VATTSpec Guider Notes   **Rev. 4/21/2021**
                                                             Chris Corbally

Introduction

VATTSpec's guider uses an Apogee, now Andor, Aspen CG8050, cooled, interline CCD. The array is 3296x2472, with pixels of 5.5x5.5 microns. The software is Craig Stark's PHD2 Guiding, so see its manual for details on normal guiding. The parameters below are for on-slit guiding. The control software is on "vattcontrol".

SETUP

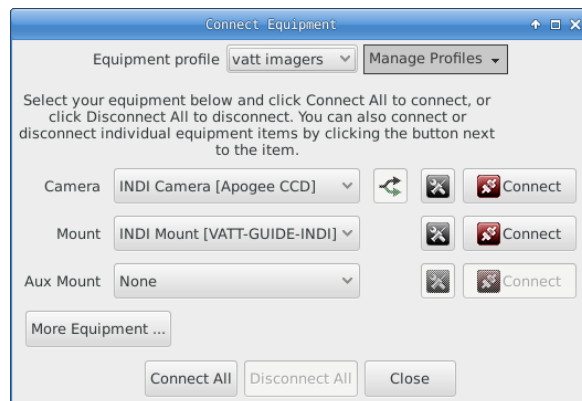Beginning from the vattcontrol Desktop

- Start <u>indiserver</u> via its icon,
  if not already started.

- Start PHD2 via its icon.

- In PHD2, click `USB male connector` icon to display **Connect Equipment** window.
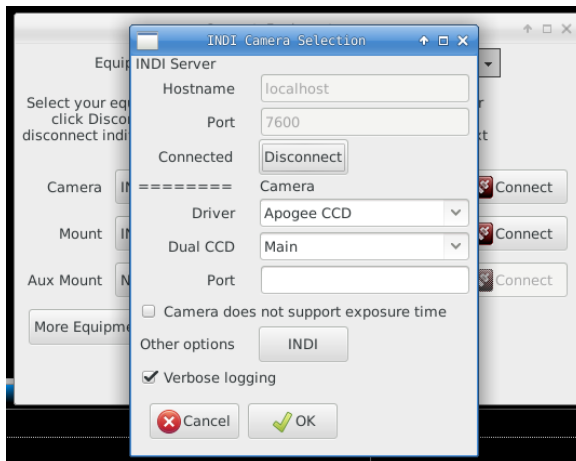
- Select "`vatt imagers`", or "`vatt spec`" if available.

- Click `INDI Camera tools` (screwdriver & wrench icon to left of Connect),
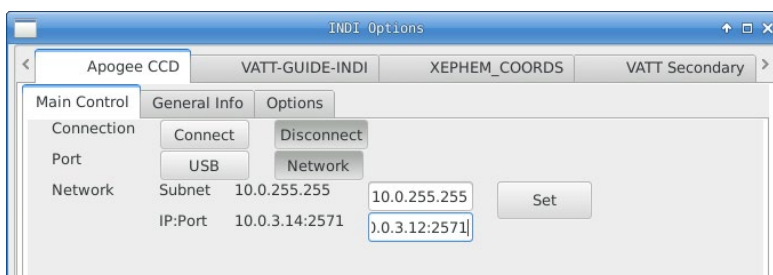
And in new window at Other options, click `INDI`

Enter as <u>Subnet</u> "10.0.255.255"
And as <u>IP-Port</u> "10.0.3.12:2571"
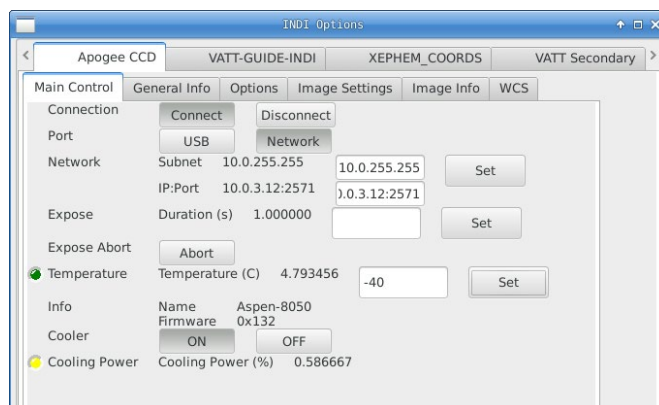(for Direct Imagers use 10.0.3.14:2571)

Click `Set`

Then `Connect`, and wait until
INDI options appear.

