Department of Astrophysics
Radboud University
Nijmegen, The Netherlands
✉ rtprincy@gmail.com

# Tahina Princy Ranaivomanana
## PhD Candidate

⚫ rtprincy
🔗 rtprincy
🌐 http://rtprincy.github.io

## 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 tool 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

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|---|---|
| **Programming** | - Python: Conduct big data analysis with libraries such as Pandas, NumPy, SciPy, and Astropy<br>- SQL: Perform SQL query to retrieve datasets from astronomical databases<br>- Bash scripting: Automate task execution, job scheduling, and data pipeline management |
| **Machine learning** | - Familiar with Tensorflow, Keras, Pytorch libraries<br>- Perform classification, prediction, and clustering related tasks on tabular, time-series, and image data<br>- Deep learning: Perform synthetic data/image generation tasks for imbalanced learning |
| **Astronomy software** | - Topcat: TAP query, data manipulation, and visualisation<br>- MESA & GYRE: Perform basic modelling tasks<br>- 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