Characterizing a Novel Flare in the Distant Quasar VIIIZw233

Ramesh, Padmalakshmi (School: Laramie High School)

Every second in the universe an exciting event is occurring, whether it be the collision of two black holes or the death of a star in an explosive supernova. One such event is a Tidal Disruption Event (TDE), where a star gets too close to a black hole and is ripped apart by the black hole's tidal forces. The hot interior of the star is exposed, causing increased activity in that galaxy's spectra. Stellar matter such as dust, gasses, and rocks orbit the black hole in an accretion disk. From the resulting friction of these fast-moving objects, energy is output as light which is termed as a quasar. VIIIZw233 is a galaxy host to a quasar of the same name and is located at 527 Megaparsecs (Mpc) from Earth. In 2018, an unusual flare from this quasar was documented by the Wyoming Infrared Observatory (WIRO) in the optical portion of the EMS. The objective was to characterize different elements of the flare in VIIIZw233 and compare them to characteristics of known TDEs. It was hypothesized that the characteristics of the flare will be similar to those of a TDE. All data were imported, pre-processed and analyzed in Google Colab, a platform for executing Python online. Packages such as lmfit, astropy, numpy, pandas, and matplotlib were used in this analysis. The criteria analyzed in this study included the peak luminosity, comparing the continuum light curve with the H-Beta light curve, the difference spectra, as well as the color of the object.

Awards Won:
Second Award of $2,000