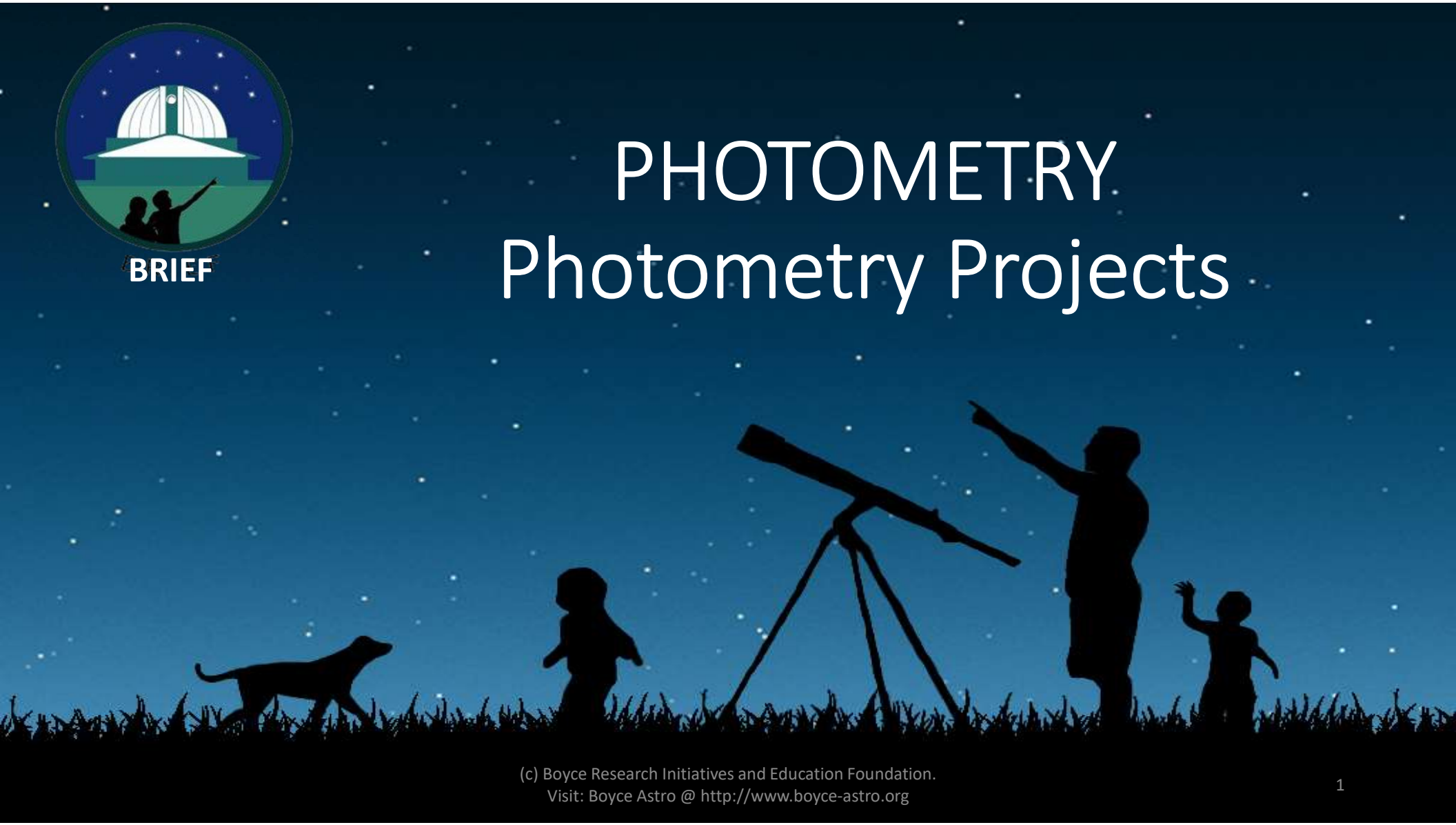
BRIEF

PHOTOMETRY
Photometry Projects



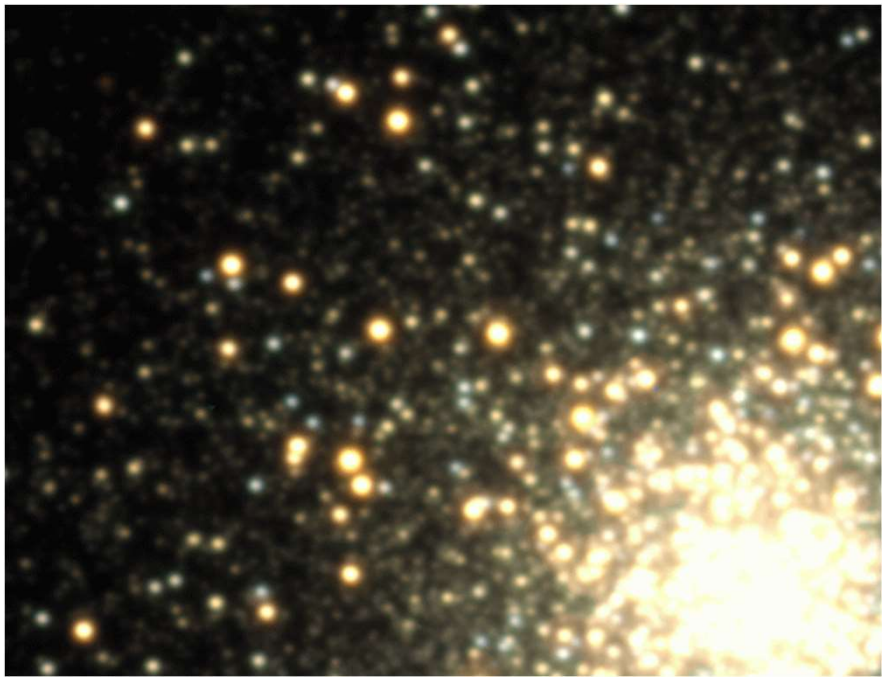
Overview

The following will outline a variety of projects that can be undertaken with Photometry.

This is not meant to be an exhaustive review, nor provide all the needed steps to perform each.

Instead, this is a guide as to how to approach each of these various topics.

This lesson is meant to be a summary, help you understand where Photometry fits into astronomical studies, and provide some background for your preparations.



Photometry Review

Photometry is the science of measuring light. In the context of astronomy, doing photometry means measuring how much light is reaching us from stars and galaxies.

This is accomplished through processes such as: Absolute/All-Sky, Differential, Aperture, PSF Fitting, and Differential Image Analysis.

