

Week 16 Written Report: Exoplanets

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Scientific Importance and Motivation

The discovery and study of exoplanets carry significant scientific importance. Exoplanets provide information about the formation and evolution of planetary systems. By studying them, scientists can learn how planets form, move, and interact within their planetary system.

Understanding the characteristics of exoplanets can also help scientists learn more about our own solar system. Exoplanet research is at the forefront of astronomy today, so their careful detection is an essential part towards improving our knowledge of the universe.

Method

To detect exoplanets, I will explore the transit method. The transit method involves observing and measuring a star's brightness over time and looking for periodic dimming which is caused by an exoplanet passing in front of it. The amount of light that is blocked can be used to determine the planet's size and the duration between orbits.

Results

The TRESCA database provides observational data of a star's brightness over time. After importing and cleaning the data, I normalize the brightness values to a baseline level by dividing each brightness measurement by the median brightness level before the transit event. This normalization helps highlight the transit occurrence visually. Figure 1 shows a Time vs. Flux plot, where the exoplanet transit event occurs in the dip. The dip in the light curve is caused by the passing of an exoplanet in front of the star. The depth and duration of the dip in Figure 1 are

key measurements to learn more from. Figure 2 provides an estimate of these values by modeling the data in the shape of a ‘U’. The estimated depth of the dip is -.015 units (a decrease in brightness) and the estimated duration is .1 day.

Figure 1: Time vs. Flux

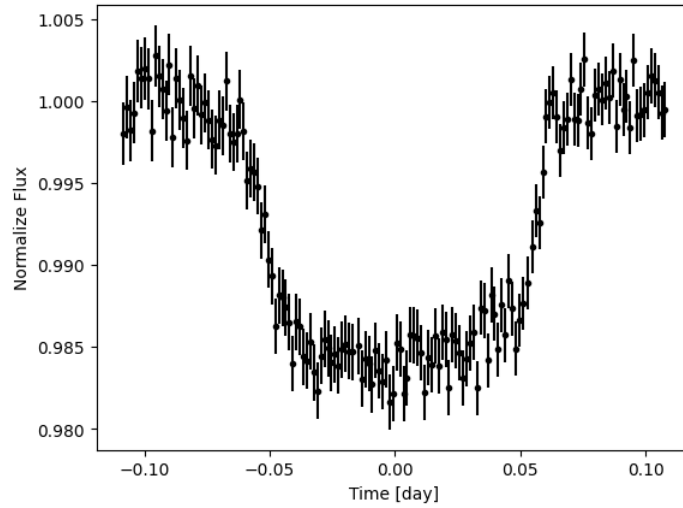
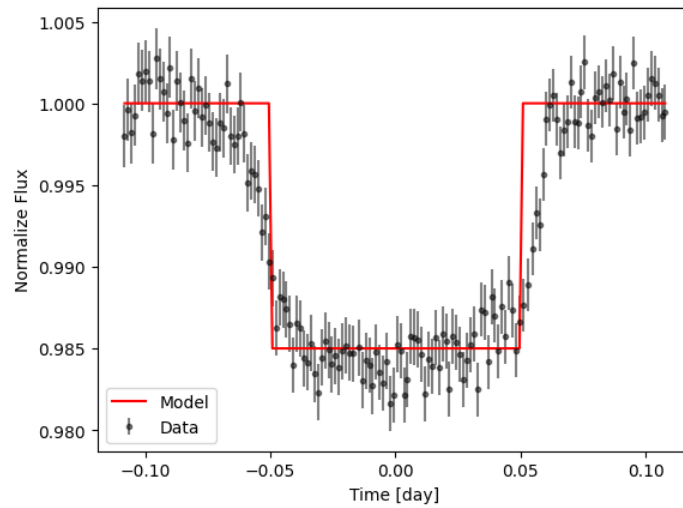


Figure 2: Estimated Depth and Duration



Conclusion

The transit method is a useful tool in the discovery and confirmation of exoplanets beyond our solar system. By observing the dimming of a star's brightness when an exoplanet passes, astronomers can infer the size and other characteristic of these exoplanets. As technology continues to advance, the transit method will remain at the head of exoplanet research.

References

<http://var2.astro.cz/EN/tresca/transit-detail.php?id=1535045428>