# Lab #6

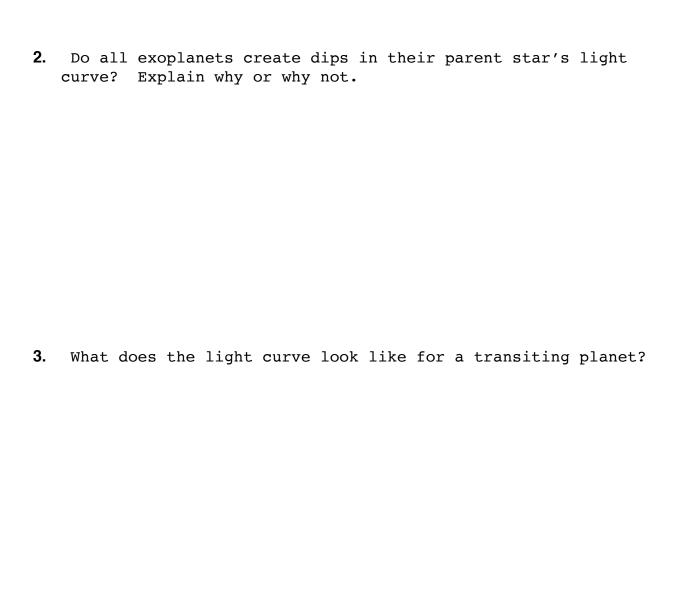# Citizen Science: Planet Hunting and the TESS Mission

## Introduction

In today's lab, we are doing another example of Citizen Science, studying an actual scientific database that you can analyze and therefore contribute to our overall body of knowledge about planetary systems.  To do this, we will use the website http://planethunters.org.

Visit that website and create an account for your group (if you established a username and password from the "Backyard Worlds" lab during lab 4, then that will work for this lab as well).  Once you are done with that, you will need to learn some introductory material to provide the context necessary to understand what you will be doing.

## Part 1

From the opening page, select "Learn More".  Read the short "Research" introduction and answer question 1.

1.  Explain in a few sentences the purpose of the TESS project. Specifically, explain what is it designed to observe, exactly, and how that leads to the discovery of planets.
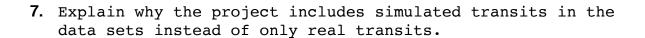
**2.** Do all exoplanets create dips in their parent star's light curve?  Explain why or why not.

**3.** What does the light curve look like for a transiting planet?

**4.** How do light curves compare for planets transiting brighter sun-like stars vs dimmer, cool red stars?

**5.** Explain how dips in the light curve due to star spots will differ from dips caused by transiting planets.

**6.** Watch the 4-minute video about TESS and answer:  Describe at least one major way in which the TESS mission differs from the Kepler mission, since both are observing transiting planets.

**7.** Explain why the project includes simulated transits in the data sets instead of only real transits.

**8.**  Now upon a new tab and google "Youtube Tabby's Star TED talk," then watch the 14-minute TED talk about this star, answering questions 9-12 below.

What were the two unusual features about the May 2009 transit detected in the light curve of the star KIC 8462852?

**9.**  What was different and unusual about the March 2011 transit compared to other normal planetary transits?

**10.**  One early hypothesis about the strange light curve is that the dips were caused by some huge cloud of dust, perhaps the result of a collision between planets.  What evidence contradicted this hypothesis?

**11.** Describe the "Alien Megastructures" hypothesis and how it would possibly explain the light curve we see.

**Part 3**

Now that you know how the website works, your group needs to analyze the data for at least 48 stars.  Split up the work so that each person in your group is in charge of classifying an equal number of stars.

For each star you analyze, it really helps to use the zoom feature to look closely for transits.  Ask your TA to observe your group as you analyze a star to make sure you are doing everything properly.

Once your group has analyzed 48 stars, you can look under the menu that has your account name as the title and select "My Stars" to see your totals.  You can then go back and see what you did for each star.  Show this to your TA so that he or she can verify in the space below that you completed this part with a signature, and your group is done!

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