

Malavika Vasist

Ph.D from University of Liege.

Focus on developing and applying machine learning techniques to retrieve exoplanet atmospheric properties using spectral data.





✉ malavika.vasist47@gmail.com

in Malavika Vasist


🌐 <https://www.malavikavasist.com/>





Work experience

- 2019 – 2025  **PhD**, University of Liege, Belgium. Under the F.R.I.A-F.N.R.S PhD grant.
- Performing faster, scalable and testable retrievals of exoplanet atmospheres using amortized Simulation based inference (SBI).
 - Finding the best SBI algorithms and architectures to perform amortized retrievals aimed at population studies.
 - Studying directly imaged brown dwarfs using spectra from JWST/MIRI, CRIRES+, HST/WFC3 and Gemini/GNIRS in medium and high resolutions.
- 2018 – 2019  **Masters thesis 2, Leiden University**
- Applied Deep Learning algorithms to predict the properties of galaxy major mergers in EAGLE simulations.
- 2017 – 2018  **Masters thesis 1, Leiden University**
- Analysed the relation between galaxy morphology and merger history in the EAGLE simulations.
 - Found that fraction of major mergers is higher for ellipticals than disks at all redshifts and increases with redshift, agreeing with the observational estimates.
- 2015 – 2016  **Bachelors thesis**
- Used the 3 point maximum power point tracking (MPPT) technique to charge photo voltaic(PV) cells. The simulation was carried out in Matlab Simulink and it was implemented in hardware.





Education

- Oct 2019 - June 2025  **Ph.D. at University of Liege, Belgium**
- Neural posterior estimation for exoplanet retrievals
- Courses in deep learning and advanced Machine Learning, 2019
 - Training in academic writing and lecturing, 2020
 - Astrostatics and Machine learning course, SAASFEE, 2021
 - Probabilistic artificial intelligence, Helsinki, 2022
 - Summer school in probabilistic AI, Copenhagen, 2023






Education (continued)

- Sept 2017 - Sept 2019  **Masters at Leiden University, Netherlands**
Astronomy and Data science
- Courses on Astronomical spectroscopy, Astrostatistics, High contrast imaging, Computational astrophysics, Databases and data mining.
 - Introduction to neural networks, Reinforcement learning
- Sept 2012 - Sept 2016  **Bachelors at BMS College of Engineering, Bangalore, India**
Electrical and Electronics Engineering.
Minor in Physics at REAP (Research Education Advancement Programme) at the Jawaharlal Nehru planetarium, Bangalore.



Skills

- Languages  Strong reading, writing and speaking competencies for English, speaking competency for Kannada, Hindi, B1 French and A2 Sanskrit.
- Coding  Python, PyTorch, Bash, basic C/C++, MatLab,
- Software  Git and GitHub, JupyterLab, Visual Studio Code, Linux systems, Slurm workload manager, \LaTeX , Microsoft office, wandb.
- Machine Learning  Supervised and unsupervised learning, Reinforcement learning, CNN, Transfer learning, probabilistic AI, Variational inference/ Simulation based inference

Conferences and talks

- 2023  **Cloud Zwei Con**, conference on exoplanet atmospheres, near Munich (**talk**).
Generative Modelling AI workshop, Copenhagen (**poster**).
Carl Sagan summer school on modelling, interpretation and observation of exoplanets, Caltech (**poster**).
ETH Zurich department visit and talk
KU Leuven department visit and talk
- 2022  **Likelihood free in Paris**, conference on likelihood free inference (**talk**).
Probabilistic AI workshop, (**poster**).
Other Worlds Lab, summer workshop on exoplanets and the ERS program (**talk**).
JWST data reduction workshop, in Leiden.
- 2021  **SAAS-FEE course**, astronomy in the era of big data. (**online**)
Code Astro, astronomy software development workshop organised by Caltech. (**online**)
- 2020  **Astro Hack Week**, on bayesian inference and machine learning. **hackathon (online)**
- 2019  **WFIRST workshop**, on the science motivation of the WFIRST mission, in New York.

Research Publications

-  H. Kühnle, P. Patapis, P. Mollière, *et al.*, “Water depletion and $^{15}\text{NH}_3$ in the atmosphere of the coldest brown dwarf observed with JWST/MIRI,” *Astron. Astrophys.*, vol. 695, A224, A224, Mar. 2025.  DOI: 10.1051/0004-6361/202452547. arXiv: 2410.10933 [astro-ph.EP].

- 2 M. Vasist, P. Mollire, H. Kühnle, *et al.*, “Panchromatic characterization of the yo brown dwarf wisep j173835.52+273258.9 using jwst/miri (submitted to a&a),” 2025. arXiv: 2507.12264 [astro-ph.EP]. [URL: https://arxiv.org/abs/2507.12264](https://arxiv.org/abs/2507.12264).
- 3 D. Barrado, P. Mollière, P. Patapis, *et al.*, “15nh3 in the atmosphere of a cool brown dwarf,” *Nature*, vol. 624, no. 7991, pp. 263–266, Nov. 2023, ISSN: 1476-4687. [DOI: 10.1038/s41586-023-06813-y](https://doi.org/10.1038/s41586-023-06813-y).
- 4 M. Vasist, F. Rozet, O. Absil, P. Mollière, E. Nasedkin, and G. Louppe, “Neural posterior estimation for exoplanetary atmospheric retrieval,” *Astronomy&Astrophysics Journal*, 2023. [DOI: 10.1051/0004-6361/202245263](https://doi.org/10.1051/0004-6361/202245263).
- 5 M. Vasist, K. Ambarish, and B. Venkatesh, “Three-point mppt technique for photovoltaic systems,” *International Journal of Engineering Research*, vol. 5, pp. 992–1128, 2016, ISSN: 2319-6890(online),2347-5013(print). [URL: https://www.academia.edu/27200545/Three-Point_MPPT_technique_for_photovoltaic_systems](https://www.academia.edu/27200545/Three-Point_MPPT_technique_for_photovoltaic_systems).

PhD Thesis

- 1 M. V. Vasist, “Exoplanet atmospheric characterization using amortized simulation based inference,” English, Ph.D. dissertation, ULiège - Université de Liège [Space science, astronomy & astrophysics and Computer science], Liège, Belgium, 20 June 2025. [URL: https://orbi.uliege.be/handle/2268/331545](https://orbi.uliege.be/handle/2268/331545).