Nicoló Dalmasso

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EDUCATION

The University of Melbourne (AU)
- **Doctor of Philosophy (PhD) in Physics – Astrophysics** **Mar 2022 - Sep 2025**

Università degli Studi di Torino (IT)
- **MSc in Astrophysics and Theoretical Physics** - 110/110 with distinction **Oct 2019 - Oct 2021**
- **BSc in Physics** **Oct 2016 - Oct 2019**

PROFESSIONAL EXPERIENCE

LLM Training Specialist **Sep 2025 - Present**
Mercor Intelligence

- ***Problem Design*** - Design advanced STEM reasoning problems to test frontier LLM capabilities and identify failure modes in technical reasoning.
- ***Performance Analysis & Pattern Recognition*** - Evaluate model outputs using statistical methods to quantify reasoning gaps and error patterns, systematically tracking and categorizing failure modes to inform data-driven improvements.
- ***Solution Development & Evaluation*** - Develop step-by-step solutions with detailed rubrics for evaluating model responses, establishing correct reasoning pathways and measurable success criteria for state-of-the-art technical problems.
- ***Quality Assurance*** - Validate model accuracy through expert review and statistical analysis, ensuring evaluation frameworks maintain consistency and reliability across diverse problem categories.

Doctoral Researcher **Mar 2022 - Sep 2025**
The University of Melbourne

- ***Data Engineering & Analysis*** - Developed automated Python pipelines for processing heterogeneous datasets, reducing manual processing time by 70% and enabling efficient extraction of insights from complex data.
- ***Data Visualization & Communication*** - Produced publication-quality visualizations of complex datasets using Python, translating technical findings into clear narratives for diverse audiences.
- ***Machine Learning & Statistical Modeling*** - Built probabilistic models (Bayesian inference, MCMC) and feature extraction pipelines, improving benchmark accuracy by 15% using ensemble methods and rigorous statistical validation.
- ***Algorithm Optimization*** - Reduced computational runtime by 40% through profiling and code optimization, enabling production-scale deployment of analysis workflows.
- ***Research Leadership & Collaboration*** - Led two large-scale international collaborations and contributed to five additional projects, delivering 7 peer-reviewed publications (5 first-author, 2 co-author) in Nature Astronomy and leading journals.

Teaching Assistant **Mar 2022 - Sep 2025**
The University of Melbourne

- ***Teaching & Mentorship*** - Conducted tutorials and lectures for undergraduate and graduate courses in Physics and Astrophysics, translating complex scientific concepts into accessible explanations for diverse student audiences.
- ***Assessment & Performance Analysis*** - Evaluated assignments, projects and exams for 200+ students, tracking grade distributions and assessment outcomes to ensure grading consistency and identify opportunities for targeted student support.
- ***Curriculum Development*** - Co-delivered Year 12 Physics lessons through SEAMS University outreach program, adapting technical content for high school audiences.

TECHNICAL SKILLS

- **Data Engineering:** ETL pipelines, feature engineering, workflow automation, performance optimization.
- **Data Analysis:** Exploratory analysis (EDA), data visualization, anomaly detection, high-dimensional data processing.
- **Programming & Tools:** Python (NumPy, Pandas, Matplotlib, SciPy), SQL, Git/GitHub, Docker.
- **Statistical Modeling:** Bayesian inference, MCMC simulations, probabilistic modeling, hypothesis testing.
- **ML Techniques:** Supervised/unsupervised learning, neural networks, model training and fine-tuning, cross-validation, A/B testing.
- **AI Tools:** LLM evaluation, prompt engineering, GenAI platforms (GPT, Claude).