EXoplanet ConfIrmaTIoN throuGh transits (EXCITING): Determining False Positives for Exoplanet Candidates

Im, Haedam (School: University High School)

EXoplanet ConfIrmaTIoN throuGh transits (EXCITING) is a project that determines the validity of TESS Objects of Interest (TOI) exoplanet candidates. The project aims to identify false positives, mainly eclipsing binaries, using a 1m remotely controlled telescope. Among various exoplanet detection methods, EXCITING utilized the transit method to analyze various target candidates over the course of seven months. FITS images from the SOPHIA 2048B CCD camera were analyzed through aperture photometry to detect the change in flux of the target star compared to that of reference stars. The light curves were detrended with various parameters including airmass. Based on the morphology of the resultant light curves and fitted parameters such as the estimated radius or transit depth, this project reports that TOI 1638.01, TOI 1252.01, and TOI 2120.01 are likely to be exoplanets, while TOI 496.01 is most likely to be an eclipsing binary. TOI 2047.01 and TOI 1516.01 require further investigations using the radial velocity method: the results show a possibility of being either a large exoplanet or a small eclipsing binary star, likely a red or brown dwarf. The results of this research will further contribute to the conclusive exoplanet confirmation process for TOI candidates, such as radial velocity verification and spectroscopic analysis.

Awards Won:
Second Award of $2,000
SPIE, the international society for optics and photonics: Second Award of $1,500