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Abstract

Radial Velocities and KEPLER light curves will be analyzed using a binary star model. Specifically, the planet-star system HAT-P-11 will be analyzed. It was first discovered by the Hungarian Automated Telescope (HAT) Network project, hence the name. HAT-P-11b is an exoplanet slightly larger than Neptune, making it possible for us to detect it using ground based methods. Exoplanets are much dimmer than their local star, therefore they cannot be directly detected with today's technology; the light coming from the star will overpower the light coming from it's respective planet. One of the most prominent methods of indirectly detecting exoplanets is through their transits. When the planet passes in front of the star, it blocks a portion of the light emitted by said star, creating "dips" in the light telescopes are able to detect. These "dips" can be seen on light curves, or curves that examine the flux as a function of time. The system became an object of interest due to its highly oblique orbit, discovered by the initial analysis on it's transits extracted from ground based observations. Data from NASA's KEPLER mission will be used, instead of the first data gathered on this planet through the HAT Network project. Because the HAT Network is a ground based system, it is prone to error due to both light pollution and atmospheric turbulence. Multiple transits will be overlapped and plotted in order to maximize our data and minimize uncertainties, to better observe the

planet's transits. Using our own software, we will extract orbital, star and planet parameters, from these overlapped plots. The technology used in astronomy has improved exponentially over the last century. Only recently, have we been able to look at other star-planet systems, other than our own Solar system. Understanding the diversity of possible said systems will increase our understanding of our own Solar system, and the observable universe. Further, because our own software will be used to calculate relevant parameters, we will be testing its validity and exploring a new way to observe complex planet-systems.