# Astroart 5 - Spectrograph "Slit mode" (CCD interface 5.30)

A brief tutorial on the new guide on reflective slit feature (spectroscopy)

(For a complete commands reference please read "User interface" guide included in CCD control package)

➡️ **Guide target on slit**

First, with guide camera and telescope connected, take a frame with slit illuminated by calibration lamp (okay also with a flatbox or twilight through the telescope aperture) and select a subframe approximately around preferred guide point (note you can check pixel coordinate with mouse cursor on AA status bar)
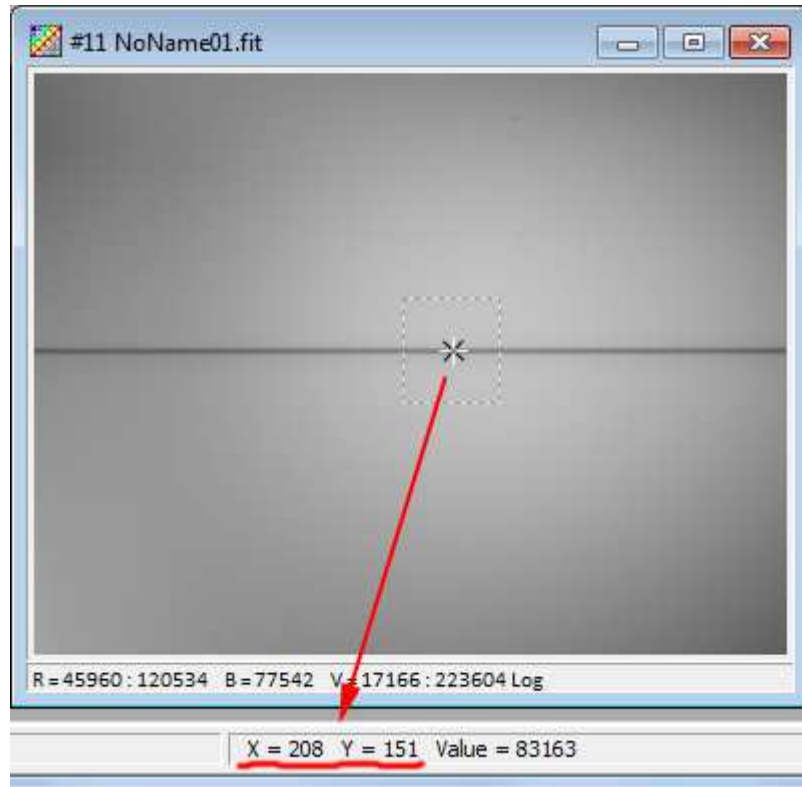

