Saavidra Perera
EXPAND Mentor

Simulating and Characterising Wavefront Sensor Images

Quinn Konopacky/Stars and Planets Group (Winter, 2021-22)

What you will do

You will develop and deliver computational scripts to analyse wavefront sensing images.

When observing astronomical objects from the ground, in the visible/infrared wavelengths, the Earth's atmosphere causes image blurring and movement which evolves very quickly with time. These distortions to the image are drastically reduced by using adaptive optics (AO). An AO system will measure in real-time the distortion the atmosphere has on the incoming light using a wavefront sensor (WFS). You will be working as part of the team that is building and testing the new WFS for the Gemini Planet Imager (GPI). GPI is an instrument that directly images and obtains spectral information of young gas giants outside of our solar system. A major component of a WFS is the detector, i.e. the component that takes images of what the atmosphere is doing. This project will be computational based and will focus on simulating and analysing detector images in Python. You would be encouraged to come to group meetings (schedule willing) and present your work, as well as interact with the rest of the UCSD GPI team in order to learn more about astronomical instrumentation as a field and what goes into designing and testing a new instrument.

Skills you will acquire

- Computational skills in the programming language python
  - Experience using python libraries: numpy, matplotlib, scipy and astropy
- Familiarity with error analysis
- Understanding of
  - Adaptive optics
  - Optical atmospheric turbulence
  - Detectors