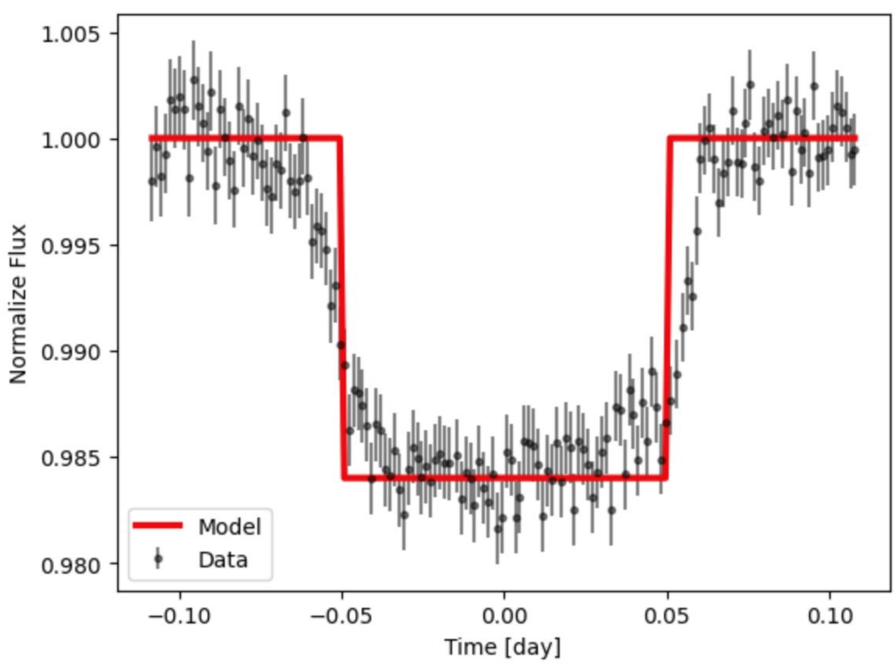
Motivation

As of recently we have been learning about exo-planet detection methods. We watched videos of how we have increased our understanding of exo-planets, along with reading papers that show us direct evidence through radial velocity, transit, and more. We focused mainly on transit, the method by which a planet is detected by observing blocked starlight. Which is of course caused from an exo-planet moving in front of the star. Data from these observations such as time in transit, and the amount of star-light which is blocked tell us more about the individual properties of these exo-planets.

Methodology

We used mainly a code that was given to us in class, we worked together in the code to discuss what each individual component meant. Adding and deleting parameters as we saw fit for our individual data set. The data sets we analyzed consisted of the flux, time, and real magnitude. These were specifically for a time that was before, during, and after a transit.



The above graph shows a decrease in flux over a specified period (roughly 2.5 hours)

Results

Given to us in class was the formula that $R_p=R_{Star}*(T_D)^{(1/2)}$, the website Nasa Exoplanets tells us a good deal of information of both the planet and its stellar host. Gathered the values of

$$\mathrm{center}_t\mathrm{ime} = 0.00207^{0.00033}_{-0.00039}$$
$$\mathrm{duration} = 0.10687^{0.00078}_{-0.00066}$$
$$\mathrm{depth} = 0.01387^{0.00027}_{-0.00027}$$
$$\mathrm{delta}_f\mathrm{lux} = -0.00088^{0.00020}_{-0.00019}$$

From our code, we can combine them into our equation to confirm the radius of the planet and other values. A bigger takeaway from this however is that our data provides us a depth of roughly 0.01387 (ration wise so no units). Which is astounding that we can detect minimal changes in light from moving stars billions of miles away.

Conclusion

In addition to reinforcing that transit data is a great way to evaluate exo-planetary orbits. We confirmed mathematically along with the NASA published data. That the radius of HD 209458b, is approximately 15.6 times that of the Earth. Our value calculated from code and raw data is on par with what NASA has, this is quite impressive