Malavika Vasist

Ph.D candidate from University of Liege
Atmospheric retrievals using machine learning
malavika.vasist47@gmail.com Malavika Vasist
https://www.malavikavasist.com/

Work experience

2019 – present **PhD candidate** , University of Liege, Belgium
- Performing faster, scalable and evaluable retrievals of exoplanet atmospheres using Simulation based inference (SBI).
- Finding the best SBI algorithm architectures suited for spectroscopic retrievals of medium to high resolution spectra.
- Evaluating the SBI retrievals using statistical tools such as coverage and posterior predictive distributions.

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.

2016 – 2017 **Internship at the Indian Institute of Astrophysics**
- Calculated the core prominence of the AGNs in the MOJAVE sample from the radio data from University of Michigan Radio Observatory (UMRAO) and Very Large Array (VLA), and contributed to submitting a proposal to the mission ASTROSAT.

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 - Sept 2024 **Ph.D. at University of Liege**
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**
Astronomy and Data science
- Courses on Astronomical spectroscopy, Astrostatistics, High contrast imaging, Computational astropysics, Databases and data mining.
- Introduction to neural networks, Reinforcement learning

Sept 2012 - Sept 2016 — **Bachelors in Electrical and Electronics Engineering**
with a minor in Physics

Research Publications

Journal Articles

1. M. Vasist, F. Rozet, O. Absil, P. Mollière, E. Nasedkin, and G. Louppe, "Neural posterior estimation for exoplanetary atmospheric retrieval," *AstronomyAstrophysics Journal*, 2023. DOI: 10.1051/0004-6361/202245263.
2. 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.

Skills

Languages	Strong reading, writing and speaking competencies for English, speaking competency for Kannada and Hindi, B1 French.
Coding	Python, PyTorch, Bash, basic C/C++, MatLab,
Software	Git and GitHub, JupyterLab, Visual Studio Code, Linux systems, Slurm workload manager, LaTeX, Microsoft office
Machine Learning	Supervised and unsupervised lerning, Reinforcement learning, CNN, Transfer leanring, 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 Zuric 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)**

Conferences and talks (continued)

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.

Miscellaneous Experience

Projects

2016 **Building a radio telescope from scratch using a TV dish antenna**, https://alternateuniverse2015.wordpress.com/2016/09/06/radio-telescope-to-monitor-the-sun/

2017 **Digital signal processing, course project**, plotting pulsar signatures in MATLAB.

Awards and Achievements

2021 **F.R.I.A-F.N.R.S PhD grant**.

Certification

2013-2017 **Research enhancement advancement program (REAP)** Awarded by Jawaharlal Nehru planetarium, Bangalore. The 3 year program mandated completing bachelors physics courses.

Leadership

Cofounder of the Astronomy club in Bachelors Founded the first Astronomy club in my bachelors in BMS college of engineering, and organized various science communication events through the years.

References

Available on Request