Matthijs Mars

+447928540348 | matthijs.mars.20@ucl.ac.uk | ORCiD | GitHub | Website

Education

PhD Candidate, Mullard Space Science Lab, University College London, *UK* 2020 - 2024
M.Sc. Astronomy and Data Science, Leiden University, *The Netherlands* 2018 - 2020
B.Sc. Astronomy , Leiden University, *The Netherlands* 2015 - 2018
B.Sc. Physics , Leiden University, *The Netherlands* 2015 - 2018

Research Experience

PhD Candidate, Mullard Space Science Lab, University College London, *Dorking, UK* Oct 2020 - Now
Supervised by: Jason McEwen, Marta Betcke
Thesis title: *Learned interferometric reconstruction for astronomical imaging*

- Developed real-time, data-driven reconstruction techniques for image reconstruction
- Developed models that generalise to varying visibility coverages in radio interferometry
- Implemented generative models to provide uncertainty quantification alongsided image reconstruction

Industry Placement, Hartree Centre, *Warrington, UK* Feb 2023 - Aug 2023
Supervised by: Adriano Agnello, Nicola Amorisci, George Holt
Project title: *Deep reinforcement learning for shape control*

- Implemented deep reinforcement learning for real-time plasma shape control
- Software development, including documentation, test implementation and Continuous integration

Master's Student, European Space Research and Technology Centre, *Noordwijk, The Netherlands* Sep 2019 - Jun 2020
Supervised by: Sandor Kruk (ESTEC) & Henk Hoekstra (Leiden University)
Thesis title: *Characterising the diffuse galactic light in the ESA Euclid survey*

- Used Gaussian Mixture Modelling to statistically model Galactic cirrus
- Used data from Planck mission, WISE survey, and optical observations to predict Galactic cirrus in Euclid survey

Master's Student, Leiden University, *Leiden, The Netherlands* Oct 2018 - Jul 2019
Supervised by: Koen Kuijken, Maciej Bilicki
Project title: *Research Project title: Photometric pre-selection for WAVES-wide*

- Photometric classificiation of galaxies in KIDS survey using ensemble methods

Bachelor's Student, Leiden University, *Leiden, The Netherlands* Jan 2018 - Jun 2018
Supervised by: Jos de Boer, Alexander Bohn, Frans Snik
Thesis title: *Finding exoplanets in (vAPP) coronagraphic data*

- Data reduction using high contrast imaging techniques for direct imaging of exoplanets using pupil plane coronagraphs

Talks and Posters

Alan Turing Institute Space Science Seminar, Sep 2023
London, UK
Seminar: Learned Image Reconstruction for Interferometric Imaging

European Astronomical Society Annual Meeting, Jul 2023
Kraków, Poland
Contributed Poster: Learned radio interferometric imaging for varying visibility coverage

Biomedical and Astronomical Signal Processing (BASP) Frontiers, Feb 2023
Villars-sur-Ollon, Switzerland
Contributed Poster: Learned Interferometric Imaging for the SPIDER Instrument

Interfacing Bayesian Statistics, Machine Learning, Applied Analysis, and Blind and Semi-Blind Imaging Inverse Problems Jan 2023
Edinburgh, UK
Contributed Poster: Learned Interferometric Imaging for the SPIDER Instrument

3rd IMA Conference on Inverse Problems from Theory to Application, May 2022
Edinburgh, UK
Contributed Talk: Learned Interferometric Imaging for the SPIDER Instrument

Technical Skills

Python: Experienced with data manipulation, analysis, and visualisation using NumPy, Pandas, Matplotlib, and Seaborn. Also experienced with:

- SciPy: Experienced in utilizing SciPy for scientific and technical computing tasks such as optimization, integration, and interpolation.
- scikit-learn (sklearn): Experienced in applying scikit-learn for machine learning tasks, including data pre-processing, model selection, and evaluation.
- TensorFlow: Experienced in building and training deep learning models using TensorFlow for various applications as well as creating custom differentiable models.
- Ray: Experienced in utilising Ray for distributed computing, enabling efficient parallel and distributed Python applications.
- RLlib: Experienced in using RLlib, a reinforcement learning library, for developing and training reinforcement learning agents.
- PyTorch: Familiar with PyToch for automatic differentiation and training deep learning models.
- JAX: Familiar with JAX for automatic differentiation and high-performance numerical computing.

Version Control & Collaboration – Experienced in using Git for version control in collaborative environments using either GitHub or GitLab, including code reviews and automated testing.

Teaching experience

Teaching Assistant: Machine Learning and Big Data, Feb 2022 - Now
University College London, *London, UK*
Tasks include:

- Creating new coursework material
- improving existing coursework
- automating grading
- marking

First year's Tutor, Leiden University, *Leiden, The Netherlands* Nov 2016 - Jun 2018
Weekly tutoring for a group of 5 Physics/Astronomy Bachelor students to help them understand the more difficult topics in the curriculum.