

Objectives:

There are a number of objectives for this observing session.

- (a) To become familiar with a CCD camera and its use.
- (b) To be able to focus a CCD camera.
- (c) To learn how to calibrate a CCD autoguider.
- (d) To obtain a number of images of two deep-sky objects.
- (e) To gain practice with using a telescope under computer control.

Introduction:

Before heading up to the observatory, re-read the instructions for using the telescopes that you were given at the start of the course, and the instructions you were given on the use of the CCD cameras. On arrival at the observatory, begin the start-up procedures as described in the instructions and ready the telescopes for observations. While the telescope is booting up, plug in the power supply for the CCD camera and make sure it is switched on. Then open CCDSoft and establish a connection between the computer and the CCD. Once the camera is connected, click on “**Temperature**” and set the temperature to about 30°C below the current air temperature. If you do not know what the temperature is, then set the temperature for -20°C. Make sure the “**Fan on**” box is checked. Then go to the “**AutoSave**” menu and create and set the folder where you will save your images. By now, the telescope should have finished booting up and you can complete the telescope start-up. **But DO NOT synchronise the telescope nor connect it to the computer yet!!**

Once the CCD has reached operating temperature, take 10 flat-field images by manually slewing the telescope towards the bright sky in the west. Your exposures should be long enough to reach a count of around 15,000 – 35,000 in the centre of the image, but short enough to avoid imaging any stars. If there is a bright star in the image, you should slew the telescope to a different region and retake the image. Following these images, take 5 dark frames of the same exposure time. Then take 5 dark frames with an exposure time the same as you plan to use for your images. **Don’t forget to check the “AutoSave” button!**

Once you have finished the dark frames, you can complete synchronisation of the telescope by centring it on a bright star, and connecting the telescope to the computer. Once this is done, slew the telescope to your first object and take a test image. **Don’t forget to switch from “Dark Frame” to “Light”!** Most likely, the image of the star will look like a large do-nut since the CCD has a different focus position than your eye. So it is necessary to focus the CCD. To do this, use “The Sky” to find a nearby

star that is moderately bright, around magnitude 8 – 10 should be fine. Then focus the telescope using the method outlined in your “**2401Imaging instructions**” handout that you were given earlier. Once you have the telescope focused, centre on your object using the control panel on “The Sky”.

Now, following the procedure outlined in your “**2401Imaging instructions**” handout, start taking images of your object. Depending on the time remaining, take either 10 or 15, 3-minute images. **Don’t forget to check the “AutoSave” button!** Once you have taken these images find another object to image (ask your instructor if you need hints), or continue taking images of your main target especially if it is faint. Continue to images until it is time for the lab to end. While you are shutting down the telescope you can **transfer your images** to your memory stick.

Preston Gott Observatory CCD Observing Log

Name(s):

Date:

Weather:

Telescope:

Instrument:

Image #	Date	Time (UT)	Filter	Exposure Time	Target	Filename	Notes

(Cut out and paste in Observing Notebook)