ALEXIS YEE SHAN LAU

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PROFESSIONAL SUMMARY

Postdoctoral Researcher with a PhD in Optics and Image Processing, specialising in algorithms for high-resolution and hyperspectral data. NASA Roman Space Telescope community contributor through open-source development. Expertise in Python and advanced signal processing for astronomical data processing.

EXPERIENCE

Postdoctoral Researcher – ESCAPE & Roman CPP 2024 – Present
Laboratoire d'Astrophysique de Marseille (LAM), France

- Contribute to the NASA Roman Coronagraph Community Participation Programme (Roman CPP) through open-source development and maintenance of data-processing pipelines and simulators on GitHub.
- Develop and maintain an existing in-house end-to-end optical simulator within the ESCAPE project (GitLab), transforming it into a robust framework for testing alternative wavefront-control algorithms, observing strategies, and post-processing techniques in Roman-like observing scenarios.
- Validate novel observing strategies and post-processing algorithms using laboratory optical-bench experiments.

PhD Researcher, PSF Estimation and Deconvolution 2020 - 2023
Laboratoire d'Astrophysique de Marseille (LAM), France

- Optimised Point Spread Function (PSF) estimation under noisy and dynamic conditions
- Generalised PSF estimation methods to hyper-spectral data
- Built reproducible data processing pipelines with graphical user interfaces using Python

Master Dissertation - Direct Imaging of Exoplanets 2019 - 2020
University of Exeter, UK

- Processed near-infrared observations from Keck Observatory, handling large-scale astronomical datasets
- Designed automated pipeline for candidate detection with astrometry and photometry algorithms
- Implemented calibration procedures and noise suppression techniques

EDUCATION

PhD in Optics, Photonics and Image Processing 2020 - 2023
Laboratoire d'Astrophysique de Marseille (LAM), France
Thesis: PSF Estimation and Deconvolution of Hyper-spectroscopic Data

MPhys Physics with Astrophysics, First Class Honours 2016 - 2020
University of Exeter, UK

TECHNICAL SKILLS

- **Signal Processing:** Fourier Analysis, PSF estimation, deconvolution, hyperspectral data analysis, adaptive optics, image processing
- **Programming:** Python (Advanced), C, C++, IDL, MATLAB
- **Software Engineering:** Algorithm optimisation, scientific software development, version control (Git)
- **Languages:** English (fluent), Cantonese (fluent), Mandarin (fluent), French (intermediate)

CONFERENCES, WORKSHOPS AND SCHOOLS

SPIE Astronomical Instrumentation (Poster presentation), 2024, 2022
AO4ELT7 (Oral presentation), 2023
LAM-GRD Seminar (Oral presentation), 2023
NYRIA Workshop (Oral presentation), 2021, 2022
AO4ASTRO2 (Oral presentation), 2021
Spatially Resolved Spectroscopy with Extremely Large Telescopes (Oral presentation), 2021
ORP Instrumentation School, 2023
European Adaptive Optics Summer School, 2021
ESCAPE Summer School, 2021
LAM High Angular Resolution Summer School, 2020

COMMUNITY SERVICES

Seminar organising committee at Laboratoire d'Astrophysique de Marseille 2022
NYRIA workshop organising committee 2022, 2023 (main-organiser)

MENTORING EXPERIENCE

Damien Camugli @Laboratoire d'Astrophysique de Marseille - LAM 2024 - 2025

- Europhotonics master internship, co-supervised with Elodie Choquet and Lisa Altinier

Lina Borg @Laboratoire d'Astrophysique de Marseille - LAM 2023

- 2-month internship, co-supervised with Benoit Neichel

Saraswathi Kalyani @Laboratoire d'Astrophysique de Marseille - LAM 2023

- 2-month project, co-supervised with Benoit Neichel