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Tahina Princy Ranaivomanana
PhD Candidate

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Profile

Fourth-year PhD candidate pursuing a dual degree at Radboud University (Netherlands) and KU Leuven (Belgium), specialising in multi-wavelength time-series data analysis and machine learning applications in stellar astrophysics. Skilled in Python programming and experienced with deep learning frameworks such as TensorFlow and PyTorch for data modeling, time-series characterisation, and classification. Published in peer-reviewed journals with extensive experience in international collaborations. Seeking a postdoctoral position at CalTech to advance time-domain astronomy and computational astrophysics.

Experience

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

- Conducted unsupervised machine learning analyses with t-SNE and UMAP on Gaia DR3 multi-band lightcurves to identify and characterise the variability of $\sim 1{,}500$ hot subdwarf stars.

- Designed and implemented frequency analysis tools for sparsely sampled multi-colour lightcurves from MeerLICHT observations, achieving significant advancements in periodicity search.

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).

MSc project   **2016 — 2017**
University of Antananarivo   *Madagascar*

- Investigated the formation and evolution of young massive clusters in interacting galaxies using photometry and population synthesis code

Teaching Assistantship
Radboud University

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

KU Leuven

- Supervised 4 undergraduate research projects   **2022**

Education

Joint PhD candidate, *Radboud University — KU Leuven*	**10/2021 — Present**
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 datasets from astronomical databases - Bash scripting: Automate task execution, job scheduling, and data pipeline management
Machine learning	- Familiar with Tensorflow, Keras, Pytorch libraries - Perform classification, prediction, and clustering related tasks on tabular, time-series, and image data - Deep learning: Perform synthetic data/image generation tasks for imbalanced learning
Astronomy software	- Topcat: TAP query, data manipulation, and visualisation - MESA & GYRE: Perform basic modelling tasks - Period04: Frequency search — pre-whitening tasks
Data handling	- Experience with large astronomical databases: BlackGEM, ZTF, TESS, Gaia

Relevant Peer-reviewed publication

[1] P. **Ranaivomanana**, M. Uzundag, C. Johnston, et al. "Variability of hot sub-luminous stars and binaries: Machine learning analysis of Gaia DR3 multi-epoch photometry". In: *arXiv e-prints*, arXiv:2411.18609 (Nov. 2024), arXiv:2411.18609. DOI: 10.48550/arXiv.2411.18609. 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].

Certification

Teaching training course: Offered by Radboud University (Online certificate)
Oxford machine learning school certificate (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) grant (EUR 600) to attend the TASC/KASC 15 conference in Porto	2024
• Receipt of the Leids Kerkhoven-Bosscha Fonds (LKBF) grant (EUR 500) to attend the Oxford machine learning school	2023
• 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

Conferences Attended & Contributions

• BlackGEM meeting (talk) — Manchester, United Kingdom	2024
• KOPAL 2024 conference (flash talk) — Litomysl, Czech Republic	2024
• TASC/KASC 15 conference (Poster) — Porto, Portugal	2024
• Malagasy Astronomy Meeting (*Talk*) — Antananarivo, Madagascar	2023
• AMCVn5 workshop (*Poster*) — Armagh, UK	2023
• sdOB11 conference (*Poster*) — Armagh, UK	2023
• MW-Gaia WG2 conference (*Talk*) — Sofia, Bulgaria	2023
• TASC/KASC13 conference (*Poster*) — Leuven, Belgium	2022
• sdOB10 conference (*Poster*) — Liege, Belgium	2022

Extracurricular Activities and Memberships

• Help commissioning BlackGEM for two weeks in LaSilla, Chile	2023
• Student member of the Malagasy Astronomical Society (MAS) — IAU-adhering organisation for Madagascar	2017 — Present
• Student member of the African Astronomical Society (AfAS)	2021 — Present
• Participated in African Space Generation Advisory Council (AF-SGAC) / DARA Big Data Hackathon	2020
• Project leader of a OAD/DARA funded project: *Madagascar Astronomy Magazine*	2018
• Member of the IAU100 National Committee: leader of national activities during the IAU100 celebration	2019
• National Coordinator of Malagasy Astronomical Society (MAS)	2019