

Operating the Schommer Observatory Direct CCD System

Fall 2004

Logging in:

Log onto the computer in the dome as user ph344 with password orion. This computer is called Hipparchus. It has the CCD interface card in it and talks to the telescope through its serial port.

Storing data: We will store all data (images) on Hipparchus in a folder “ph629data” using the following convention for subdirectories. If the observation takes place on month *mm* and day *dd*, then the observer creates a subdirectory *mmddyourinitials* and stores their data there.

When you are ready to analyze your images, copy them to your home directory. Do not delete images from Hipparchus. I will do this when the course is over.

Turning on the CCD power and the thermoelectric cooler: These are controlled by the two rocker switches on the gray box mounted next to the telescope. The switch nearer to the telescope tube is the power to the thermoelectric cooler. The other switch is the power to the CCD. Turn on both switches. The LCD display gives the temperature of the CCD in Kelvins. Note that the temperature display is powered by the CCD power. If you don't hear the fan come on when the switches are turned on, try tapping the side of the gray box.

Setting up the telescope for Direct CCD Imaging:

- If the telescope has been used for visual imaging, you will have to rotate the mirror in the instrument to illuminate the CCD. Point the telescope to the zenith, remove the two screws near the center tube that secure the mirror, rotate the knob to the “instrument” position, and reinstall the two screws.
- Select the desired filter by rotating the knob on the filter wheel. Note that the detents for each filter position are subtle – make sure the filter is fully in its intended position. The filter positions are: 1) B, 2) V, 3) R, 4) I, and 5) clear.
- Select the desired zoom factor by sliding the release lever under the zoom dial and rotating the zoom knob. Position 82 gives the minimum zoom (largest field) and position 347 gives the maximum zoom (smallest field). Relock the release lever when you have selected the desired zoom.
- The best telescope focus for the CCD camera is in the vicinity of +8.5 mm. The fiber viewer can also be useful for getting an approximate focus, in the “view” position, but make sure that it is in the “observe” position before you take any images.
- Cover both the periscope eyepiece and the visual eyepiece to prevent light leaks in the system.

The CCD control window:

Run the CCD control program by double-clicking the “Direct CCD” icon on the desktop.

- The dialog boxes near the top of the control program window allow you to set up the path and root filename for saving the images that you take; you may either enter values directly in the Filename and Path boxes or select the path via the Browse button which brings up a file list viewer.
- To take images without saving them to disk, uncheck the save image box. This can be useful when you are setting up and want to take some test images. Remember to recheck this box to save your real images. (Actually, the latest image is always stored as C:\Images\current.fit.)
- The items near the center of the frame allow you to specify the type of exposure (zero, dark, flat, or object), the CCD gain (high or low), and the exposure time (fractional seconds are allowed). There is also a box to enter the filter (B, V, R, or I), but the actual filter selection is done manually.
- The items near the bottom of the frame specify information that will go into the image header: object name, names of the observers, camera zoom setting, the telescope focus number, and the CCD temperature.
- Once you have selected all of the settings for an image, click the “Single Exposure” button to take one image. The “Multiple” button allows you to take a sequence of identical exposures. After an image is taken, it is written into a file named “current.fit” in the C:\Images directory on Hipparchus. If the Save Image box is checked, it will also be written to the specified path. The filename of the saved image will be the image root name (default “image”) with a sequence number (001, etc) and the extension “.fit”. The sequence number will automatically increment with each successive exposure.
- After the image is read out, it may be viewed with the ATV fits viewer. If ATV is not running, start IDL and type ATV at the prompt in the bottom of the IDL window. To view the most recently obtained image (saved or not) open the current.fit image in the C:\Images folder.
- The Exit button quits the CCD Control program.

The ATV image display window:

Images are stored on the PC disks in FITS format. Load images using the “read fits” entry under the files menu (upper left). In the color “mouse mode”, dragging the left mouse button left-right changes the brightness and dragging it up-down changes the contrast (note the effect on the image and on the color bar at the bottom of the image). Clicking the right mouse button centers the image on the location of the cursor. There are many other features of ATV. See the description given by the help menu item.