INDI Options setup

- **Apogee CCD**
  – **Main Control**
  Set Camera Head Temperature, if desired,
  to a minimum of -40 C.
  (Dark frames are taken at -20 C.)
  Click on `Set`, and cooling Power will start
  changing.

- **Apogee CCD**
  – **Image Settings**
  Check Frame is
     Width = 3296, Height = 2472

  Binning
  (_need to reset this each time PHD is run_)
  X = 3, Y= 3
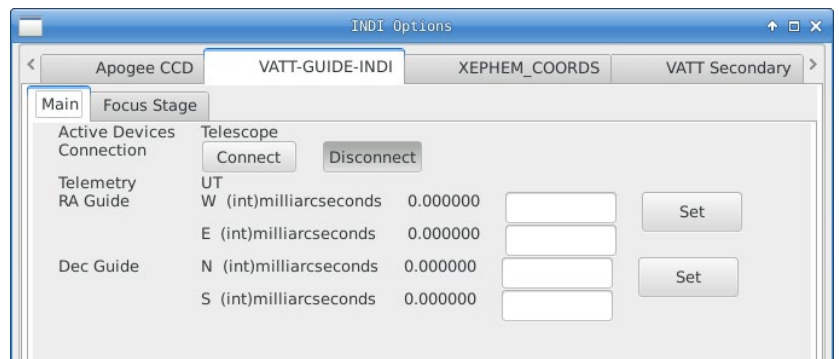
  Then click `Set` to register values.
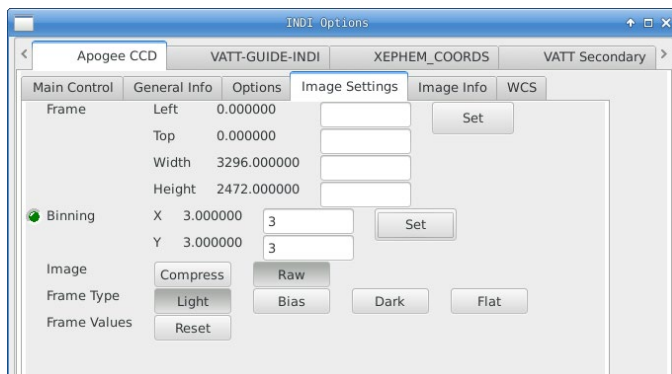
- **VATT-GUIDE-INDI**
  – Main
  For Autoguiding, go to this Main window.
  Click `Connect`,
  And a UT clock should appear and begin incrementing.

- EXIT **INDI Options** window

  In INDI Camera Selection, verify settings for Autoguidiing:
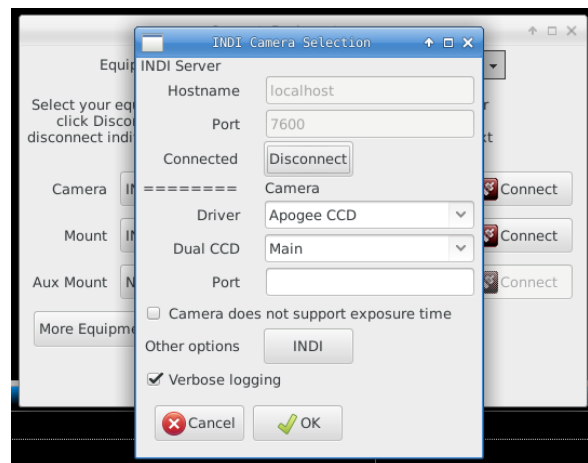   Hostname: localhost
    Port: 7600
    Driver: Apogee CCD
    Dual CCD: Main
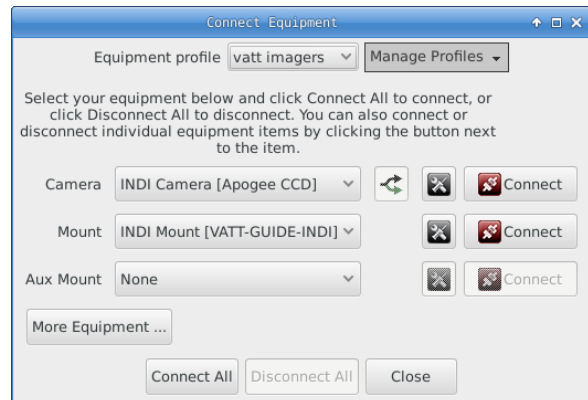   Port under Dual CCD: [empty]

