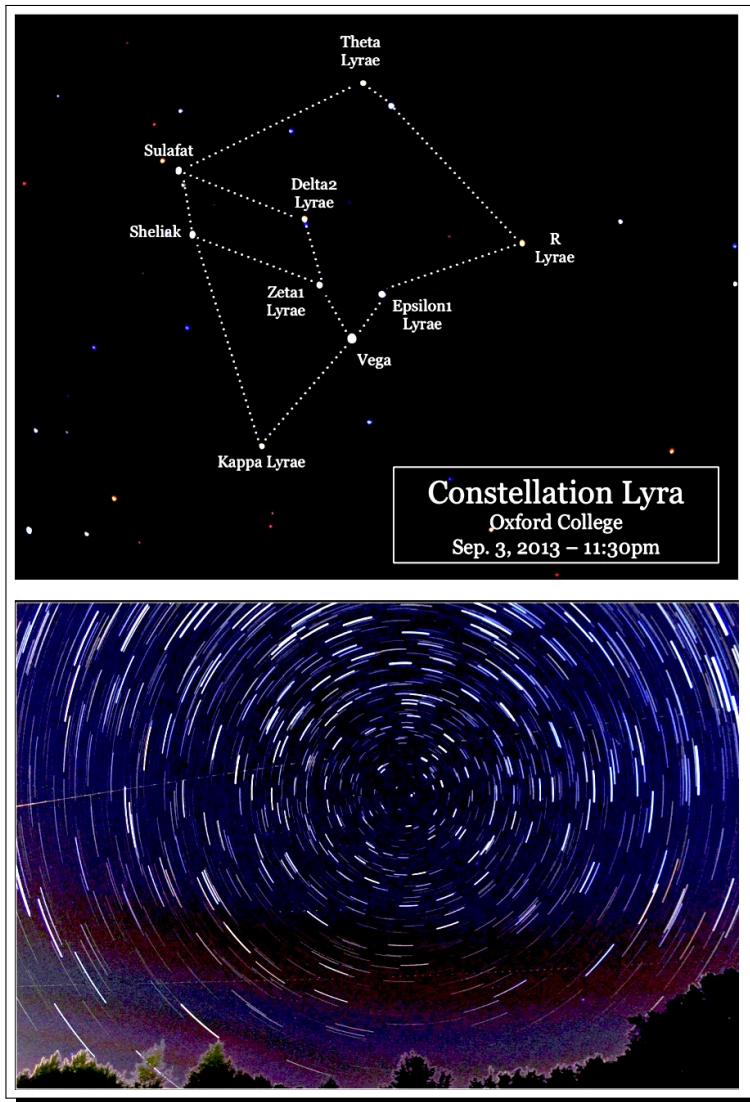


NAME: _____

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The Orion Constellation and Star Trails

In this observing lab, you will photograph the constellation of Orion and create a star trails image.



Procedures for Photographing the Orion Constellation

1. At Night: Photographing the Constellation Orion.

Dr. Segre will help you with setting up the camera and computer to do this, but there are several things to pay attention to. The most important is the **exposure time** of the camera. The exposure time is how long the camera is recording the image. In normal daytime photography, in sunlight for instance, typical camera exposure times are only about $1/100^{\text{th}}$ of a second. At night however, because there is so little light, the camera needs much longer exposure times to collect enough light to form an image. Typical exposure times for star photography are 15-30 seconds.

1. Look towards the SouthEast and locate the constellation Orion by eye. Look for Orion's belt, the three bright stars in a line located in the middle of the constellation. Dr. Segre can help with this, and you can also use the Voyager planetarium program.
2. Once you've found Orion, point the camera in its direction and take a series of test photographs with a 5 second exposure while you move the camera around until you are sure that the whole constellation is in the field of view of the camera. Finally, increase the exposure time to 10-20 seconds and take a single bright image of the Orion. You should be able to see in the photograph most, if not all, of the stars that make up the constellation.
3. To make a star trail image of the Orion constellation, you will need to take consecutive photos of Orion over a 10-15 minute period. For example, if you find that you get a good single image with an exposure time of 20 seconds, then take 36 consecutive images, one after another, for 12 minutes total. This process can be done automatically using the intervalometer device that plugs into the camera. Later on, back in the lab, you will take those 36 images and create a star trail image using StarStax.