With unobstruct optical path, start a sequence "no save", using the same window, during which you have to bring the target inside the selected box by mount movements.
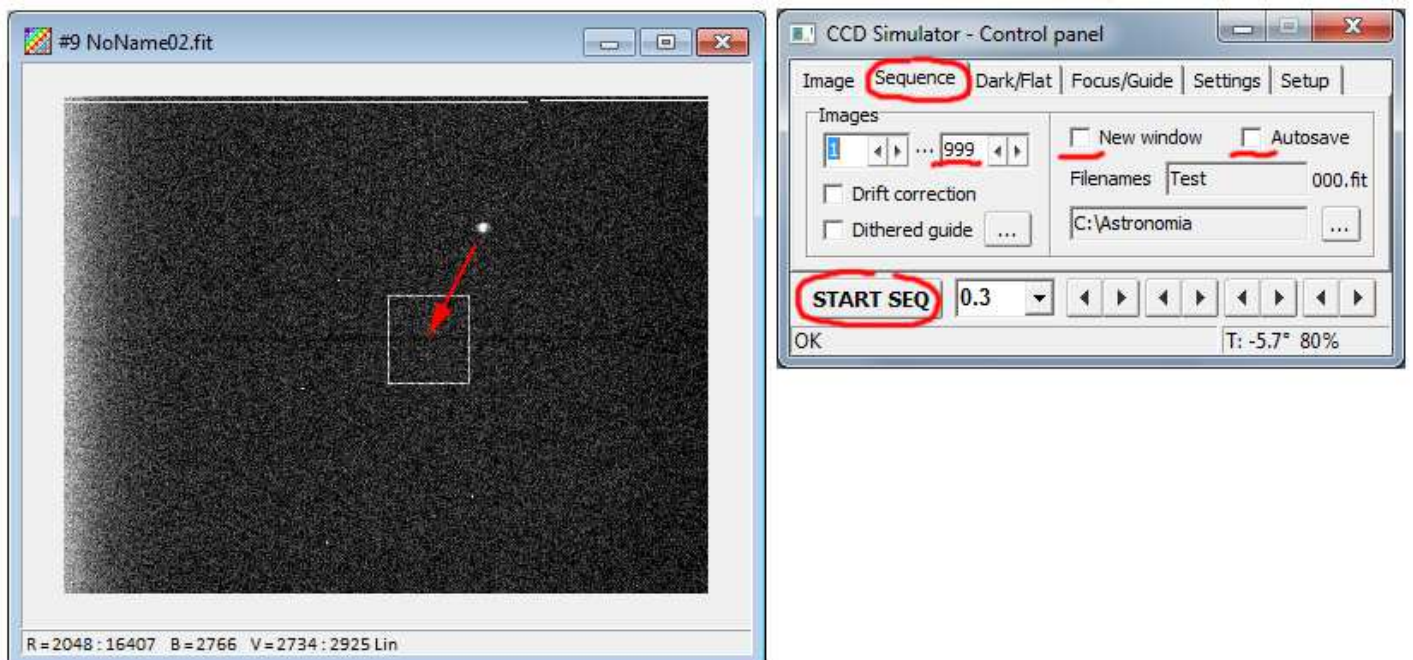
Then open guide window with an appropriate exposure time. Here is also opened "Option 1" window from tab "Setup" -> "Options". If you are not satisfied with the automatic leveling of view thresholds you can adjust them with manual settings. The same for camera exposure time. Note it is possible to change thresholds and exposure time values also during auto-guiding.
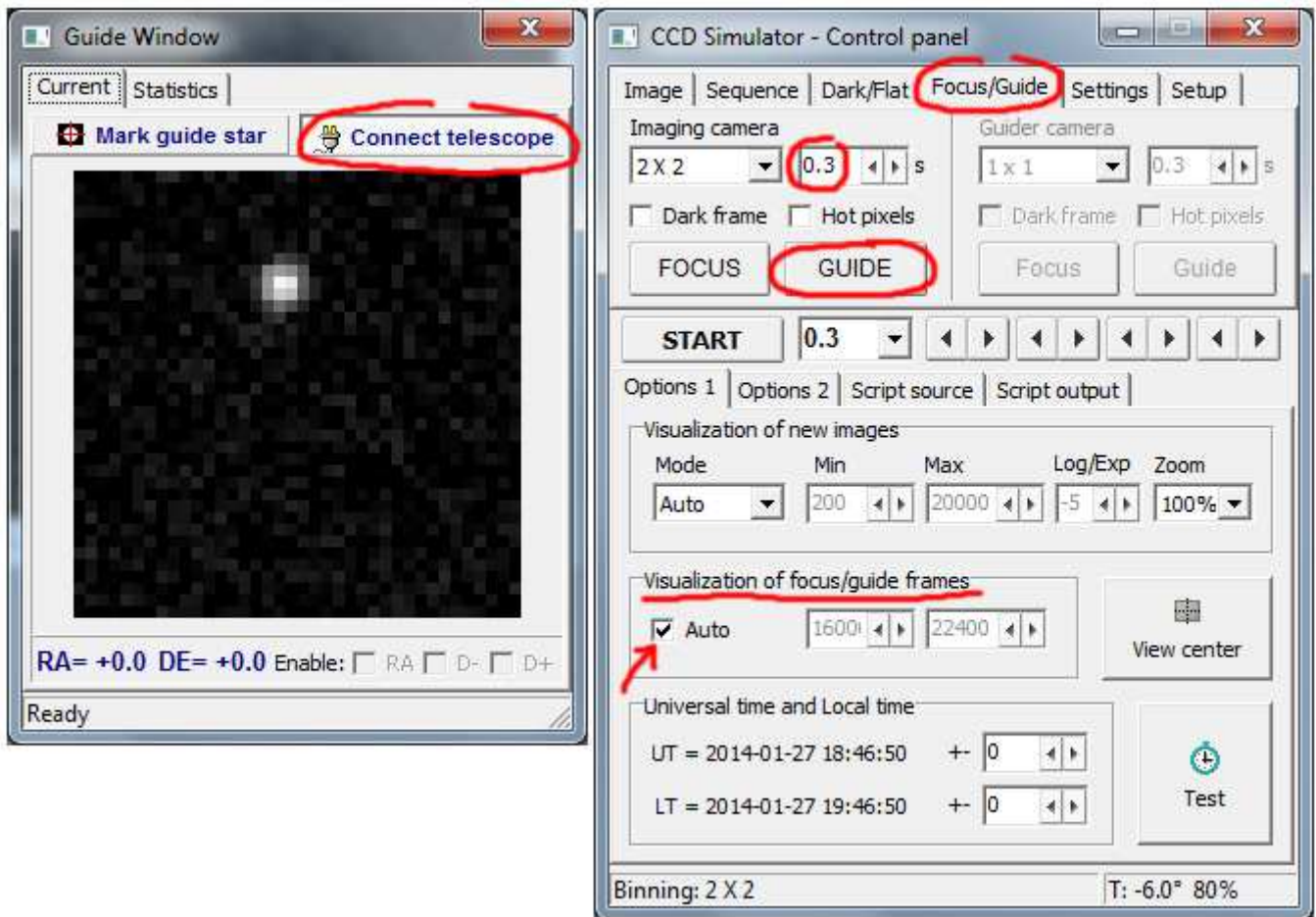

