

Alberto Bassi

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Summary: I am a PhD candidate in Physics at ETH Zurich, with a strong theoretical and computational background in statistical Physics, Bayesian statistics, machine learning, and large-sample hydrology. My research mainly focuses on theoretical machine learning and machine learning applications to hydrology.

EDUCATION

Universidad Complutense de Madrid, Research stay | Madrid, Spain 2025

Research outline: phase transitions cascades in deep restricted Boltzmann machines.

Project supervisors: **Beatriz Seoane** and **Aurélien Decelle**

ETH Zurich, PhD in Physics | Zurich, Switzerland 2022 – Present

Research outline: exploration of phase transitions in deep neural networks; understanding the nature of catchment attributes in large-sample hydrology with machine learning and improving predictions; use of meta dynamics for sampling multi-modal high-dimensional posteriors of stochastic models.

Thesis supervisors: **Carlo Albert**, **Sebastian Huber**, and **Antonietta Mira**

Galilean School of Higher Education, MSc in Physics | Padova, Italy 2017 – 2022

Thesis title: Learning Catchment Features with Autoencoders.

Thesis supervisors: **Carlo Albert**

Marks: GPA: 29.89/30, Final Grade: 100/100 cum Laude

University of Padova, MSc in Physics | Padova, Italy 2020 – 2022

Thesis title: Reconstruction and Parameter Estimation of Dynamical Systems using Neural Networks.

Thesis supervisors: **Amos Maritan**, **Valerio Lucarini**, and **Varun Ojha**

Marks: GPA: 29.56/30; Final Grade: 110/110 cum Laude

University of Reading, MSc thesis research stay | Reading, United Kingdom 2022

Research outline: investigated the applications of various neural networks to dynamical systems.

Project supervisors: **Valerio Lucarini** and **Varun Ojha**

University of Innsbruck, Erasmus | Innsbruck, Austria 2021

Marks: GPA: 1.0/1.0

University of Padova, BSc in Physics | Padova, Italy 2017 – 2020

Thesis title: Tolman-Oppenheimer-Volkoff equations in unified models of dark matter and dark energy.

Thesis supervisors: **Sabino Matarrese** and **Daniele Bertacca**

Marks: GPA: 28.90/30; Final Grade: 110/110 cum Laude

PAPERS

Bassi, A., Albert C., Lucchi A., Baity-Jesi, M., and Franczi E.: **When the Left Foot leads to the Right Path: Bridging Initial Prejudice and Trainability**, arXiv:2505.12096, *under review*.

Bassi A., Fenicia, F., Mira, A., and Albert, C.: **On the Information Content of Catchment Attributes for Streamflow Prediction**, *in preparation (to be submitted to Hydrol. Earth Syst. Sci.)*.

Bassi, A., Höge, M., Mira, A., Fenicia, F., and Albert, C.: **Learning landscape features from streamflow with autoencoders**, *Hydrol. Earth Syst. Sci.*, 28, 4971–4988, <https://doi.org/10.5194/hess-28-4971-2024>, 2024.

AWARDS & SCHOLARSHIPS

Best poster award (BayesComp23), won one of the ten best poster prizes (out of 100). 2023

Galilean School of Higher Education, full scholarship, awarded to exceptional students (acceptance rate of 5 %), admission tests in maths and physics, additional exams and final thesis. 2017 - 2022

Merit-based fee reduction, awarded for exceptional academic achievements. 2017 - 2022

Italian Physics Olympiads, silver medal (among the first 10 qualified in the national finals). 2017

SKILLS

Programming Advanced: Python, C++, Julia, Fortran; Intermediate: Git; Familiar: Matlab, R

Technical Machine learning (Pytorch, Jax), MPI (Python, C++), cluster managing

Languages Native: Italian, Friulan; Fluent: English, German; Conversational: French, Spanish

TALKS & CONFERENCES

StatPhys29 | Florence, Italy 2025

Poster: Bridging order/chaos phase transition and initial guessing bias in deep-untrained neural networks.

European Geosciences Union, Deep learning in hydrology | Vienna, Austria 2025

Speaker: Leveraging Machine Learning to Uncover and Interpret Relevant Catchment Features.

Eawag Peer Review | Kastanienbaum, Switzerland 2024

Poster: New insights from large hydrologic datasets using machine learning models.

European Geosciences Union, Deep learning in hydrology | Vienna, Austria 2024

Speaker: Learning Catchment Features with Autoencoders.

Mediterranean Machine Learning Summer School | Thessaloniki, Greece 2023

Poster: Learning Catchment Features with Autoencoders.

Università della Svizzera italiana | Lugano, Switzerland 2023

Speaker: invited seminar on Bayesian neural networks and Hamiltonian Monte Carlo.

BayesComp 2023 | Levi, Finland 2023

Poster: Using Meta Dynamics to Enhance Bayesian Inference for Stochastic Models.

FURTHER WORK EXPERIENCE

Reinforcement Learning for path optimization | HHM-AG and ETH Juniors 2023

Applied RL algorithms (DDQN, PPO) for minimal path optimization problems in construction engineering.

Teaching assistant, Eawag (ETH) summer school in Environmental Analysis, Switzerland 2023

Member of PhD committee, Eawag (ETH), Switzerland 2023 – 2024

Organizing and coordinating events for PhD students at Eawag.