Observational Cosmology; Strong Lensing Analysis, Follow-up Observing Proposals, Spectrograph Fiber Positioner R&D

Abstract:
Cosmology is the study of the overall structure and evolution of the universe. I worked on three projects in the realm of observational cosmology. In the first project I analyzed candidate strong gravitational lenses in image cutouts from DELVE data, identified by a convolutional neural network as containing possible lenses, and visually identified which objects were the lens, source, or neither. I built a file with this information that was read to calculate the Einstein radius of each candidate lens and the photometric distributions for lens and source galaxies in the sample. To plan follow-up observations using SIFS, I built a code to overplot a diagram of the field of view and spectroscopic fibers on the data cutouts, in order to determine the best position and position angle for these observations. Finally, I worked on R&D for a spectrograph fiber positioner, building GUIs to operate the system, designing automated tests to characterize its behavior, testing the electronics, and designing code to calibrate the system, calculate how to get to a location, and execute the motion.