Photometric data measures the total brightness or flux of an object that reaches your detector. How much reaches us depends on the amount of light received from an object that can be impacted by the intrinsic power emitted by the object (Luminosity), the distance of the object, and the observing conditions such as exposure time.

Through Photometry, light reveals some important information about the objects being observed: temperature information by measuring the colors of stars, distance and mass of stars studied in star clusters, structure and character information of stars by studying variable stars, and constraints on the models of stellar evolution by observing the energy output of stars at several wavelengths (the spectral energy distribution).

Photometry Projects

Photometry, using the same basic processes, provides many different fields of study.

Some of these are:

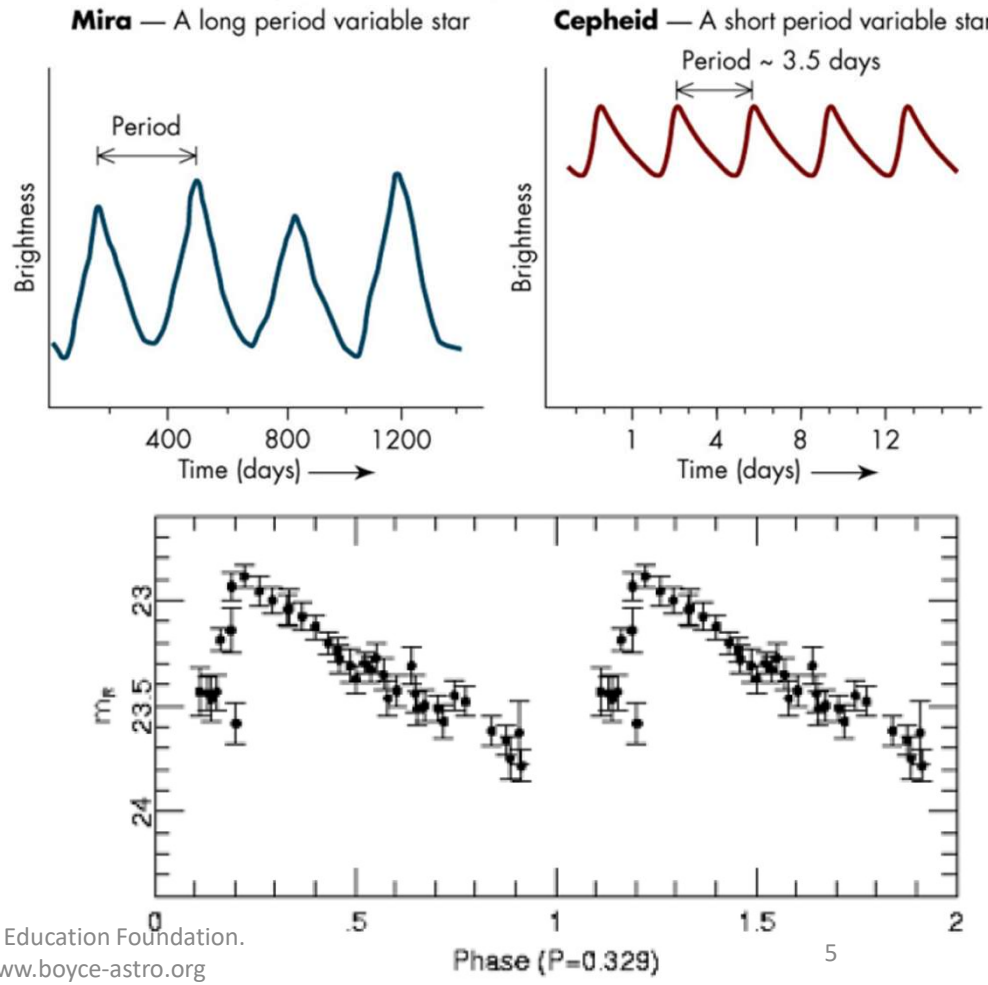
- Variable Stars
- Supernova Study
- Asteroids and Comets
- UBVRI
- Exoplanets

