PhDGuide Setup

Aaron Mueninghoff
aaron.mueninghoff@stonybrook.edu

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PhDGuide is an open-source telescope guiding software. It works by moving the telescope such that one or more stars remain in the same position on the guiding camera. Since it sends instructions to the mount, it sometimes will fight with other programs (such as Cartes du Ciel) for control, which can result in either guiding or tracking not working as expected. It is therefore recommended that PhDGuide be set up once the telescope is pointed at or near the science target.

1. Connect the autoguider camera to the laptop via a USB cable and to the mount via a telephone cable. Open PhDGuide and click on the connect button (bottom leftmost button, looks like a USB plug). A window will pop up, click "Connect All" and look at the text below the row of buttons at the bottom of the screen to see that the connections have been established.

2. Select an exposure time from the dropdown menu in the row of buttons and click the loop button (2nd from the left, with the two arrows in a circle) to begin taking exposures continuously. The text below the buttons should now say "Looping". Clicking the "STOP" button (5th button from the left) will stop looping and guiding. The exposure time can be changed while looping, but the change will only take effect at the start of the next exposure.

3. Click on a star in the image to select it for guiding; a box will appear around the star. If you do not see any stars other than your target, try changing the exposure time, adjusting the gamma with the slider to the right of the exposure time, or clicking the "Auto-select star" button (3rd from the left, star with a magnifying lens on it).

   It is important to choose a star that looks like a 2-dimensional Gaussian, as that is what PhDGuide is looking for. (Note that a star on any of the slits is highly non-Gaussian. Also note that a saturated star is non-Gaussian.) The signal-to-noise ratio (SNR) of the selected star is shown in the bottom-right of the window next to the label "SNR". *The higher*

the SNR of your guiding star, the better. Note that SNR is not necessarily correlated with brightness. The "Auto-select star" feature is generally good at picking suitable stars, but does not always pick the best available star.

4. If the autoguider has been moved or rotated since the last time PhDGuide was used, i.e. if you just set it up, then you need to (re)calibrate the guiding. To do this, click the settings button to the right of the gamma slider (it has a picture of a brain); you should now see the "advanced setup" window. Go to the "Guiding" tab and check the "Clear mount calibration" box if it is not greyed out. Also make sure that the "Calibration step (ms)" box is set to 100 (it should be by default). Click "OK" to close the window.

5. With your guiding star still selected, click the guide button (4th button from the left, has a pictue of green cross-hairs on it); there should now be green horizontal and vertical lines going through your guiding star. If needed, PhDGuide will begin the calibration sequence, which may take several minutes, and will display progress/diagnostic information below the row of buttons. (Note that calibration time is directly proportional to the exposure time.) Once it has started guiding with the star you selected, the text below the row of buttons will say "Guiding". Watch the exposures to make sure the guiding is working correctly (the target stays on the slit and does not drift off, and the software does not lose track of the guiding star). If the software is losing track of the guiding star due to low SNR, increase the exposure time or try using a different star. If the guiding seems to be moving in the wrong direction or not moving at all, try recalibrating.

6. To stop guiding (end of observation, switching targets, etc.) click the red "STOP" button. Note that the "STOP" button also stops taking exposures; you will have to start looping again if you want to find a new target.