Marcello Massimo Negri

I am a highly motivated PhD student at the University of Basel under the supervision of Volker Roth. Currently, I am working to make machine learning models more expressive and interpretable at the same time.

As a first result we improved sparsity in Bayesian graphical models with Conditional Matrix Flows (see **NeurIPS** publication). In parallel, we developed a physics-informed deep learning model that conserves the continuity equation by construction (see **ICLR Spotlight** - top 5% papers).

We also developed a comprehensive library of (conditional) Normalizing Flows in PyTorch named FlowConductor.

As a side project, I recently helped **Human Rights Watch** developing a software to detect village burnings in Darfur, Sudan.

EXPERIENCE

Research assistant | **ETH Zürich** (prof. Hofmann) 03.21 - 06.21

I developed a **deep learning emulator** for cosmological simulations in the context of **gravitational wave physics**

Research assistant | **ETH Zürich** (prof. Schweitzer) 06.20 - 06.21

I worked on **data collection**, **processing** and **cleaning** tasks in a Python and Unix environment within three projects

EDUCATION

Ph.D. Machine Learning | **University of Basel** 02.22 - present

Main research: Bayesian inference, density estimation, physics-informed ML, sparsity
Other research: image segmentation, diffusion models

M.Sc. Physics (GPA 5.71/6) | **ETH Zürich** 09.19 - 12.21

Thesis topics: **meta-learning** • VAEs • **few-shot learning**
Semester project topics: **time series analysis** • temporal networks

B.Sc. Physics (110/110 cum laude) | **UniMI** 09.16 - 07.19

Thesis topics: **boosted regression trees** • neural networks • Higgs Boson mass

SELECTED PUBLICATIONS

F. Arend Torres, M. Negri, M. Inversi, J. Aellen, V. Roth, *"Lagrangian Flow Networks for Conservation Laws"*, **spotlight ICLR 24** (pdf, code)

M. Negri, F. Arend Torres, V. Roth, *"Conditional Matrix Flows for Gaussian Graphical Models"*, **NeurIPS 23 (**pdf, poster, code)

F. Arend Torres, M. Negri, M. Nagy-Huber, M. Samarin, V. Roth, *"Mesh-free Eulerian Physics-Informed Neural Networks"*, arxiv, 2022 (pdf)

M. Negri, V. Fortuin, J. Stühmer, *"Meta-learning richer priors for VAEs"*, **AABI 22 (**pdf, poster)

RESEARCH AND SIDE PROJECTS
https://mnegri.netlify.app

SOME CODE
https://github.com/marcello-negri

INFO

4th January 1998
Basel, 4054 Switzerland
Italian, English (C2), German (B1)
marcellomassimo.negri@gmail.com

RESEARCH INTERESTS

- Bayesian Inference with Normalizing Flows
- Sparsity and interpretability
- Physics-informed ML

TEACHING

- TA: Bioinformatics Algorithms
- Supervision: 5 thesis on UNet, attention, diffusion models

COMPUTER SKILLS

PyTorch, TensorFlow, Scikit-learn, Pandas, NumPy, SciPy

Python, C++, Shell Scripting, LaTeX, R, Mathematica