# TAKING AN IMAGE

Equipped with an articulated camera, the Goodman spectrograph can image objects using a circular field of view with a diameter of seven arcminutes. Instructions for imaging targets follow:
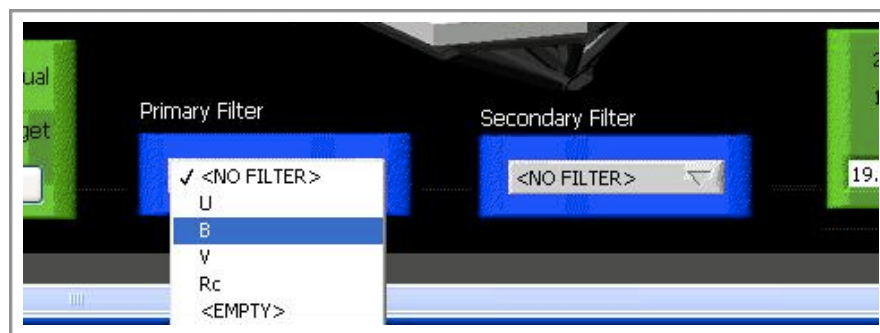
1. Set camera and grating to imaging mode

In the *Wavelength Angles* subpanel, select *Imaging* from the drop-down menu, and wait for the indicator light to turn green.
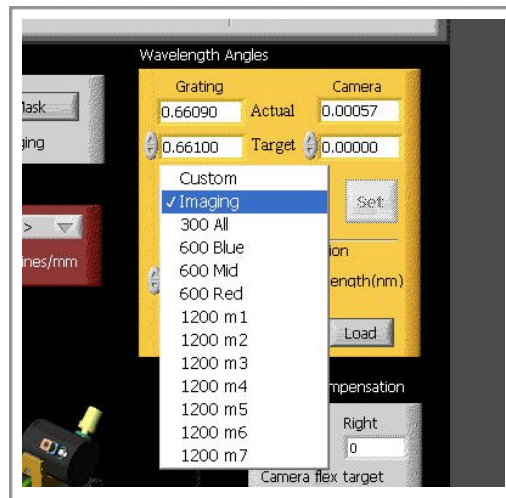
2. Choose filter(s)

In the *Primary Filter* subpanel, select the filter of your choice from the drop-down menu, and wait for the indicator light to turn green. Do the same in the the *Secondary Filter* subpanel.

3. Remove unwanted obstructions

In the *Grating* subpanel (red), select ***<NO GRATING>***, and wait for the *Grating* indicator light to turn green.


In the *Mask* subpanel (light blue), select ***<NO MASK>***, and wait for the *Slit* indicator to turn green. Alternatively, if a slit is already in place, one may also press the *Withdraw Mask* button to move the slit out of the imaging field, revealing a 3' x 5' imaging rectangle.
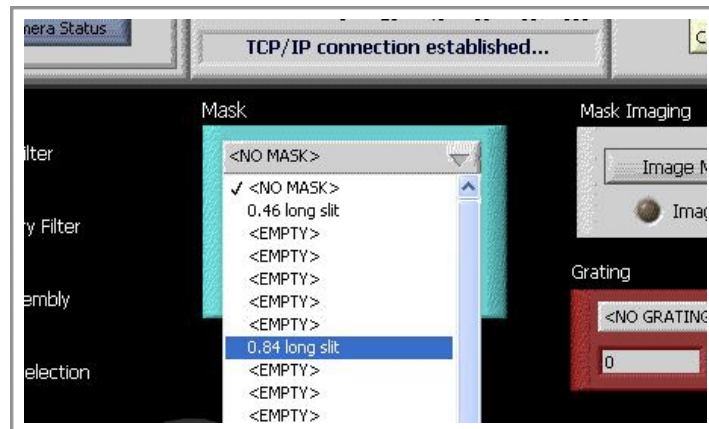

4. Set focus values

In the *Camera Focus* and *Collimator Focus* subpanels (green, bottom-left and bottom-right), enter the desired focus values in the input box and press the **Set** buttons.

