Enzo Peres Afonso

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Education

University of Cape Town *2022 – 2025*
BSc in Astrophysics & Physics

Technical Skills

Programming & Development: Python, C/C++, Linux, Git, Bash Scripting, HTML/CSS, Flask, MMBasic

Astronomical Data Processing: FITS Handling (Astropy, ccdproc), IR/Optical Calibration & Stacking, catalog cross-matching, Source Extraction (Photutils), Visualization (APLpy)

Electronics & Design: CAD (Fusion 360), 3D Printing, Circuit Prototyping, Embedded Systems (Raspberry Pi, Arduino, STM32), comm protocols (UART, 2IC, RS232 etc)

Research Experience, Select Projects & Internships

ROTSE-IIIc Telescope Restoration Project *Cape Town, South Africa*
South African Astronomical Observatory *Jan 2024 – Present*

- Developed the complete Observatory Control System using `pyobs` framework, replacing the obsolete `C/C++` legacy infrastructure.
- Developed software to interface legacy hardware with modern `python` frameworks via serial communication protocols.
- Engineered and deployed a fully autonomous weather monitoring and all-sky camera suite; designed custom mechanical and electrical components (CAD/3D printing) and integrated real-time telemetry into the telescope's observatory control system.

South African Astronomical Observatory Intelligent Observatory Program (Intern) *Cape Town, South Africa*
South African Astronomical Observatory — Supervisor: Dr. Nicolas Erasmus *Jan 2024 – Present*

- Deployed a machine learning computer vision pipeline to automate real-time cloud detection from all-sky cameras.
- Automated the Lesedi 1-metre telescope's daily flat-field and spectrophotometric target scheduling, significantly reducing the need for manual operator intervention during observing "pre-flight" routines.
- Support IO members across multiple observatory projects, developing python solutions for data-processing pipelines, ML model prototyping, automated testing frameworks and code documentation.

PyObs OCS Project (Intern) *Göttingen, Germany*
Institute for Astrophysics and Geophysics — Supervisor: Dr. Tim-Oliver Husser *Jun. 2024 – Jul. 2024*

- SAAO-funded research visit to collaborate on the development of the open-source `pyobs` observatory control system framework.
- Developed an asynchronous `python` library to control telescopes via the Meade LX200 protocol over serial communication.
- Engineered a low-latency `C/Python` wrapper to interface Andor sCMOS hardware with the `pyobs` observatory control system.
- Participated in seminars on exoplanet data reduction hosted by the **Max Planck Institute for Solar System Research**.

Outreach & Volunteer Experience

I am passionate about making science accessible and supporting the next generation of scientists. Through **Zulelinye Outreach** and as a juror for the **South African Young Physicists' Tournament**, I work to create opportunities for students in underserved communities. I actively mentor high schoolers on personal research projects, Eskom Expo entries, and preparations for the International Young Physicists' Tournament. Within various levels and contexts, such as recently guiding a student to apply Machine Learning to LIGO gravitational wave data. To further inclusivity, I developed **Astro Touch**, an open-source tool that converts astronomical `FITS` data into tactile surface models for the blind and visually impaired. Outside of academia, I have served for 7 years as a volunteer surf rescue lifeguard and helicopter rescue swimmer with **Lifesaving South Africa**, where I was honored to receive a National Bravery Award for my role in rescue operations.

References

Dr. Nicolas Erasmus
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Prof. David Buckley
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Dr. Tim-Oliver Husser
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