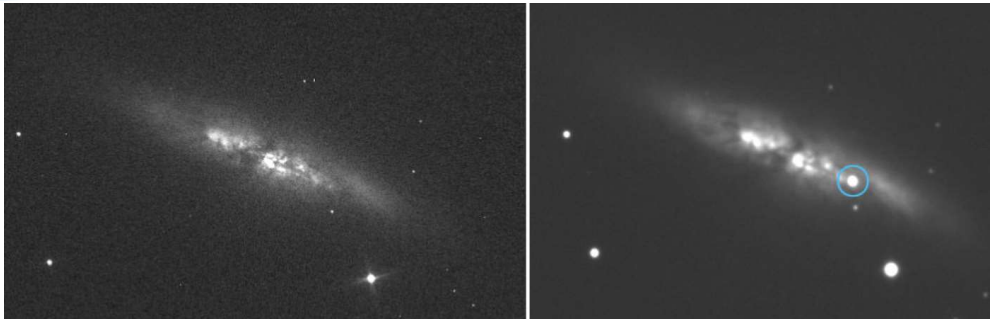
Variable Stars

Not all stars have a constant luminosity or flux.

Some change brightness over time. These are called Variable Stars.

There are several classes of variable stars. Some can given clues to astrophysical occurrences, distance, stellar formation, and stellar death.





Supernova

A supernova is a brilliant point of light indicating the explosion of a star that has reached the end of its life.

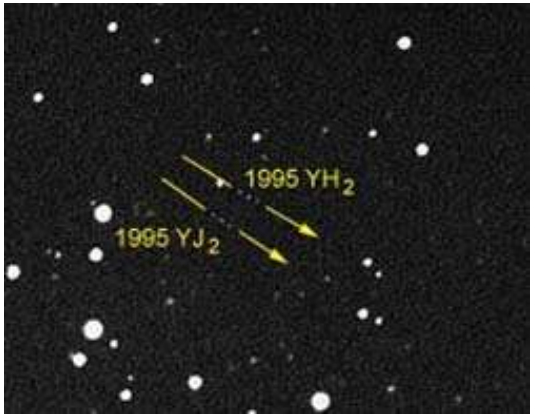
These explosions can briefly outshine entire galaxies and will radiate more energy than our sun will in its entire lifetime.

