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

We developed a comprehensive **PyTorch library** of Normalizing Flows named FlowConductor.

# **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 - 03.21

I worked on **data collection**, **processing** and **cleaning** tasks in a Python and Unix environment within 3 research projects

## **EDUCATION**

## Ph.D. Machine Learning | University of Basel

02.22 - present

Main research: Bayesian inference, generative models, 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) | University of Milano 09.16 - 07.19

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

### SIDE PROJECTS

In collaboration with Human Rights Watch we developed 10.23 - 12.23 a Telegram Bot to detect and monitor village burnings in Darfur, Sudan

# **SELECTED PUBLICATIONS**

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

<u>M. Negri</u>, 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

#### **GITHUB**

https://github.com/marcello-negri

## INFO

Born in Italy, 4<sup>th</sup> January 1998 Living in Basel, Switzerland Italian, English (C2), German (B1) marcellomassimo.negri@gmail.com

### RESEARCH INTERESTS

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

### **TEACHING & MENTORING**

- TA: Bioinformatics Algorithms (dynamic programming, Markov Models, phylogenetic trees)
- Supervision: 5 thesis on UNet, attention, diffusion models

## **COMPUTER SKILLS**

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

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