Activate the slit mode pressing **SHIFT + click (left mouse button) on guide window image**. Label "Slit mode autoguide" appears at top. Press "Mark guide star" button. A cross-hair is placed at center of guide window (not on star and probably not exactly on the slit). Absolute coordinate X,Y of guide point appear on top.
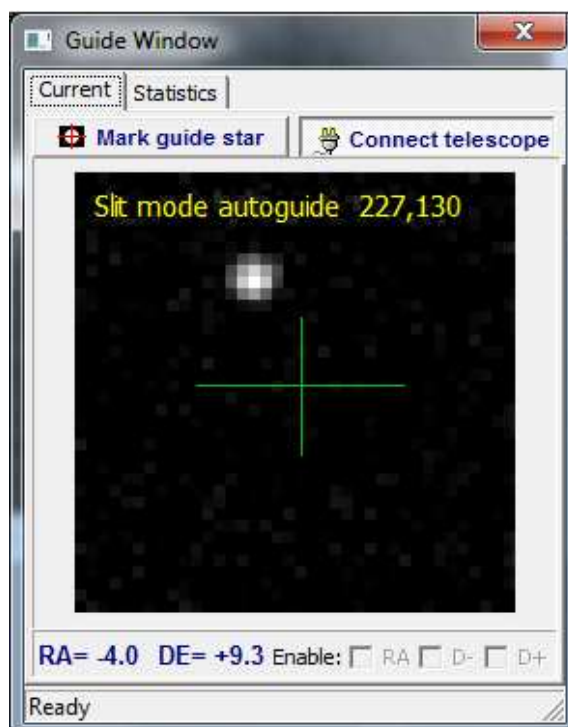
If guide has not engaged (star too far from center), bring the star near cross-hair with micrometric mount command. The star is locked on cross-hair center, autoguiding is ON.