TIP: If you don't know where to start, try:
Collimator Focus = +1000
Camera Focus = +300
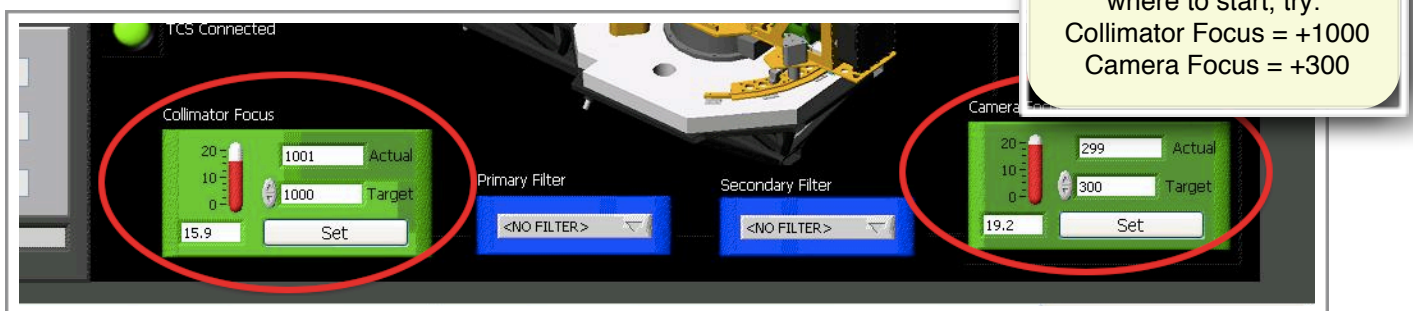
5. Set CCD region of interest (ROI)

In the *Camera Control Panel*, select one of the pre-defined imaging modes from the **CCD ROI Mode** drop-down menu (*Imaging 1x1*, *Imaging 2x2*, etc.)   If you do not wish to take an exposure of the entire 7x7' imaging field, you may define a custom ROI by selecting *Set user-defined ROI*.
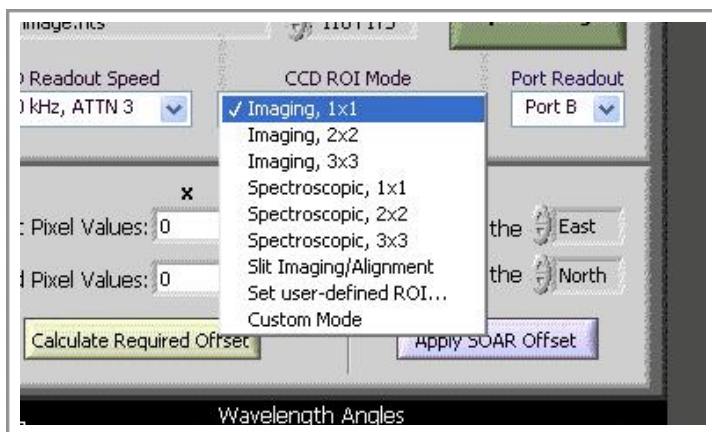
6. Set readout speed (affects gain & readnoise values)

In the *Camera Control Panel*, select one of the readout modes from the **CCD Readout Speed** drop-down menu. Refer to the document on readout modes to see the Gain (e-/ADU) and Read Noise (e-) associated with each of these modes.
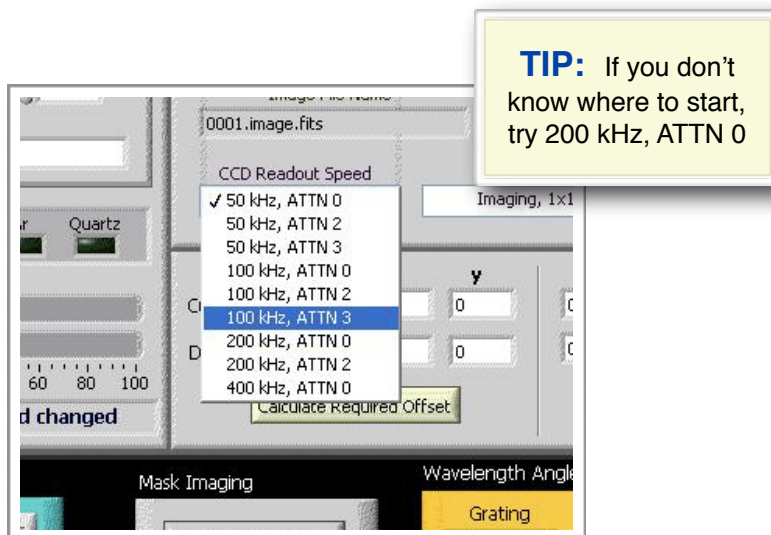
## 7. Edit FITS header information, filename, and # of exposures

