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Launch to the Milky Way – What is SkyServer?

Don't forget to record data and observations as you work through this activity. All of the questions and reminders from the activity are listed in order below.

1. What is a database? What kind of information is stored in the SDSS database?
   A database is a table of measurements that can be searched and organized in different ways. The SDSS contains dozens of different measurements for over 900 million objects in the sky.

2. How do astronomers define a constellation? What constellations are you familiar with? Can you describe how much of the sky a constellation occupies?
   A constellation is a group of stars that have been given a name. I'm familiar with the Sagittarius, Taurus, and Orion constellations. A constellation can cover a varying amount of the sky; there is not a set area it should cover.

3. Predict how you think Regulus will look in the SkyServer Navigate tool.
   I think Regulus will be very bright.

4. Difference – I can't see the constellation! After following the instructions in this section, describe the differences between the field of view your eyes have when looking up at a constellation versus the field of view of the SDSS telescope.

   The FOV with the SDSS telescope is much narrower than it would be with your eyes.

5. What happens to the apparent field of view when you zoom in or out in Navigate?

   The FOV increases when you zoom out and decreases when you zoom in.

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6. Difference – The stars are a lot brighter! The SDSS telescope is engineered to maximize its ability to gather the light of faint objects. In doing so, the design of the telescope and instruments sacrifice the ability to study bright objects.
    a. Describe the results of these engineering design choices on the images your see in Navigate.

       Since the SDSS is designed to collect a lot of light even from the faintest objects, it will be unable to see really bright objects as they will just become blinding. The extra light makes them appear bigger than they really are.

    b. Every design decision involves a trade-off of some kind. What are the trade-offs for design choices for the SDSS telescope/camera system? Describe one.

       The SDSS was designed to collect a lot of light, so for already bright objects, SDSS will not do a good job at taking an image because it will be overloaded with light.

    c. What steps do you think SDSS scientists and programmers have to take to deal with the trade-off you described above?

       Scientists and programmers may use a machine learning algorithm to process the image and make it less bright.

7. Difference – Regulus looks a lot bigger! Why does Regulus appear to be a large circle in Navigate?

   Regulus appears to be a large circle because the image overflows due to the long exposure time. Therefore, the object appears to be larger than it is.

8. What is a CCD designed to do?

   A CCD is designed to be the recording surface of a camera using freed electrons to count the pixels in the image.

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9. Create a list of design features of the SDSS camera and their consequences.

Feature	Result
Camera has 30 CCDs	Large surface area for collecting light
Collecting light for 54 seconds	Can capture distant objects but also overflows other bright objects
Large number of pixels	Zoom in and still have a high quality image
Different filters	Colored images
Combine different colors	Colored images

10. SkyServer allows you to find objects visually in the SDSS database. All of the information connected with each object you see remains available. From Navigate, where can you go to view information about an object? You don't need to understand all of the pieces of information at this point; just list their locations below.

From the navigate tool, you can look at RA, dec, and other types of information in the upper right corner.

11. Create a collection of objects in your NoteBook. Try uploading your collection to image list. Do a screen capture of your results and place them

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below, or describe two ways you can
access more information about your objects from the NoteBook.

obj list page 1

1237648720693755918 J115845.4-002715.4	1237648720693755949 J115852.34-002724.1	1237648720693756154 J115851.16-002903.1	1237648721230496029 J115800.57-001221.2	1237648721230561335 J115822.96-001213.6