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Tahina Princy
Ranaivomanana — PhD

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Profile

Astronomer and data scientist with a strong focus on Machine Learning and time-series data analysis. Specialised in applying advanced machine learning techniques to complex datasets. Proficient in programming languages such as Python, PyTorch, and SQL, with hands-on experience building and deploying ML models for tasks such as Classification, Anomaly Detection, Similarity Search, and Generative AI-related tasks. Demonstrated ability to translate performance requirements into scalable computational software solutions. Published author in peer-reviewed journals and a key contributor to large-scale international collaborations, showcasing communication, teamwork, and cross-cultural project management skills. Now looking to leverage this unique blend of research, technical software and machine-learning expertise, and data-driven problem-solving in data-handling challenges in the industrial or scientific domain.

Experience

PhD project **10/2021 — 09/2025**
Radboud University — KU Leuven *The Netherlands - Belgium*

- Developed an innovative approach to: i) identify 193 new hot subdwarf variables; and ii) filter out contaminant sources from a catalogue of ∼60,000 sources, using unsupervised machine learning with UMAP and t-SNE on Gaia DR3 time-series data.
- Designed and implemented efficient frequency analysis tools to detect periodicity in sparsely sampled, multi-colour, heteroscedastic time-series data from the MeerLICHT telescope.

MPhil project **2020 — 2021**
University of Manchester *United Kingdom*

- Developed semi-supervised GAN models for pulsar data synthesis and classification, aligning with large radio surveys (SKA).

Teaching Assistant
Radboud University

- Delivered tutorials for data analysis and astronomical instrumentation courses **2023 - 2024**
- Delivered tutorials for a Data Analysis course **2021**

KU Leuven

- Supervised two bachelor research projects (two students per project) **2022**

Education

Dual PhD degree in Astronomy, *Radboud University — KU Leuven* **10/2021 — 09/2025**
MPhil in Astronomy, *University of Manchester* **2020 — 2021**
M.Sc. in Astronomy, *University of Antananarivo* **2016 — 2017**
B.Sc. Honours in Astrophysics, *University of Antananarivo* **2015 — 2016**
B.Sc in Physics, *University of Antananarivo* **2012 — 2015**

Skills

- Programming
  Python: Conduct big data analysis with libraries such as Pandas, NumPy, SciPy, and Astropy
- SQL
  Perform SQL query to retrieve and manipulate large datasets, including those from astronomical databases
- Bash scripting
  Automate task execution, job scheduling, and data pipeline management on UNIX-based systems
- Machine learning libraries: Tensorflow, Keras, Pytorch
  Perform classification, prediction, and clustering related tasks on tabular, time-series, and image data
- Deep Learning
  Perform synthetic data/image generation tasks based on neural network models
- Data handling
  Experience with extracting and handling large heterogeneous data, including those from astronomical observations: BlackGEM, Gaia, TESS, ZTF

Certification

Oxford machine learning school 2025 certificate (Online certificate)
Oxford machine learning school 2023 certificate (Online certificate)
Teaching training course: Offered by Radboud University (Online certificate)
Advanced Machine Learning and Signal Processing: Offered by IBM Skills Network (online certificate)
Data Analysis with Python: Offered by IBM Skills Network (online certificate)
Exploratory Data Analysis for Machine Learning: Offered by IBM Skills Network (online certificate)

Prizes and Grants

- Receipt of the Leids Kerkhoven-Bosscha Fonds (LKBF) grants for attending conferences 2023/2024/2025
- Recipient of the UK's Newton Fund/DARA Big Data MPhil Bursary 2020
- Receipt of SKA/SARAO grant to attend the 2nd Big Data Africa School — South Africa 2018

Relevant international conferences Attended & Talk contributions

Talk

- The 12th international meeting on hot subdwarfs & related objects — North Carolina, US 2025

Talk title: Unravelling Hot Subdwarfs and Binaries Variability with Gaia DR3 and Machine Learning

- KOPAL 2024 conference (flash talk) — Litomysl, Czech Republic 2024
- MW-Gaia WG2 conference — Sofia, Bulgaria 2023

Talk title: Classification of variable stars observed in multiple filters with MeerLICHT and BlackGEM

Poster

- TASC/KASC 15 conference — Porto, Portugal 2024
- AMCVn5 workshop — Armagh, UK 2023
- sdOB11 conference — Armagh, UK 2023
- TASC/KASC13 conference — Leuven, Belgium 2022
- sdOB10 conference — Liege, Belgium 2022

Machine learning conference

- Oxford machine learning school (OxML), Oxford, UK 2023 & 2025

Extracurricular Activities and Memberships

- Help high school students with their projects on time-series analysis, Netherlands 2025
- Help commissioning BlackGEM telescopes for two weeks in LaSilla, Chile 2023
- Leader of national activities during the IAU100 celebration 2019
- Former national coordinator of Malagasy Astronomical Society (MAS) 2019
- Project leader of a OAD/DARA funded project: *Madagascar Astronomy Magazine* 2018

Relevant Peer-reviewed publication

[1] P. **Ranaivomanana**, M. Uzundag, C. Johnston, et al. “Variability in hot sub-luminous stars and binaries: Machine-learning analysis of Gaia DR3 multi-epoch photometry”. In: 693, A268 (Jan. 2025), A268. DOI: 10.1051/0004-6361/202452429. arXiv: 2411.18609 [astro-ph.SR].

[2] P. **Ranaivomanana**, C. Johnston, P. J. Groot, et al. “Identifying and characterising the population of hot sub-luminous stars with multi-colour MeerLICHT data”. In: 672, A69 (Apr. 2023), A69. DOI: 10.1051/0004-6361/202245560. arXiv: 2302.07266 [astro-ph.SR].

[3] P. **Ranaivomanana**, C. Johnston, G. Iorio, et al. “Unsupervised learning for variability detection with Gaia DR3 photometry. The main sequence–white dwarf valley". Resubmitted to Astronomy & Astrophysics (A&A) journal (September, 2025).

[4] P. **Ranaivomanana**, C. Johnston, M. Uzundag, P. J. Groot, et al. BlackGEM observations of compact pulsating stars: Mode identification for the DOV PG 1159–035 using multi-colour photometry”. Submitted to Astronomy & Astrophysics (A&A) journal (August, 2025).