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Student Success Center

Computational Work for Astronomical Instrumentation

Quinn Konopacky/CASS (Oct, 2022)

What you will do

Use python computational language to assess the performance of a wavefront sensor that will be used for the Gemini Planet Imager (GPI) instrument. GPI is a high-contrast imaging instrument tasked with discovering Jupiter mass exoplanets. After a successful run on Gemini South Telescope in Chile, it is being moved to Gemini North Telescope in Hawaii. With the new location there will be many upgrades to different subsystems of the instrument, including to the wavefront sensor. Atmospheric turbulence is a limiting factor for ground-based telescopes observing in the visible and near-infrared. The rapidly changing atmosphere results in the distortion and movement of astronomical images. These effects can be compensated for by using an adaptive optics system, which includes a wavefront sensor that measures the changes in the atmosphere. This wavefront sensor for GPI is being built and tested at UCSD, before being integrated into the rest of the system.

As part of the EXPAND project you will use lab data taken by the wavefront sensor to characterise the instrument and assess its performance. All scripts will be written in python using the scientific stack (i.e. numpy, matplotlib and scipy). This work is dependent on the laboratory progress at the start of this project. If the wavefront sensor is not ready to be tested, you will work on another project that uses different wavefront sensing data.

Skills you will acquire

- Computational skills in the programming language python
    - Experience using python libraries: numpy, matplotlib, scipy and astropy
- Presentation/Communication Skills
- Scientific reading
- Familiarity with error analysis
- Understanding of adaptive optics and limitations of ground-based astronomy