General Audience Abstract

Being both very bright, massive, and distant, quasars serve as great sites for researching gravitational lensing. During this event, a quasar can be multiply-imaged in an observation, and finding the time-delay for when each image arrives can be a great probe to the Hubble's constant H_0. But to get accurate measurements, we need to consider all objects that might influence the light's path, not just the main lensing galaxy. These could be other individual galaxies or groups of galaxies. In this study, we look for these *perturbers* in the J1537 lensed quasar environment by measuring their redshifts; that is to say, their distances from us. A total of 58 redshifts from the Gemini Multi-Object Spectrograph (GMOS) were recovered after image reduction was carried out using Gemini-IRAF and the RANSAC Assisted Spectral CALibration (RASCAL) Python package. Additionally, 19 redshifts were supplied from the Multi Unit Spectroscopic Explorer (MUSE), giving us a total of 77 redshifts. However, our success rate was about 45%, lower than the expected 60%-70%. We think some technical issues affected our results, such as a bad amplifier, as well as inaccurate wavelength solutions on the blue end. We also use additional packages to find groups, and two distinct groups (Group I & Group II) were identified along with their distances and flexion shifts. With these distances, we measured "flexion shifts" to decide which objects should be considered in our lens model and only those with significant shifts would be included. The cut chosen is defined as $\log_{10}(\text{flexion}) > -4$. Three objects were found so far that pass this cut, along with a single group, and will need to be included in the lens model. The more accurate this model, the better the constraints on H_0 will be.