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motivation

When an exoplanet passes in between a star and the Earth, there is a dip in the star's light. By measuring this flux we can determine the planet's size and even atmosphere.

methods

assumptions + calculations

By using flux data and creating a model of the dip in brightness we can determine a planet's size. We do this by centering the graph on the middle of the dip and then adjusting for the percent of which the brightness dropped

```
def generate_transit_lightcurve(time_arr, t_0, tau, delta):
    flux_arr = np.zeros(np.shape(time_arr)) + 1.0
    time_start = t_0 -tau /2
    time_end = t_0 + tau /2
    ind = np.where((time_arr >= time_start) & (time_arr <= time_end))
    flux_arr[ind] = 1.0 - delta
    return flux_arr
```

The drop in brightness is related to the area ratio of the planet and the star. So, a planet 1/10th the size of the star would result in a 1/100th brightness drop.

results

The first star dropped by about 1/1000, so the planet should be about 1/100th the size. The second star dropped 1/100, so the planet should be about 1/10th the size.

conclusions

There are many methods to learn information about planets, and transit is good for determining size and even atmosphere. Using transit we can discover Earth-like planets to see if there is life anywhere else in the universe.

AI acknowledgement

No AI was used for this project.