Teaching notes for Introduction to the Telescope Lab

This lab is to introduce the students to using the telescope. All students should complete this lab before they use the telescope for any other lab this semester. This should help in reducing the amount of repairs needed on the telescopes throughout the semester.

Before going onto the roof to begin this lab you should go over the parts of the telescope. Bring a telescope into the classroom and give a quiz on what the different parts are (the students should have read through the lab script before coming to class). If you want to describe the difference between a reflecting and a refracting telescope that is up to you.

Be sure to briefly go over the answers to the pre-lab questions as you introduce the properties of the telescope we will be focusing on in this lab. The exercises in this lab should help to illustrate the different properties and how they depend on the telescope or eyepiece.

This lab first starts with the same exercise we've done in the past (if you've taught these labs before) to find the FOV of the telescope with two different eyepieces. The procedure for this part of the lab consists of timing a star travelling across the FOV with the motor of the telescope turned off. You should use both a 40-mm eyepiece and one other. Be sure to know which star you will be using for this exercise and have the telescopes used for this exercise already set on that star for the students. FYI:

Eyepiece Focal Length (mm)	Approx FOV (')
40	40
25	30
12.5	15

The second part of this lab focuses on magnification, light gathering power, and resolving power. The telescopes for this exercise should be set up with the C-14, C-8 number 4, and another C-8 right next to telescope number 4. All three of these telescopes should have h and χ Persei or the Ring Nebula (for fall semester) or Pleiades (for spring semester) in the field of view.

The eyepieces in each of these telescopes should be as follows: the C-14 should have a 40-mm eyepiece, telescope number 4 should have a 20-mm eyepiece, and the other C-8 next to number 4 should have a 12.5-mm eyepiece. The reason for these eyepieces is to have the same magnification in the C-14 and telescope 4 so the students are only focused on the difference in light gathering power. And to have different magnifications in two same size telescopes, 8-inches, so the students only focus on magnification.

The students should look in all three telescopes multiple times. Have the students look through all three telescopes once before recording any notes. Then have them go back and forth between the C-14 and telescope 4 to record notes on light gathering power, and then back and forth between the two C-8s to record notes on magnification.

The third part of this lab is to observe resolving power. How well can the students notice that Albireo is a double star with their eyes, binoculars, and a telescope? Have the students look through all three of these instruments and record notes on the differences they see. Be sure to guide them on what should be included in their lab report.

Indoor alternative

Three modified exercises are detailed. For the first, you will need to set up a telescope outside (only if its not pouring down!) focused on a terrestial light source approximately due east or west to get it close to the celestial equator. Then turn on the drive motor. The telescope will drive at the right rate, but the object will move in the opposite direction to usual in the eyepiece.

The second exercise purely involves studying the provided images in the lab script and measuring the relative sizes of the angle bars used.

The third part involves setting up a piece of black paper with 4 sets of stars on them, some double, some single. The doubles should be separated by a small amount – measure the separation, you'll need to give it to the students later. Place the paper on the wall at the end of the corridor from your class. Set up a pair of binoculars at the other end of the corridor. Provide meter rules so the students can measure the distance between them and the target when they make their estimates. Use the "skinny triangle" rule to get the resolution for the eyes and the binoculars.