The star may appear "cut" asymmetrically or completely outside the slit so, **by clicking on appropriate border side of image** you can nudge the cross-hair (and the guide star) until you see the star image halo perfectly centered on slit.
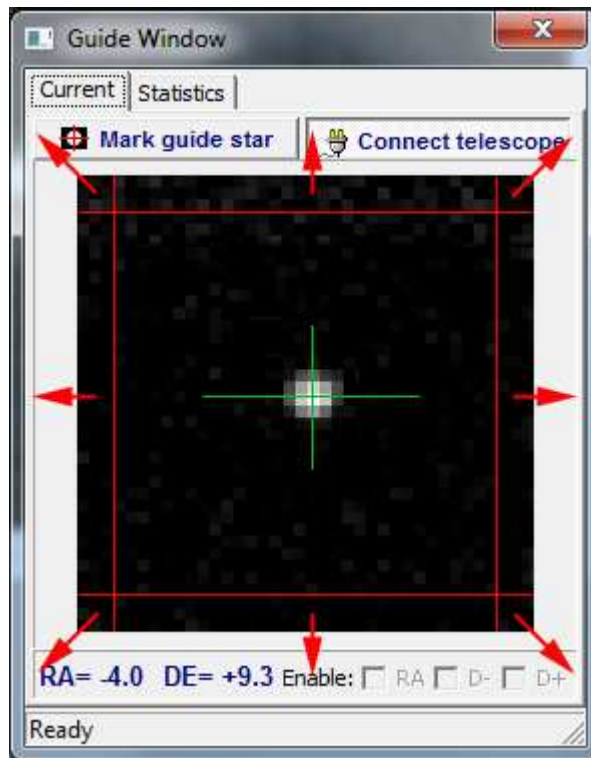
Cross-hair must lie on slit axis. The shape of star image in its ideal position is unmistakable:
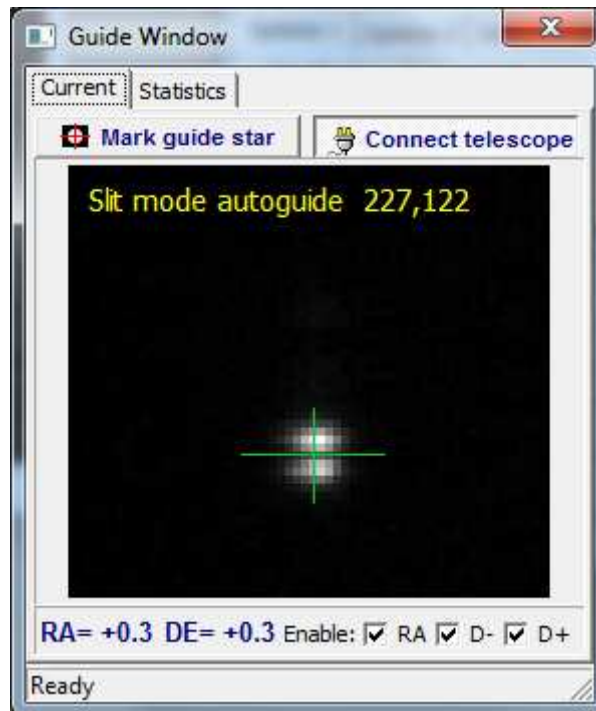
For a rigorous positioning you could take some spectra at different target location and check the best throughput coordinate.

You can annotate the absolute coordinates of selected guide point shown at the top of guide window image, an information useful for repeatability (if you not remove guide camera from spectrograph, coordinate of best point should remain unchanged).

I described an introductive method to become familiar with the controls, alternatively you can try to precisely center the cross-hair directly on the illuminated slit in the guide window, then bring the target near it with mount command to start guiding. We have several ways to achieve the purpose.

➡ Guide on a field star

For very faint targets that completely disappear when on slit or too faint for autoguiding (with reasonable exposure time), guiding is possible if another bright star appears in the field. In this example, the target is mag 12 and and nearby guide star is mag 9.

The step are the same of previous case but we need a relatively long exposure and an appropriate level stretching (view thresholds) to see clearly when the target entering the slit.

The selected subframe area must contain now both the guide star and the target (located near the slit).


Open guide window with an adequate exposure time. Activate the slit mode **pressing SHIFT + click on guide window image** and press "Mark guide star" button. Move the cross-hair toward the guide star by clicking on proper border side of image until autoguide is engaged. The star is locked on cross-hair center.

The target may appear "cut" asymmetrically or completely outside the slit so, by clicking on proper border side of guide image you can nudge the cross-hair (and the guide star) until you see the target image halo perfectly centered on slit.

Automatic level stretching could make the target invisible if the guide star is much more bright than target. In this case it is convenient to deactivate it and enter manually the appropriate view thresholds.

