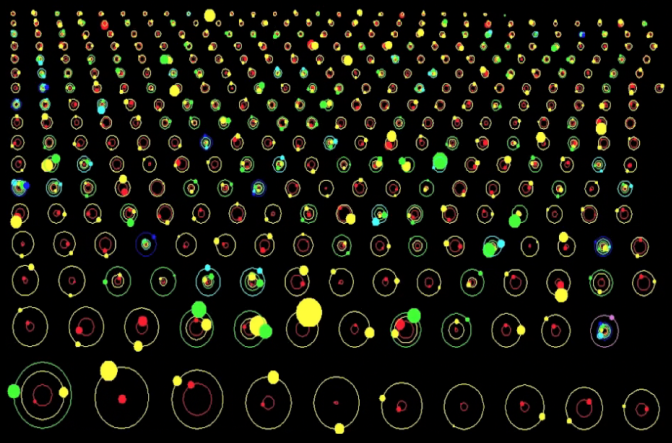
EXOPLANET SEARCH

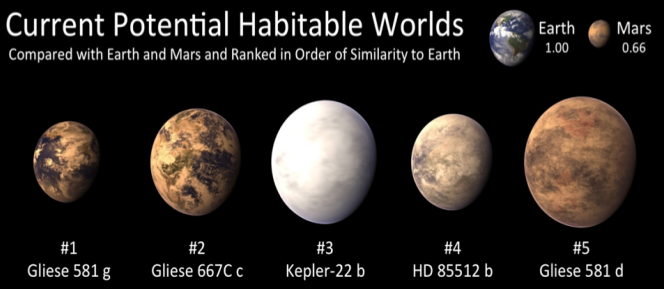
Using Radial Velocities and Spectral Shifts

under the guidance of Dr. Furesz (1) and Mrs. Odden (2) and using data from Sam Quinn(3)

(1) Harvard Smithsonian Institute for Astrophysics, (2) Phillips Academy, (3) Georgia State University



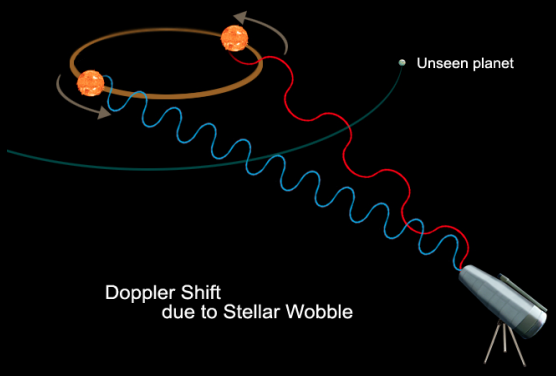
Exoplanets are planets that orbit stars other than the sun. There are estimated to be hundreds of billions of exoplanets, some potentially capable of carrying life, just in our galaxy. However, identifying these planets can present a challenge.



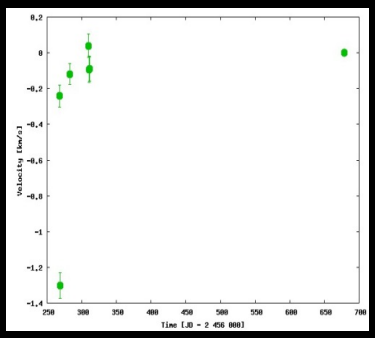
The Kepler Project , a NASA project in which a small portion of the sky was imaged by the Keck Observatory and a telescope in space, discovered over 700 new exoplanets of varying size and velocities. Researchers used data from the project to analyze brightness shifts and radial velocity to find these exoplanets.

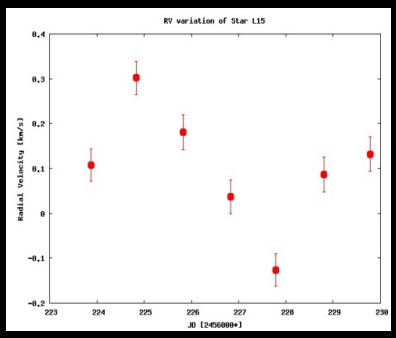
In our project, we use a similar method of analyzing radial velocity. Using Sam Quinn's data, we hope to emulate his discovery process and discover this variable star.

If a star has an exoplanet orbiting it, due to the pull of gravity, the star will "wobble," producing redshift and blueshift in its emitted light. The greater the mass of the exoplanet, the greater the shift in spectra. Using IRAF (Image Reduction and Facility) from the National Optical Astronomy Observatories, we analyzed the spectra shifts of 27 stars from the Hyades cluster to determine which stars could potentially have exoplanets. Specifically, we looked at the Julian dates, radial velocity, and standard deviation to determine the likeliest exoplanet hosts.



Although both of these plots have high standard deviations, only one is a potential exoplanet hosts. We also had to critically analyze each star to determine if it could feasibly describe a physical system. Star L15 is a much more likely candidate, despite having a lower standard deviation.





Currently, we have determined the two most likely candidates for an exoplanet. Our next step is to measure the radial velocity for other parts of the spectra and find the exact period of the exoplanet and create a more accurate plot.