

PROFILE

PhD candidate specialising in multi-wavelength time-series data analysis and machine learning applications in stellar astrophysics. Proficient in Python programming and deep learning frameworks (TensorFlow, PyTorch) for data modelling, time-series characterisation and classification. Published in peer-reviewed journals and experienced in international collaborations.

EDUCATION

Joint PhD candidate, <i>Radboud University – KU Leuven</i>	10/2021 – Present
MPhil in Astronomy, <i>University of Manchester</i>	2020 – 2021
M.Sc. in Astronomy, <i>University of Antananarivo</i>	2016 – 2017
B.Sc. Honours in Astrophysics, <i>University of Antananarivo</i>	2015 – 2016
B.Sc in Physics, <i>University of Antananarivo</i>	2012 – 2015

EXPERIENCE

PhD project	10/2021 – Present
<i>Radboud University - KU Leuven</i>	<i>The Netherlands - Belgium</i>

- 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	09/2020 – 09/2021
<i>University of Manchester</i>	<i>United Kingdom</i>

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

Teaching Assistantship	
Delivered tutorials for data analysis and astronomical instrumentation courses – Radboud University	2023 - 2024
Supervised 4 undergraduate research projects – KU Leuven	2022
Delivered tutorials for a Data Analysis course – Radboud University	2021

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](https://doi.org/10.48550/arXiv.2411.18609). arXiv: [2411 . 18609](https://arxiv.org/abs/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](https://doi.org/10.1051/0004-6361/202245560). arXiv: [2302 . 07266](https://arxiv.org/abs/2302.07266) [[astro-ph.SR](#)].

## CERTIFICATION

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**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

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- 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

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- 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

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- 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