

How to use the Ortega Telescope for photometry

Preparing for Telescope Operation

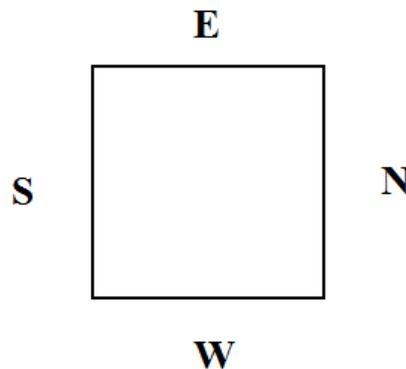
- 1) Things to do before you can use the telescope
 - a) Make sure that the step ladder and any other objects are away from the telescope
 - b) Make sure that all of the PCs are on
 - c) Check the weather and make sure there are no showers in the area
 - d) On the telescope control panel, turn the *MTR Driver Chassis* switch to *on*
 - e) Push the *Halt Motors* button to unhalt the motors
 - f) Turn the *Mirror Doors* switch to *open*
- 2) Opening the dome
 - a) Open *DFM* and let it initialize, if it is not already open
 - b) Under *Telescope*, click *Misc*
 - c) Click *Dome Shutter* tab
 - d) When opening the dome, always open the upper shutter first. Click *Upper Shutter Open*.
The upper shutter takes a few minutes to open completely
 - e) When the upper shutter has opened, click *Lower Shutter Open*
**When the dome shutters open or close, oil may fall from the shutters onto the telescope, so ALWAYS open the shutters before opening the mirror doors*
- 3) Opening the mirror doors
 - a) In the *Misc* window, click the *Switch* tab
 - b) Change the dome status to *On* and click *Apply*
 - c) Click *Open Mirror Doors*

Finding and Tracking an Object

- 1) Turning tracking on and changing tracking rates
 - a) In the *Misc* window, change the dome status from *Home* to *Track* and click *Apply*
 - b) Under *Telescope*, click *Rates*
 - c) Change *RA Rate* to *15.01* and click *Apply*
- 2) Slewing the telescope
 - a) Under *Telescope*, click *Movement*
 - b) Enter the RA in *Slew Right Ascension* and the DEC in *Slew Declination*
 - c) Enter the epoch in *Epoch* and click *Apply*
 - d) Click *Start Slew*. The telescope will now slew to the position

Taking Images

- 1) Turning off spectrograph control
 - a) Under *Telescope*, click *SAG/Spectrograph Control*
 - b) Click *Apply* to the *I on Axis*
- 2) Setting up Maxim DL
 - a) On the imaging laptop, open *Maxim DL*
 - b) When Maxim DL is open, click the camera button at top of screen
 - c) Under *Setup*, click *Connect*
- 3) Setting up a filter
 - a) In DFM, under *Telescope*, click *Filter Selection*
 - b) Click *Initialize* and make sure it says *Home*
 - c) Click on the filter you want and click *Move to Selected Filter*
- 4) Taking a single image
 - a) In Maxim DL, under *Maxim CCD*, Click the *Expose* tab
 - b) Set the image parameters and click *Expose*
- 5) Taking a sequence of images
 - a) In the *Sequence* tab, Under *options*, Click *Set Destination Path*
 - b) All images go to *C:Data*. You can set up a folder in this directory
 - c) Under *Options*, click *Set Sequence*
 - d) Enter the image parameters and Click *OK*
 - e) Change filename to what you want
 - f) Once finished, click *Start*
- 6) Orientation of CCD image
 - a) Images taken with the Ortega Telescope are mirrored and flipped. Here is a diagram showing the image orientation:



Differential Photometry

- 1) Taking Bias images
 - a) Make sure the mirror covers are closed
 - b) Under *Set Sequence*, choose *Bias*
 - c) Take about 30 images with 0s exposure time
 - d) Make sure bias is in your filename
- 2) Taking Dark images
 - a) Make sure the mirror covers are closed
 - b) Under *Set Sequence*, choose *Dark*
 - c) Take about 12 images with 300s exposure time
 - d) Make sure dark is in your filename
- 3) Taking Flat images
 - a) Make sure the mirror covers are open
 - b) Set up portable lights so that they shine on projection screen
 - c) In DFM, under *Telescope*, click *Movement*
 - d) In the *Offset Zenith* tab, click *Apply* to the *Set Flat Field Position* option
 - e) Click *Start Slew*. The telescope will now slew to the projection screen
 - f) In Maxim DL, Under *Set Sequence*, choose *Flat*
 - g) Take 1 image with a 1s exposure time. Check the photon count of the images. If the counts are less than 25000 or greater than 35000, then use more/less light or increase/decrease the exposure time
 - h) For V and R filter, try 1s exposure time. For B filter, try 5-6 sec exposure time
 - i) The sky can also be used to take Flat images. It is best to start taking images a few minutes after the sun has set

Closing

- 1) Putting the telescope home
 - a) Put the telescope to the zenith position
 - b) Stop tracking by changing *RA Rate* from *15.01* to *0*
 - c) Close the mirror doors
- 2) Closing the dome and taking bias/dark images
 - a) If you have not already done so, once the mirror doors are closed, this is a good time to take bias images
 - b) Change the dome status to *On* and *Home*. The dome will now go to its home position
 - c) Once the dome is home, change the dome status to *Off*
 - d) Close the lower shutter
 - e) Close the upper shutter
 - f) If you have not already done so, this would be a good time to take Dark images
- 3) Turning the telescope off
 - a) Push the *Halt Motors* button to halt the motors

- b) Change the *Mirror Doors* switch from open to *closed*
- c) Turn off the *MTR Driver Chassis* switch
- d) Leave all computers on and cameras connected
- e) Get some sleep!

Troubleshooting:

- 1) When the dome shutters do not open:
 - a) In DFM, make sure the dome is on
 - b) If dome is on and it still won't open, manually cycle the power and try to open them again
 - c) The last resort is to use the long dome crank to open the dome manually
- 2) When DFM shuts down unexpectedly:
 - a) Click *Don't Send* when prompted if you want to send a message or not
 - b) Restart DFM
 - c) DFM will not know where the dome is positioned, so put the telescope at the zenith position, move the dome to home using the control box, and turn on the dome
- 3) If mirror doors do not open all the way:
 - a) Lightly grab one mirror door and softly pull it open so all the others open
- 4) If the filter slide gets stuck:
 - a) Close DFM, restart it, and initialize filters
- 5) If the dome will not track:
 - a) Try turning the dome and dome track off and back on again
 - b) If it still does not track, move the dome to home using control box, turn off the dome, turn off DFM, reopen DFM, and initialize the dome
 - c) You can always rotate the dome manually using the control box
- 6) If there is a total power loss during observation:
 - a) Close the dome manually with the long dome crank
- 7) If telescope is not pointing well, you can reset the pointing using bright stars:
 - a) In DFM, under Movement, select DFM Object Library
 - b) Pick a bright star that is close to your field
 - c) Using a short exposure, take a picture to see where the star is in the field of view
 - d) Using the remote control, hold Set and move the telescope in the direction that gets the star to the middle of the field of view
 - e) Once the bright star is in the middle of the FOV, go to *Telescope, Initialization, Telescope Position*, and click the *Use Next Object Position* button, and *Apply* it
 - f) Move to your object