11 - Celestron Telescope III: Night Time Observing

Purpose: Gain experience setting up the 6" Celestron telescope outside and acquiring and tracking a source. If weather is not favorable, setting up inside and looking at distant object. In either case, acquire an image with the CCD camera.
Due: At the end of class, at least one Observing Log Sheet and one image uploaded to Laulima's Drop Box (at least two, if weather fair).

Materials:
6" Celestron telescope and case
Tripod
Silver case of eyepieces, CCD, etc.
Laptop, power cord, and case
Telescope Check-In/Out Sheet
Observing Log Sheet(s)

Information:

This laboratory exercise builds on the experience you obtained previous classes when you learned to set up and operate a 6" Celestron telescope and CCD camera. In this lab, you will set up the equipment and take and save at least one CCD image using the telescope. You will be required to load at least one image into Laulima's Drop Box.

IMPORTANT:
The checklist below is similar to the one you followed during the previous two classes. You are required to go through this list to remind yourself of what and what not to do:

- DO NOT LEAN ON OR APPLY FORCE TO THE OPTICAL TUBE (orange).
- DO NOT FORCE ANY KNOB BEYOND ITS LIMIT. If it won't turn or move, do not force.
- DO NOT TOUCH THE CORRECTOR PLATE (top glass in the tube).
- DO NOT TOUCH ANY LENSES, MIRRORS, or OTHER GLASS SURFACES.
- DO NOT BLOW ON THE LENSES.
- DO NOT LEAN ON THE TRIPOD.
- BE CAREFUL WITH CABLES
- WATCH WHERE YOU AND THE TELESCOPE ARE MOVING.
- If outside and it starts to rain or any moisture condenses on the telescope, DISASSEMBLE QUICKLY AND SAFELY AND BRING TELESCOPE INSIDE.

CHECKOUT:

Q1) Complete and sign the Telescope Equipment Check-In/Out Sheet, which includes a signature from the instructor or TA signature, who will then file the form. You will always complete and submit the Check-Out Sheet when using a telescope.

Part I: Telescope Assembly and Alignment

The basic steps for assembling the telescope are below, similar to Lab 10 - Celestron II. Ask for help whenever in doubt:

1. If outside, keep all equipment cases on the tarps provided.
2. Screw tripod leg spacer into tripod and extend lends to desired length. Make sure all bolts are hand tight.
3. Level tripod platform (bubble level included). This is very important on uneven ground.
4. Carefully lift telescope onto tripod platform.
5. One partner hold telescope while other affixes it to tripod with the three bolts (hand tightened).
6. Verify the telescope is mounted properly (notch in arm should align with mirror-side plastic rim).
7. One partner hold the telescope while the other unscrews the quick-release lock. Carefully raise the telescope one-third (1/3) of the way up. Fasten it by screwing it hand tight.
8. Plug in the power cord to the telescope, wrap once around leg to secure it (if possible), and plug into outlet with the power-brick resting on a surface.
9. Remove the front cap and store. Do not touch the corrector plate.
10. Remove the end cap and store in the tripod leg spacer/accessory tray.
11. Insert eyepiece assembly (flip mirror plus 25mm eyepiece and CCD camera) at the back-end of the telescope. You may need to adjust the balance.
12. Affix the finder-scope (do not over-tighten. This strips the screws. Make sure to turn off the finder-scope when not in use.)
13. Turn on the telescope (power switch).
14. Proceed to specific lab tasks.

QUESTIONS/TASKS:

1. Since it will probably still be light, do a simulated "One Star Align" like Lab 10 – Celestron II. Accurately enter the time and date.
2. Acquire a sharp image of a distant object in the eyepiece and with the CCD camera. As best as possible, align the finder-scope.

   Q2) Sketch what you see in the eyepiece on an Observing Log Sheet (provided). Mark the region imaged by the CCD camera. Upload the CCD image to each group member's Laulima's Drop Box (with a suitable name). Record the image name on the Observing Log Sheet.

3. If/when dark enough (or the Moon is visible), do a "Solar System Align" or "One Star Align" on the hand-paddle, depending on what's available.
4. Align the finder-scope on the bright alignment object. Seek help if you are having trouble. This is crucial to being able to take images of astronomical objects.
5. Use one of the pre-programmed options (`SOLAR SYSTEM`, `STARS`, `SKY TOUR`, `DEEP SKY`, probably in that order) to find an astronomical object.

   Q3) Repeat Q2 for the astronomical object.

SHUTTING DOWN:
Students will properly power-off the telescope, disassemble, and return all pieces to their original storage place (including caps). This has to be done very carefully and in the correct order. The instructor and TA will be there at all times to help.

Q4) Have the instructor or TA initial one of your Observing Log Sheets that the equipment is properly stowed and that you may leave.