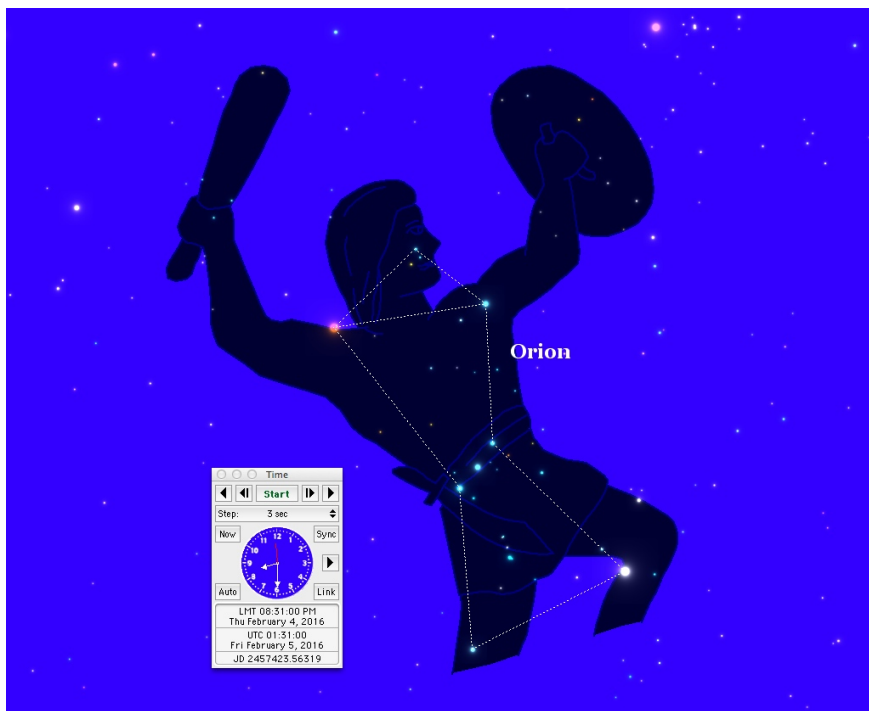


Photo Analysis Back in the Lab

To complete this observational lab, you will need to do two things:

1. Create an image of the constellation Orion with the names and temperatures of all of the stars labeled.
2. Create a star trails image of Orion.

You will first need to get all of the photos that you took. To do that, go to **www.philsegre.com**. Choose **Intro. to Astronomy-ASTR116 → ASTR116 Spring 2016**. Near the top of the page, click on the **Thursday Feb. 4, 2016** link and **Download** your photos for your group into a new folder onto your computer.

Photograph of Orion

Choose any one of your photos of Orion. **The goal is to make an image of Orion like the cover image of Lyra (but with the star temperatures listed also)**. To do this you will need to be able to write text and draw lines on the jpg's, and this can be easily done in Powerpoint. To do this, you should download and use the Powerpoint template, called **Powerpoint-Landscape-Template.pptx**, from the class webpage.

1. Begin by opening **Powerpoint-Landscape-Template.pptx**. Drag any one of your Orion images onto one of the pages and rescale the image to fill almost the entire page. To increase the brightness of the image, **right click on the image** then choose **Format Picture**, then try increasing the **Brightness** and the **Contrast** to improve the quality of the star images.
 - (a) To properly label the stars in your photo, open the Voyager program, set the time to the exact time the photo was taken, and scroll over to Orion. By comparing side by side your photo and the image in Voyager, you should be able to identify the names of the stars in Orion. To find the temperature of the stars, on the popup Info panel, click on the Physical tab. You will see listed the Temperature of that star.
 - (b) Draw the outline of the constellation with white lines connecting between the constellation stars (like the one shown on the cover image for Lyra). Make sure that the lines that you draw do not cover over the stars, the stars should always be visible!
 - (c) Write, using a textbox, the names and temperatures of as many stars in Orion as you can.
 - (d) If there are other bright stars not in Orion, label them in the same way also.
 - (e) Put your name, date, and constellation name on the slide.

Star Trail Image of Orion

To make a star trail image from your collection of sequential photos, use the software program **StarStax**.

1. Begin by opening **StarStax**. Choose **File** ⇒ **Open Images** and select all of your Orion images. You should now see them all listed on the left panel of the program.
2. Click on the top purple icon on the upper right of the program, this brings up the analysis panel.
3. Look on the panel on the right, make sure that the **Blending Mode** is set to **Lighten**. This is the option to make a star trail image.
4. Click on **Edit** ⇒ **Start Processing**. You should now see the star trails image on the screen.
5. Click on **File** ⇒ **Save As** to save your image.
6. Now, drag your star trail image onto another powerpoint slide, and resize the image to fit.
7. To increase the brightness of the image, **right click on the image** then choose **Format Picture**, then you can increase the **Brightness** and **Contrast** to whatever you think improves the image quality.
8. Put your name, date, and title on the slide.

→ **When you are done making the two powerpoint slides, you need to rename the powerpoint file with your name and email it to Dr. Segrè.**

Star Colors, Distances, and Temperatures

You might have noticed that the stars, and the stars trails, display a variety of colors. We will talk about this much more when we talk about stars later in the semester but for now, you can examine whether there is any correlation between the colors of stars and their temperatures.

1. Examine the brightest stars on your photo, and fill in the table below after obtaining the corresponding star Temperature and Distance from the Voyager program.

Orion Constellation

Star Name	Color on Photo	Temperature	Distance

2. Looking at the table, is there any relation between the temperature of a star and its visual color?

3. Are all of the stars at the same distance from Earth, in other words are all the stars really close to each other or do they just appear that way to us?