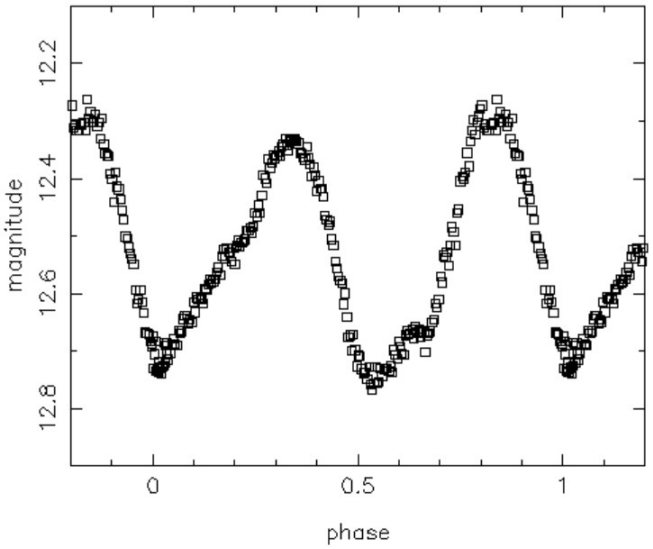
In their explosions, they are also the primary source of heavy elements in the universe as elements heavier than Iron are created in these explosions.

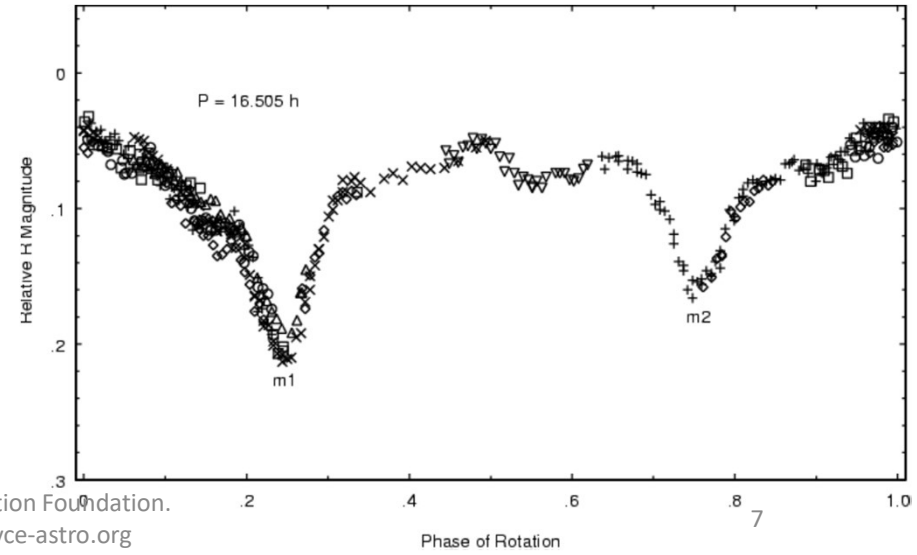
Asteroids and Comets

These objects can be discovered through noting movement through multiple images.

While stars stay fixed on an image, an Asteroid or Comet will move through subsequent images. You can locate such objects through flickering image and time lapse photography.





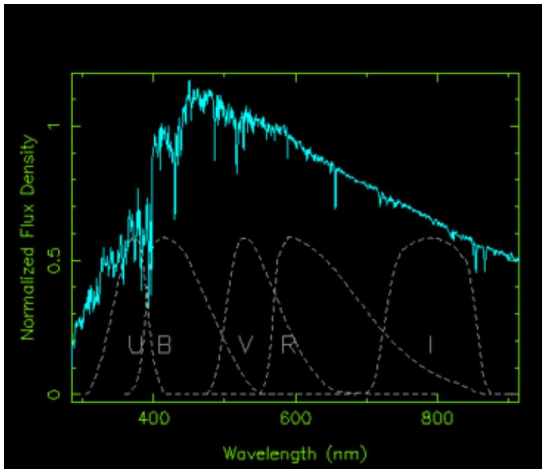


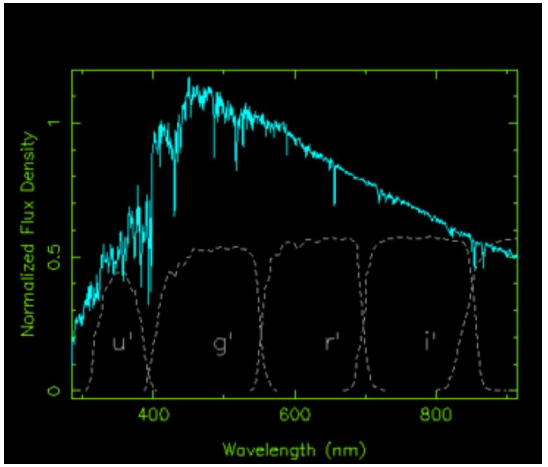
UBVRI Photometry

Through the use of filters you can obtain an instrumental magnitude from which to learn about the stellar properties of what you are imaging. For example, imaging through U, B, and V filters can provide clues as to the type of star you are observing.