  Click `OK` at bottom.

- Back in **Connect Equipment** window

  Click Camera `Connect`

  Click Mount `Connect`

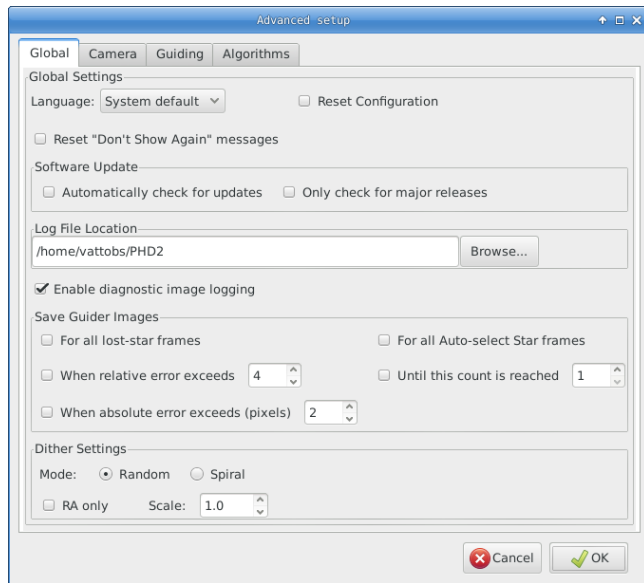 (click Mount `Connect` again if a yellow banner appears with error message about not connecting.)

  Click `Close`

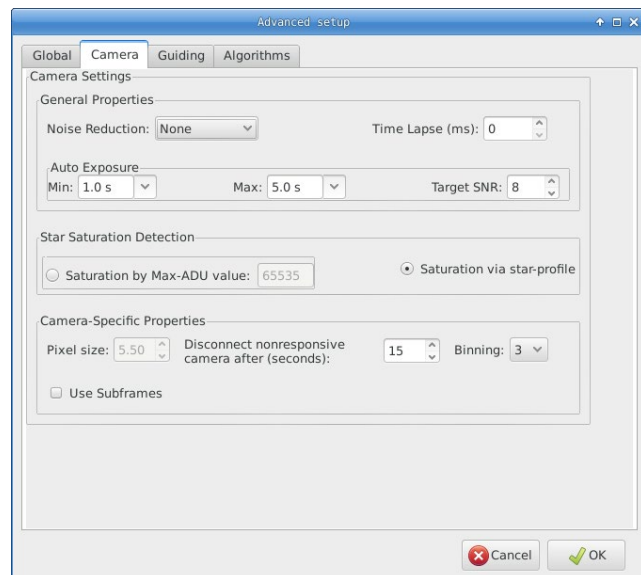- NB. At end of night, "`Disconnect All`" from this window, before exiting PHD2.

