

# Calibration Frames

## Biases and Darks

You will also need to download calibration files including biases, darks and flat field images. In your confirmation letter we shared the locations of the our Google Drive folders for this data. More importantly there is also a link to the directory under the Imagery Data menu pull down menu in your WBI. Figure 18 shows a part of this screen for the Master Biases and Darks:

The calibration Biases and Darks come in two different formats. Unless you are using PixInsight to process your images, download the files that end in ".fit" It is important to understand that the master dark frame we are giving you is a long exposure (1800 seconds). This means you will have to use dark frame scaling when you process your images in your favorite program. If you prefer to match your data exposures and dark frame times you are welcome to take your own dark frames; but this uses up valuable observing time! Just select the "Cal FramesI (Dark/Bias)" (Fig 19) under the Live Observing pull down menu. It may be an appropriate option if you are doing unguided imagery and your exposures are short. Taking a little time to acquire these short exposure darks is OK. If your exposures are less than 1 minute in time- you need only subtract the bias images from your data. There is no significant dark current in this short time period. Remember for biases and darks you need to match the temperature and binning to your data. Our file naming convention has this information. "1x1" or "2x2" is the binning state and the last number ("-35") is the temperature.

## Flat Field Frames

The Schulman Telescope is equipped with an instrument rotator. This gives you the flexibility to frame images as you would like them and to find guide stars for long exposures. However you also need to use flats that characterize how the chip is being illuminated and the orientation (PA, position angle) matters. Under the Imagery Data menu you will find a link for Flat Fields. Like Dark Frames and Biases above there is also a link to our public Google Drive folder for these files. First you will see folders that are labeled with dates. After your night of observing you will choose the folder that is the data for the morning following your observing session. Then you will be presented with four folders which represent four camera orientations (0, 90, 180, and 270 degrees). See Figure 20. Choose the folder that is closest to the PA of your target field. If for example your PA is 45 degrees, selecting either flats in the "0" folder or the "90" folder is OK.

There will be many files to download that you will use to create master flats from. These files are not binned (1x1 state). Many image processing programs will bin the flats on the fly before applying them to your data. Alternatively, you can simply bin the images if necessary on your end before using them.

Although downloading these calibration data is an extra step; most remote observing programs do not attempt to make available this quality of calibration data that closely characterize data you acquire. The results are better processed data that will result in better images.

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