

In the final unit of the semester, we covered many different methods people use to detect exoplanets. One of these ways is to observe the brightness of a star, especially the way it fluctuates. When an exoplanet is blocking out part of the star, the brightness will be reduced, and depending on the size and distance of the exoplanet, the fluctuation can be different for each exoplanet. In project five, we graphed the flux data of an exoplanet discovered by using the transit method.

In the first part of the project, we had to create a model light curve to compare to the data we will observe later. We first graphed it with model numbers and turned it into a function so we can easily recall it in later steps.

We then imported the actual data of Gliese 436 b into our code and plotted the points on a flux vs time graph. By observing the curve created by this data, we're able to find the time and flux drop, which will help us graph the model light curve on top of this data. Just by observation, the flux seemed to drop by about 0.008, and the transit happened at 2.3 hours which lasted roughly 0.8 hours. We just plugged these values into the model light curve that we found earlier and compared this model to the data.

Once the model light curve is close to the actual data, we have to find the reduced chi-squared to see the accuracy of the model where a lower value means better accuracy. Using the formula $(\text{chi-squared}) / (\text{degrees of freedom})$, we're able to calculate the reduced chi-squared. In this project, we have already found the values of three points, so the degrees of freedom will be the total number of data points - 3. In the end, we found the reduced chi-squared of this model to be about 3.08, which seems reasonable based on how the final graph looks with the model over top of the actual data.

Our group consists of Ainsley, Maggie, and Lisa. We worked on our code and written reports separately. For the slideshow, Maggie definitely took the lead and did most of the work since Ainsley and I had issues with accessing the editing mode. Once it was figured out, I added a short explanation about the calculations for the reduced chi squared, and Ainsley added some information about flux and the transit method for background. We also did not use any kind of artificial intelligence in this project.