On the *Camera Control Panel*, select the tab corresponding to the type of exposure you will take (Object, Flat, Comp, etc.), and add a name and comments, if desired. The text entered here will be added to the FITS header of the image you are about to take. Also enter the number of exposures you would like to take in the tab.
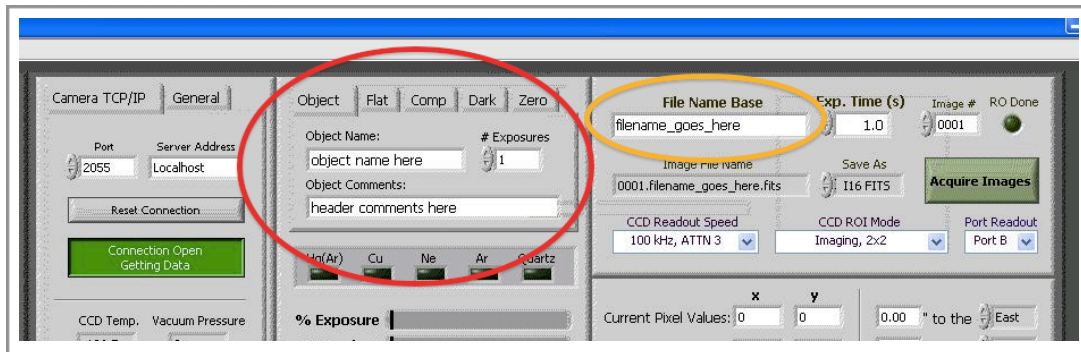
In the text box labelled *File Name Base*, enter the filename you would like for the image. Note that the software will add a number to the front of what is typed here and the ".fits" extension to the end.
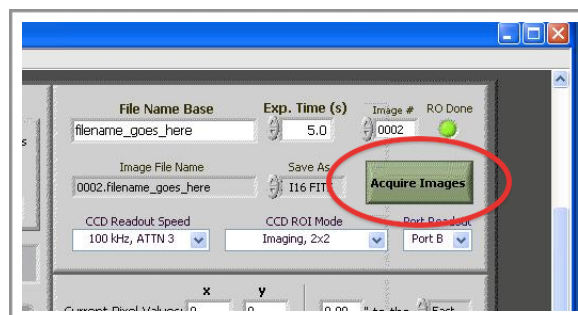
8. Enter an exposure time

On the *Camera Control Panel*, enter a value for the integration time in seconds.
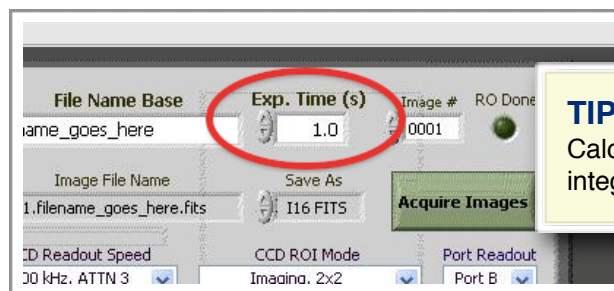
TIP: Refer to the Exposure Time Calculator for tips on choosing an integration time.

9. Take an exposure

Press the green *Acquire Images* button the *Camera Control Panel*.

The *% Exposure* progress bar will immediately begin updating to reflect the progress made on the exposure. Once the integration has stopped, the *% Readout* bar will update to reflect how much of the CCD has been read out at any moment. Once both bars reach 100%, the exposure is complete, and the *RO Done* indicator light in the upper-right hand corner will light up. If more than one exposure was entered, the above process will repeat automatically until all exposures are completed. In this case, the status bar (bottom center of *Camera Control Panel*) updates the user on how many exposures have been taken in the series.

Tips & Suggestions

- for tips on binning, see SETTING THE BINNING

- for help with choosing an ROI, see SETTING THE REGION OF INTEREST (ROI)

- refer to the Exposure Time Calculator for recommended integration times

- if you plan on going back-and-forth several times between imaging and spectroscopic modes on the same field try the following:

  a) with the desired slit already loaded, image the field by pressing the **Withdraw Mask** button on the *Mask Assembly* subpanel. This will reveal a 3'x5' field instead of the full imaging field but will save time compared to unloading the slit into the carousel over and over again.

  b) use the **Image Slit** button to quickly go from spectroscopic to imaging mode. Pressing the button will withdraw the grating and move the camera to an imaging position. Pressing the button again will return the system to the previously-used spectroscopic mode