ADVANCED SETUP (the Brain icon)

- Under **Global**
– probably no need to change
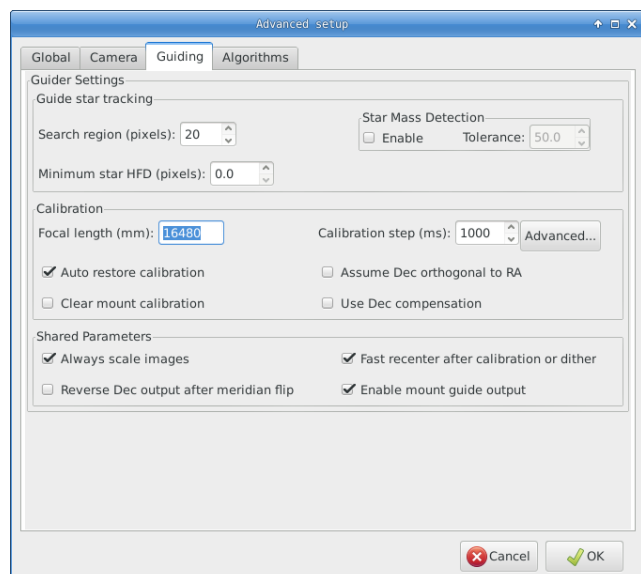anything, unless interested in errors   and
lost-star frames.

- Under **Camera**
– check pixel size is 5.5 x 5.5
microns, and binning is 3.

- Under **Guiding**
– set Search region to 25 pixels, or
more if seeing is poor.

– For on-slit guiding, probably better   to
**un-**check enable "`Star mass
(change) detection`".

- Under **Algorithms** – especially <u>Hysteresis</u> and <u>Aggressiveness</u> are critical settings for on-slit guiding, so tweak (generally lower) these values as appropriate.

<u>Minimum Move</u> is about right at 0.20 pixels, but if star stays above or below green crosshairs, then adjust down to, say, 0.15 pixels.
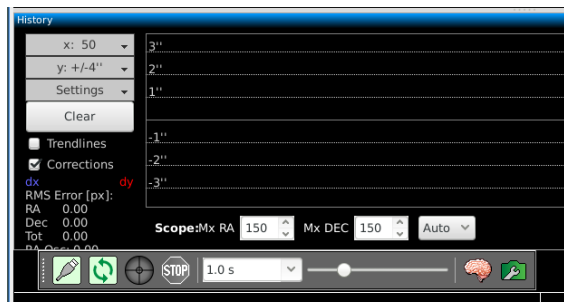
NB Hover cursor over parameter to get brief help box.
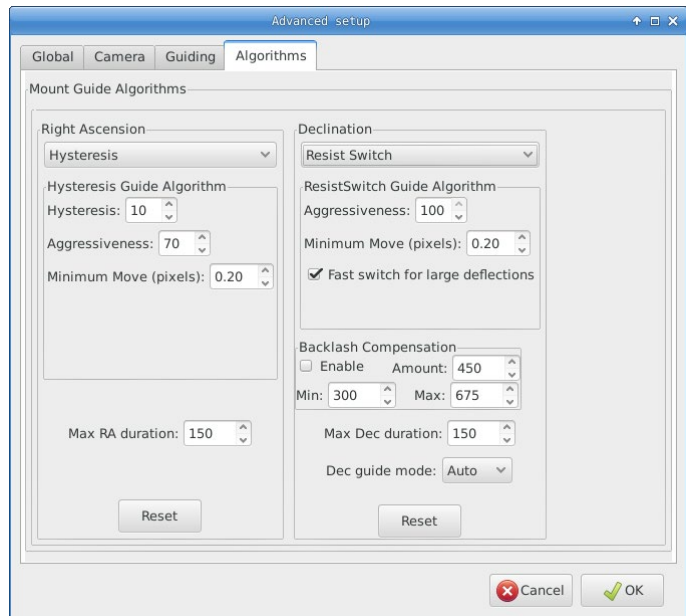
Note the menu options under both RA and Dec, though Hysteresis and Resist Switch are probably the only options needed.
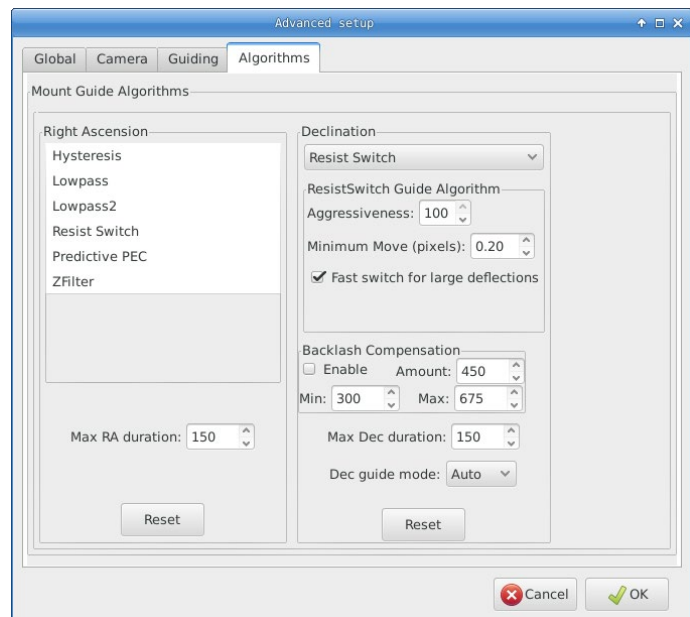
Max RA and DEC duration can also be adjusted from the main PHD2 window (Scope: Mx RA/DEC). A value between 100-150, rather than the Direct Camera value of 2500, works better for on-slit guiding.

