Noemi Anau Montel

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Research Interests

My research interests lie towards analyzing complex astrophysical and cosmological datasets at various observable scales for new physics searches. In particular, my work uses novel probabilistic machine learning techniques to develop innovative data analysis pipelines and statistical algorithms. The aim is to alleviate the statistics challenges facing the fields of astrophysics and cosmology in light of high-quality data from current and future observatories. On the application side, I am currently working on gravitational lensing, cosmological simulations of large scale structures, and point sources in sky maps.

Education

ORCiD

University of Amsterdam, GRAPPA Institute — **Amsterdam, NL**

Ph.D. in Physics — Oct. 2020 – present

Advisor: Christoph Weniger

Università di Torino — **Torino, IT**

Laurea magistrale in Fisica Teorica (equivalent to *M.Sc.* in Theoretical Physics) — Oct. 2018 – Jul. 2020

Grade: 110/110 magna cum laude with honors

Advisor: Nicolao Fornengo

Laurea triennale in Fisica (equivalent to *B.Sc.* in Physics) — Oct. 2015 – Jul. 2018

Grade: 110/110 magna cum laude

Advisor: Paolo Gambino

Publications

arXiv Inspire HEP

Author of 4 articles (one currently under review), and 3 contributions (one currently under review) to the Machine Learning and the Physical Sciences Workshop at the Conference on Neural Information Processing Systems (NeurIPS). A full publication record can be found in the publication list.

Teaching and Supervision Experience

Teaching assistant (preparing and leading tutorials, designing and marking exams) for master courses:

- Advanced Cosmology (16 hours); Lecturer: C. Weniger — Winter 2024
- Machine Learning for Physics and Astronomy (64 hours); Lecturer: C. Weniger — Spring 2022, 2023
- Quantum Field Theory 3 (16 hours); Lecturer: M. Isachenkov — Winter 2023
- Quantum Field Theory (32 hours); Lecturer: E. Verlinde — Fall 2020

Guest lecturer for the Professional Skills and Career Development Physics and Astronomy course (2023).

Research supervisor for 3 MSc students and 1 BSc student, devising their projects and providing weekly supervisor support on their theses.

Seminars and Conference Talks

† = remote, ⋆ = poster

Seminars:

- Harvard University (Department of Physics) — Cambridge (MA), US, May. 2023
- Radbound University (Donders Institute) † — Jan. 2022

Contributed talks:

- GRAPPA 10 year anniversary conference [slides] — Amsterdam, NL, Jul. 2023
- The Road to Differentiable and Probabilistic Programming in Physics [slides] — Munich, DE, Jun. 2023
- Third EuCAPT annual symposium at CERN [slides] — Geneva, CH, May. 2023
- Cosmic Connections (Symposium at Flatiron Institute) ⋆ — New York (NY), US, May. 2023
- Novel approaches to characterise the Galactic Centre Excess [slides] — Annecy, FR, Mar. 2023
- Simulation-based inference with Swyft Workshop [slides] — Amsterdam, NL, Jan. 2023
- NeurIPS 2022, ML and the Physical Sciences Workshop ⋆ [poster] — New Orleans (LA), US, Dec. 2022
- Identification of Dark Matter (IDM) 2022 [slides] — Vienna, AU, Jul. 2022
- Likelihood-free in Paris [slides] — Paris, FR, Mar. 2022
- UK National Astronomy Meeting (NAM) 2021 † [slides] — Jul. 2021

Professional Activities and Community

- *Reviewer*, NeurIPS Machine Learning and the Physical Sciences Workshop — 2023
- *Co-Organizer*, Simulation-based inference with Swyft Workshop — Jan. 2023
- *Member*, GRAPPA Colloquium Committee — 2022 – present

Professional Skills

Programming skills:

- *Expert*: Python (including `PyTorch`, `Pyro`, `JAX`), bash, vim, slurm, Git, LaTeX.
- *Intermediate*: Mathematica, C++, html.
- *Contributor/mantainer*: `swyft`, `torchns`.

Languages: fluent English, native Italian, intermediate French, beginner Hebrew and Dutch.

Research Training

- ISAPP School on Exploring the Dark Universe — Texel, NL, Nov. 2023
- MIAPbP Workshop on Differentiable and Probabilistic Programming — Munich, DE, May. 2023
- Lorentz Center School on Fundamentals of the Universe — Leiden, NL, Apr. 2023
- GGI School on Astroparticle Physics, Cosmology and Gravitation — Firenze, IT, Mar. 2021 and 2022