Centering phase (note exposure time and threshold manual setting):
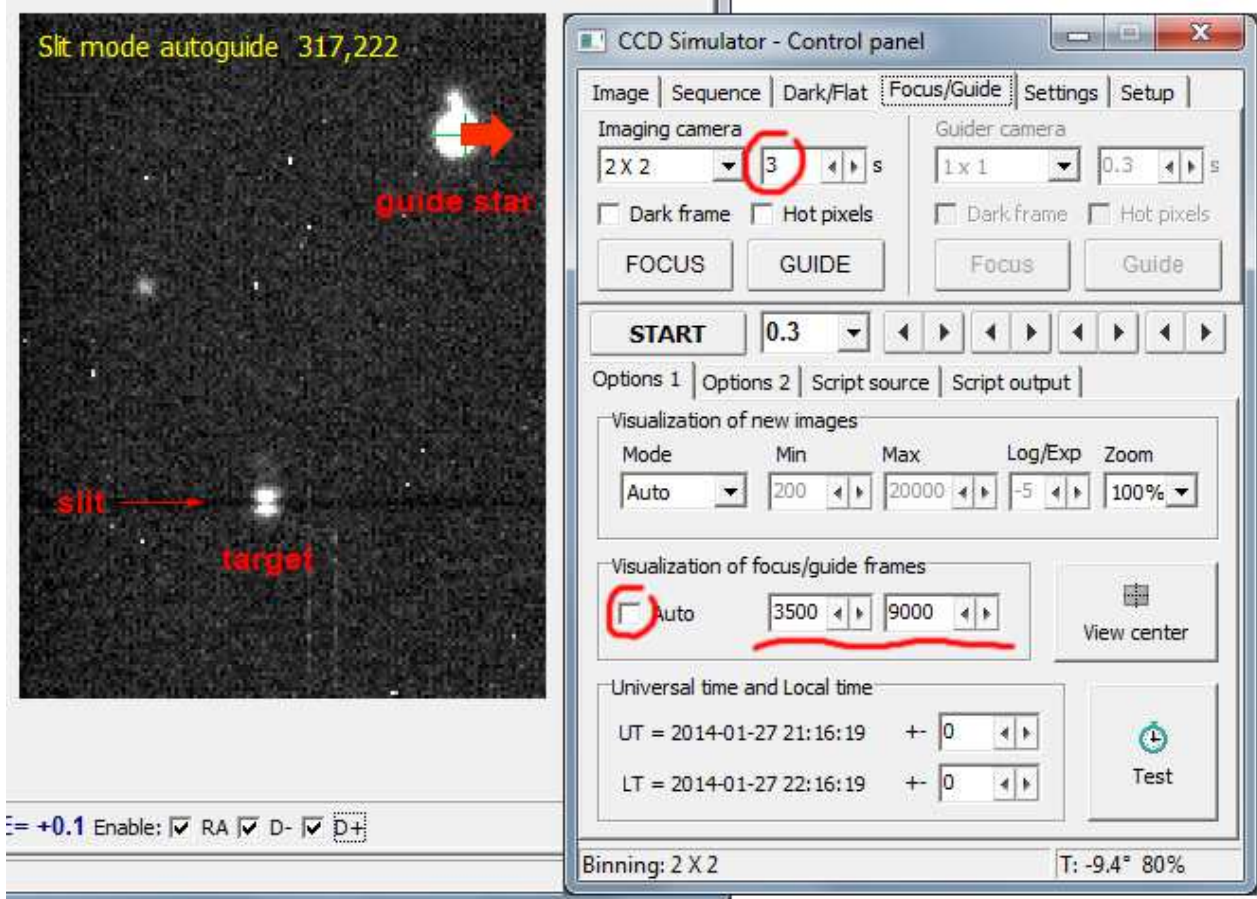
Once the target is correctly centered on slit we can reduce exposure time so that the mount works with a better reaction time. Spectra capturing can begin.
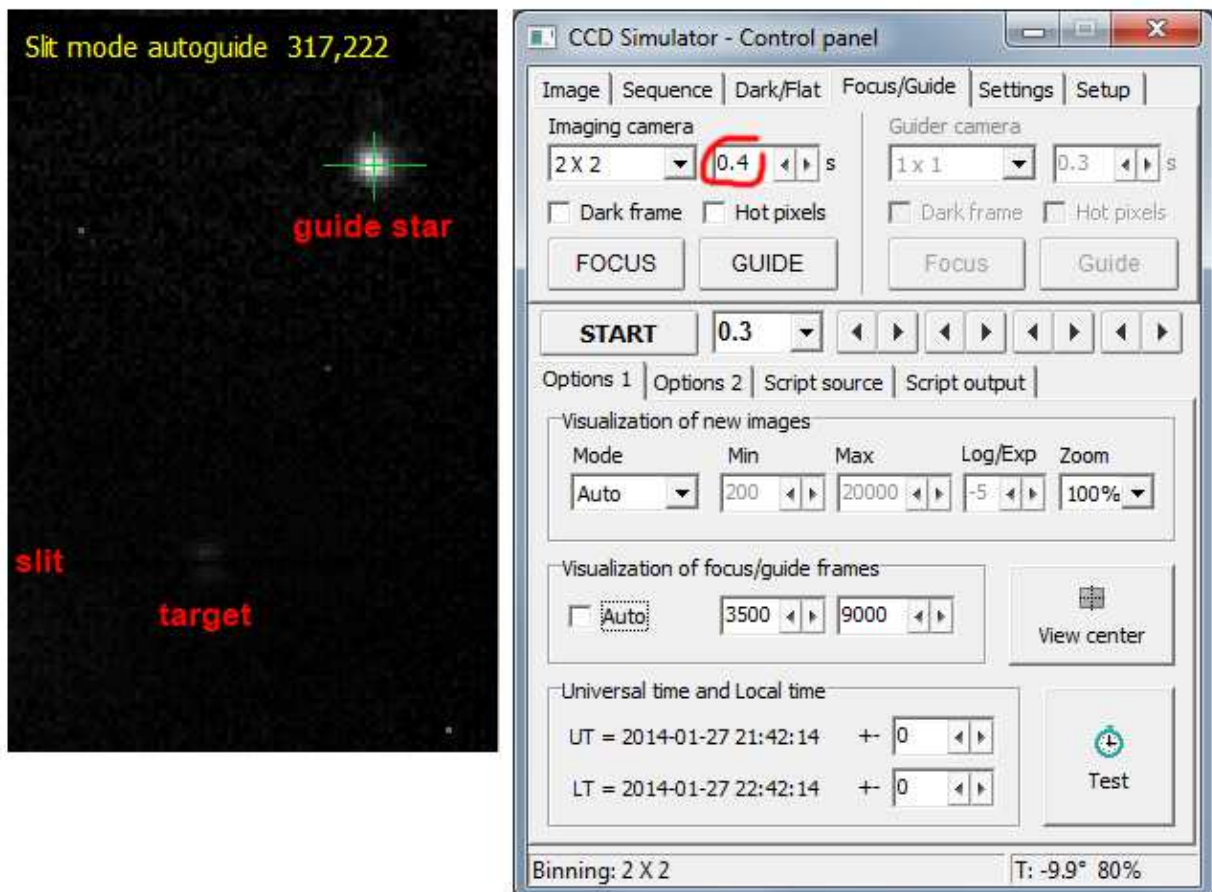
Note the algorithm to detect star position work very well even with a usual star image shape (not cut by the slit), <u>on condition that there aren't other bright stars in guide window</u>. One might select the subframe in order to have only the guide star and target (usually a very faint image, especially when in slit). Even guiding the star on slit (first case described), pay attention to select the subframe so that there are no other sources inside guide window than the target.

The capability of nudge the guide point during operations also allow a good guiding in case you use a secondary guide scope in parallel (e.g. the situation in which target is very faint and there are no stars in slit view field). The requirement is to have another camera on spectrograph slit view, with the sole purpose of positioning and checking if the star emerges from slit (i.e. due to mechanical flexures). If so, we can nudge the guide point so that target go back in slit. Note this mode could be also useful with faint target that have a proper motion like asteroids or comets.

You can download the new CCD Interface V 5.30 from MSB Astroart website:

http://www.msb-astroart.com/

Paolo Berardi, february 2014

E-mail: xberardi@gmail.com