

Physics 344 Lab 4

Addendum: Observing Jupiter or M101

Purpose: Because of the long orbital period of the outermost of the four bright Galilean moons of Jupiter and because of the scarcity of clear weather this semester, it is prudent to start obtaining images of Jupiter this week. Jupiter is still not high until later in the evening. Thus, the early sessions will obtain images to monitor the brightness of the fading supernova 2011fe in M101.

Procedure: If it is clear on the evening that you take your observations for characterizing the CCD, take some images of M101 (early session) or Jupiter and its moons (late session) after taking the Lab 4 data.

Setup:

1. Click on the *Temperature* button in the control panel and return the Temperature Setpoint to about 35 degrees cooler than the ambient temperature. Make sure that the *Fan On* and *Shutdown Temperature Regulation when Terminating* boxes are checked. Then click on *OK*. It will take several minutes for the CCD to stabilize at the selected temperature.
2. Select the *AutoSave* tab in the CCD control panel, make sure that the *Image* radio button is selected, and that neither the *AutoSave On* nor the *Save Focus Images* boxes are checked. Click on “*Choose Folder...*” and navigate to *G:/Ph344/lab5/* Create a new folder here, named with the date and your initials (e.g. Oct01TP), and then select this folder. Set the *starting number* to 1. Select a *prefix* image name.
3. While the CCD is cooling, move the telescope to the zenith and start *The Sky*. Connect to the telescope, sync the pointing on a star near the zenith and just east of the meridian. Then move to a bright star, carefully center the star in the finder telescope (but not the main telescope since the fold mirror directing light to the CCD blocks the view) and synchronize the coordinates.
4. Move the telescope to M101 (early-evening session) or Jupiter (late session). For M101, it is probably a good idea to first go to a bright star in the same general region of the sky, center that star in the finder and re-sync, and then go to M101. For Jupiter, you can just go to Jupiter and center it in the finder. If observing Jupiter, use *The Sky* to determine which of the Galilean moons are visible at the current time, and where they are with respect to the planet.

Focusing:

1. The telescope is focused by moving the secondary mirror with the stepper-motor controller on the observing desk. Turn on the encoder readout above these controls with the green button. If necessary, use the focus motion buttons on the panel below to set the encoder to 6.150 mm.

Observing Jupiter:

1. Select the *Take Image* tab on the control panel, and set the exposure time to 0.03 seconds, 1x1 binning, *Filter: V, Frame: Light, Reduction: AutoDark, Subframe* off, and *Imager* selected.
2. Take test exposures to make sure that Jupiter is centered in the field and all the moons are visible, and that Jupiter is not saturated (brightest spots fainter than ~50,000 ADU). Adjust the telescope position and the exposure time as required. To move the telescope, use the Motion Controls under the Telescope menu. Make sure the RA, DEC and Jog radio buttons are selected. A 5 arcminute jog is about one quarter of the narrow (East-West) direction of the field. The W button moves stars down in the image (when looking east) and the N button moves stars left.
3. Then take and save (to G:/Ph344/Lab5/your directory) an image (in FITS format).

Observing M101 Supernova

1. Select the *Take Image* tab on the control panel, and set the exposure time to 30 seconds, 1x1 binning, *Filter: V, Frame: Light, Reduction: AutoDark, Subframe* off, and *Imager* selected.
2. Take test exposures to make sure that M101 and the supernova are both visible (see the image available under this lab on the class website. If it is necessary to move the telescope, use the Motion Controls under the Telescope menu. Make sure the RA, DEC and Jog radio buttons are selected. A 5 arcminute jog is about one quarter of the narrow (East-West) direction of the field. The W button moves stars up in the image (when looking west) and the N button moves stars left.
3. Then take and save (to G:/Ph344/Lab5/your directory) an image (in FITS format) in each of the V, R, and B filters.

Shutdown

1. When you are finished, cover the telescope and point it to the zenith. Terminate the connection to the telescope and exit *The Sky*. End the *CCDSOFT* program and turn off the power to the CCD at the plug strip in the telescope base.