Through this method you can also produce an HR (Hertzsprung Russell) diagram by plotting the apparent magnitude of your stars against color index such as B-V, which gives the temperature.

Converting the apparent magnitude into absolute magnitude, stellar distances can be determined.

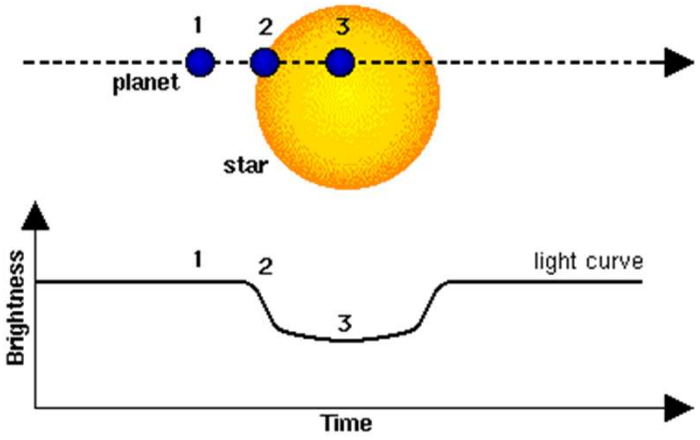


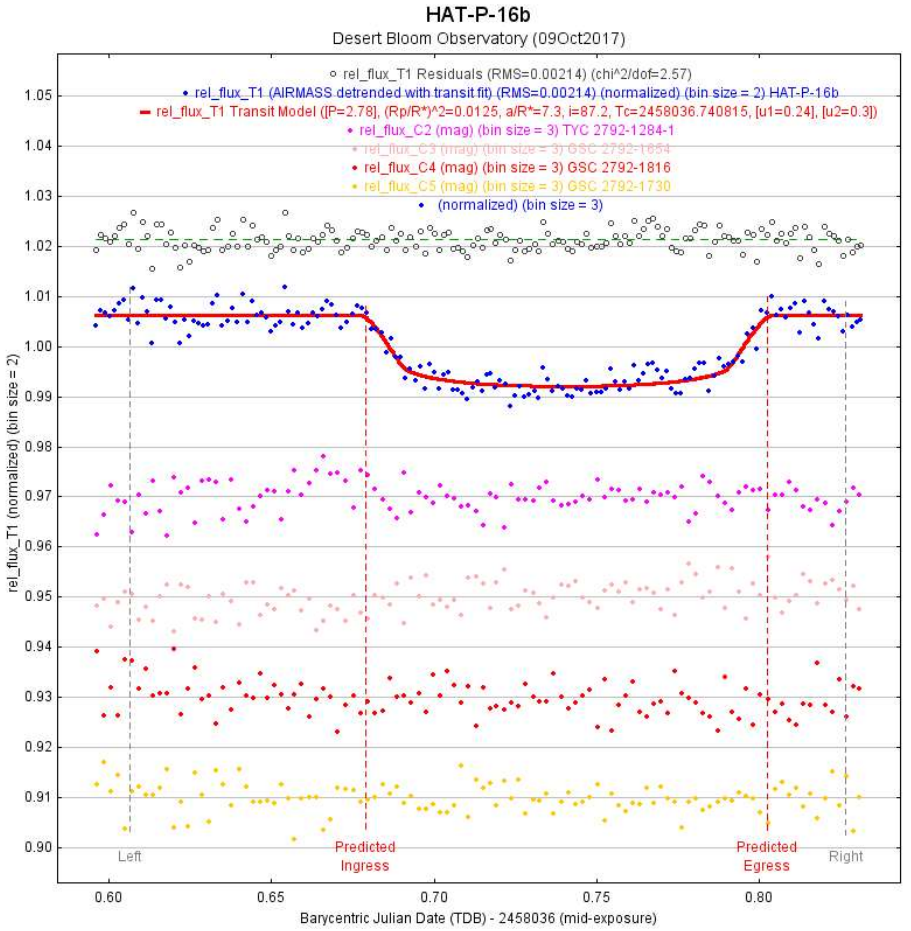


Exoplanets

Differential photometry can measure the change in Flux of a host star as an exoplanet orbits in front of, and behind, it.

This is a flux comparison and plotting when compared to other non-variable comparison stars.





Summary

These are some examples of projects that can be undertaken with Photometry.

The key to success with these projects lie in good planning, good instrumentation, and standard processes.

Questions?