Manu Ventura

Data Scientist

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EMventura

Data scientist and educator with a PhD in Astrophysics, passionate about applying data, technology, and critical thinking to drive positive change. Strong background in Python, end-to-end data processing, machine learning, and high-performance computing, with a proven record of delivering reliable, optimised and interpretable solutions in cross-functional environments. Motivated by applying data and technology to solve real-world problems with meaningful impact.

Work Experience

2025 – today **Digital Trainer**, *Intersect, Sydney, Australia*

- Delivered technical workshops and short courses on Python, Machine Learning, and HPC to researchers and non-specialists.
- Developed data-driven learning modules tailored to problem-solving and reproducibility, successfully adopted in Intersect training programs.

2022 – 2025 **Researcher – PhD in Astrophysics**, *The University of Melbourne, Australia*

- Handled terabyte-scale datasets using Python, NumPy, pandas, and HPC tools; optimised performance across parallel computing environments.
- Published three first author papers and communicated findings at international conferences and to the general public. List of publications available here.
- Led technical problem-solving across teams, managing multiple competing priorities independently while serving as a data expert within a multidisciplinary collaboration.

End-to-end simulation pipeline for predictive analytics in complex systems

- Led the development of a data-driven simulation pipeline to model early galaxy formation successfully used within an international research collaboration and made publicly available via GitHub here.
- Generated predictive insights on radio signals detectable by radio interferometers, integrating statistical modelling, large-scale data processing, and scalable analytics.
- Translated simulation outputs into actionable insights by calibrating and validating probabilistic models against high-resolution data, achieving <10% deviation and ensuring reliable predictions of cosmological signals.

Optimised simulation framework for rapid execution of complex models

- Efficiently executed large-scale cosmological simulations successfully deployed on national HPC systems, by optimizing code performance and reducing computational time by up to 70%.
- Built portable, containerised analytics pipelines using Docker and Git, with automated parameter scans to guarantee reproducibility across HPC and local environments.
- Built dashboards and visual diagnostics to interpret and communicate results.

2022 – 2025 **Lab coordinator and tutor**, *The University of Melbourne, Australia*

- Taught and supported over 200 students in data-focused physics courses.
- Prepared course content and tools, ensuring smooth delivery and technical accuracy.
- Led teams of demonstrators and maintained the digital learning environment.

Key skills

Data analysis & visualization

Python · Jupyter · Data management · NumPy · pandas · h5py · Matplotlib · seaborn · scikit-learn

Software development

Git · Docker · Unix · Slurm and PBS · C · Development, execution and deployment · HPC architectures · MPI · scalable parallel performance

Leadership & Communication

International conferences · Academic teaching · Public outreach · Leading research projects

Education

2022 – 2025 **Ph.D. in Astrophysics**, *The University of Melbourne, Australia*
Courses: *Optimization and Parallel Computing, Machine Learning*

2019 – 2021 **M.Sc. in Astrophysics & Cosmology**, *University of Padova, Italy*
Courses: *Advanced numerical methods, Bayesian Statistics*

2016 – 2019 **B.Sc. in Astronomy**, *University of Padova, Italy*
Courses: *Mathematical physics, Mathematical analysis, Physics*

Awards & Grants

2024 **480k CPU hours**, *Project leader*, Computing time on OZSTAR supercomputer, Swinburne, Australia

2022 **ND Goldsworth Scholarship**, *Awarded by the University of Melbourne based on academic excellence*

2019 **Scholarship "Mille e una Lode"**, *Awarded by the University of Padova based on academic excellence*

Interests & Hobbies

My passion for community engagement extends beyond my teaching and public outreach activities. I **volunteered** as a scout leader, mentoring children and teenagers in teamwork and outdoor skills, and as an Italian teacher supporting language integration for immigrants. When I am not running simulations of the Universe you will find me **outdoors** either climbing, hiking or camping.

Languages

- English & Italian — Fluent
- Spanish — Proficient

References

Available upon request.