SIERRA COLLEGE OBSERVATIONAL ASTRONOMY
LABORATORY EXERCISE

NUMBER **II.E.**	TITLE: MaxIm DL Image processing	
DATE- DAY- LOCATION	PRINT NAME/S AND INITIAL BELOW:	GROUP ☐

OBJECTIVE:

- To understand the basics of MaxIm DL.
- To combine several images to make another image which can reveal a fainter object
- To combine images take with three color filters to make a color image.
- To make a blink movie to spot a moving object.
- To process the image in MaxIm DL (and perhaps in CCDSoft and Registax).

DESCRIPTION:

MaxIm DL has several uses including running a CCD camera on a telescope and a descent assortment of tool to post-process images. We will be exploring latter use of MaxIm DL by opening and processing several images taken either from an ordinary digital camera or the CCD camera from the NCC Robotic Observatory. These include enhancing contrast, aligning and combining images, and color combining images. **Answer all questions posed in this lab in the Blue Book.**

PROCEDURE:

1. Open up MaxIm DL. Open the C:\Maxim Images directory (or one specified by the instructor). There you will find several images taken with the Nevada County Campus (NCC) robotic telescope. Go to the directory labeled M51. Your instructor will show how to open and display and orient the picture, as well as using the Screen Stretch to enhance brightness and contrast. Your instructor will also show you the techniques of <u>combining</u> and <u>color combining</u> (including color weighting) and how to obtain information about each picture by examining the image's "header."

2. Close all images and explore the other directories. Remember to keep the Screen Stretch window up as it can be handy to quickly enhance your image. Answer all questions in the Blue Book:

    a. Combine at least 5 Luminance (Clear Filter) images of M57 (m57-00*L). With the combined image, enhance the contrast by using the Screen Stretch. It is probably best to also reverse the contrast (as demonstrated in Step 1), so that the stars are black against a grey background. Now look for a small object that appears to have two little wispy tails coming out it. Use TheSky to identify the name of this object. **Record the name in your BlueBook.** Close all of these images when you are done.

    b. Now make a color image of one of the M57 sets of images (note the capital M here). Start with just one set (e.g. M57D-001L, M57D-001R, M57D-001G, M57D-001B). Notice that the blue images tend to be worse than the others. The blue color can be weighted more when the images are actually combined as discussed by the instructor in Step 1. You should close all the images when you are done. Record in your Blue Book the value for the blue weight you preferred.

    c. Repeat the procedure in Step b with at least two of the three objects M16, M27, and M33. Show the instructor each completed image.

    d. Now explore the Pluto folder. Open the luminance Pluto images called Pluto-007L and Pluto2A-001L. These were taken on different dates. Use View>Animate to show the motion of Pluto. When the Select File dialogue box is up, select all images and make sure to Align the images first. (Your instructor may request you to reverse the contrast on the two images.) Once that is done, select OK on the Select File dialogue box and the Blinking dialog box appears. The rate should be set to 0.5 sec. After pressing the play button, Pluto should blink from middle of the image to one side of the image. **How many arcminutes did Pluto move between the photos? (Hint: each pixel is about one arcsec, use the coordinates display at the bottom of the MaxImDL window**.)

e. Now go to the Eris folder. To see Eris clearly, we will have to Combine images which are on the same day. There are 20 on one day (ErisB) and 20 on another (ErisC). Combine each set of 20 images using auto-star matching. Reverse the contrast on each of the combined images to see Eris the clearest and adjust the contrast until the grey background becomes somewhat grainy. Then Blink-Animate the combined image (you'll need to Align the images with auto-star matching first before blinking). Locate Eris, which should be somewhere near the middle of the image. Don't be fooled by specks which appear in one image and are nowhere to found in the other image. **How far in arcminutes did Eris move? (Hint: each pixel is about one arcsec large. Use the coordinates display at the bottom of the MaxImDL window.)**

f. Now go to the Moon Folder. Combine 10 of the Moon images with the manual two-star method. Show the instructor the Master Moon image, displayed using the "Moon stretch".

g. Now go to the Saturn and Moon Folder and go to the Saturn subfolder. Combine ten of the images using the manual two-star alignment method. Show the instructor the Master Saturn image, displayed using "Planet Stretch"

h. Go to the M11 folder. Use the method used in step 2b to combine one L, R, G, and B image into a single color image. (Use Color>Color Combine, select the LRGB option, align via the manual 2-star matching method. Use the blue weight you determined in step 2b.) Examine your image, noting that some stars are especially red, while others are yellow or even blue. **Show the instructor the color image.**

i. Construct an M11 combined image using the images in the M11 folder. First, combine (using auto-star matching) five images within each L, R, G, B band to create master images in each band. Then, use Color Combine (using manual two-star align) to combine the four L, R, G, B master images into a single M11 output image.

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