient-Specific Calibration via Differentiable Haemodynamics Simulations: Demonstrating feasibility of parameter inference through differentiable 1D-haemodynamics solver written in Master's Thesis. (Preprint)
- Raman spectroscopy enabled automatic media release controlled by convolutional neural networks. (Work in Progress)

Experience

- **Novartis Pharma AG** — Basel, Switzerland
  MSc Student Proc Dev & New Technologies — *June 2024 - December 2024*
  - Developing ML/AI algorithms for classifying Raman spectroscopy data.

  Technologies: imbalanced-learn, JAX, Matplotlib, NumPy, scikit-learn, SciPy, TensorFlow
  Theory: (C)NN, DoE, GMM, PCA, SMOTE

- **plantime.io** — Basel, Switzerland
  Software Engineer — *January 2024 - April 2025*
  - Developing ML/AI algorithms for optimizing shift scheduling.

  Technologies: Rust
  Theory: Evolutionary optimization algorithms

- **ETH Zurich** — Zurich, Switzerland
  Teaching Assistant — *September 2021 - February 2022*
  - Teaching Assistant for Lecture "Numerical Methods for Computer Science".

  Technologies: C++
  Theory: ODEs, PDEs and numerical algorithms to solve them

- **ETH Zurich** — Zurich, Switzerland
  Research Assistant — *September 2020 - June 2021*
  - Hired for continued development of BEM code that was implemented in Master's Thesis.

  Technologies: C++, CMake, Git
  Theory: BEM, Resonances in Transmission Scattering Problems

- **ETH Zurich** — Zurich, Switzerland
  Teaching Assistant — *September 2020 - February 2021*
  - Teaching Assistant for Lecture "Numerical Methods".

  Technologies: C++, CMake
  Theory: ODEs, PDEs and numerical algorithms to solve them

- **CSCS Swiss National Supercomputing Center** — Lugano, Switzerland
  Internship — *May 2018 - August 2018*
  - Writing regression checks for Piz Daint, Cray XC40/XC50 production system.

  Technologies: C, MPI, MySQL, Kibana, Grafana

Certificates & Extracurriculars

- **Ready, set, go! A short introduction for Student Teaching Assistants** (remote) Zurich
  Education Development and Technology, ETH Zurich *April 2020*
  - Improving didactic skills
  - Setting goals for upcoming teaching activity

- **Effective High-Performance Computing & Data Analytics with GPU** (remote) Lugano, Switzerland
  Summerschool, CSCS-USI *July 2020*
  - GPU: architecture & programming (CUDA, OpenACC)
  - JupyterLab
  - Python: Numpy, SciPy, Dask, Numba
  - ML: Rapids
  - Deep Learning: TensorFlow

- **International Consulting Network (ICON)** Shanghai, (remote) Belo Horizonte
  Student Consulting Network *March 2017 - February 2018*
  - Market Research & Trend Analysis consulting for CREP (Real Estate, China) & Lalubema (Private Security, Brazil)

Volunteering

- **Mapathon@Novartis with the Swiss Red Cross** Basel
  Tracing maps in underserved areas for risk reduction and disaster response. *October-November 2024*

- **Jugendsession** Bern
  Formulating policy suggestions to be passed on to the Parliament: Neutrality in Media. *November 2011*

- **Jugendsession** Bern
  Formulating policy suggestions to be passed on to the Parliament: Electronic Voting. *November 2009*

Named References

- **Dr. Andreas Jocksch**
  Senior Research Software Engineer
  - Phone: +41 91 610 82 32
  - Mail: andreas.jocksch@cscs.ch

  Relation: Supervisor during internship at CSCS on writing regression checks for Piz Daint, Cray XC40/XC50 production system.

- **Prof. Dr. Ralf Hiptmair**
  Full Professor and Deputy head of Dep. of Mathematics / Head of Seminar for Applied Mathematics at ETH Zurich
  - Phone: +41 44 632 34 04
  - Mail: ralf.hiptmair@sam.math.ethz.ch

  Relation: Supervisor of Computational Science Master's Thesis on solving the transmission scattering problem using BEM (C++).

- **Prof. Dr. Siddhartha Mishra**
  Full Professor at the Dep. of Mathematics / Deputy head of Seminar for Applied Mathematics at ETH Zurich
  - Phone: +41 44 632 75 63
  - Mail: siddhartha.mishra@sam.math.ethz.ch

  Relation: Supervisor of Mathematics Master's Thesis on differentiable haemodynamics solver in JAX (Python).

- **Dr. Georgios Kissas**
  Postdoctoral Fellow at ETH AI Center + BAUG + MAVT + SAM
  - Phone: +41 78 969 95 77
  - Mail: gkissas@ai.ethz.ch

  Relation: Co-Supervisor of Mathematics Master's Thesis on differentiable haemodynamics solver in JAX (Python) and Supervisor of publication thereof.