IN MENU ON TOP OF PHD2 WINDOW

View

- **Slit Position** (to make a box the size of the slit)
  Be sure to have first set the Binning to 3 x 3.
  And check the "`Spectrograph Slit`" option.

 Shown are approximate values for narrow slit.
  For wide slit, X same, Y=250 & Height=16.
  Tweak by using a calibration lamp, with Guider Mirror in Center position, to illuminate slit.

Darks

- The Dark Library is probably made and in use. This practically eliminates the streaking down a column of pixels for the longer exposures and fainter objects.
- If the library is not running and the dome is completely dark, click on "Dark Library" and rebuild a library of darks. Suggested range is 1 to 15 secs, with 5 frames per exposure time.

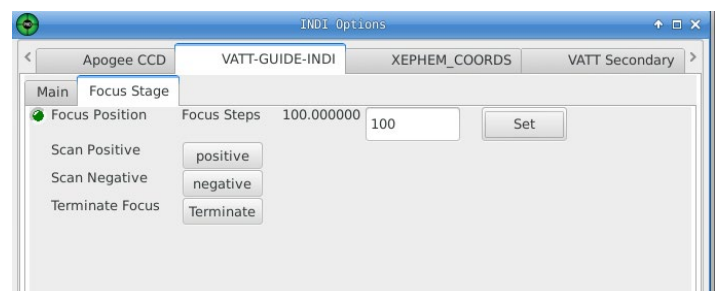- The Bad-pixel Map was no significant help in removing the streaks.
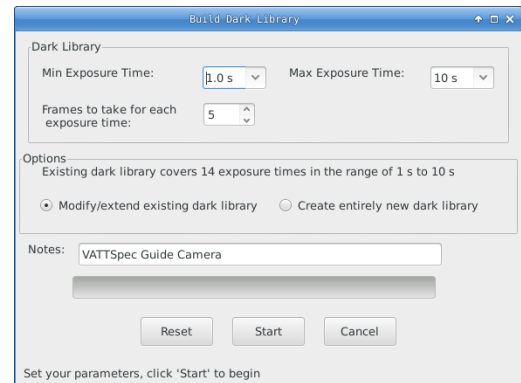
Focusing Guide Camera
(this is usually accessed via the green Tools icon in main PHD2 screen)

**VATT-GUIDE-INDI**
– **Focus Stage**

Set focus steps to100 for tweaking, 1000 or more for defocusing to make collimation setting.

Click and release "`Scan Positive / Scan Negative`" to start changing focus, and stop with "`Terminate`".
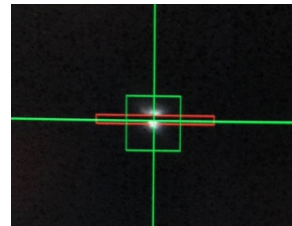
ACTUAL ON-SLIT GUIDING

- Hit the Loop button, bottom left of screen, to start the camera.
- Center star in slit with telescope paddle,
 and click on it to get the green box.

  Yes, this one is not quite centered!
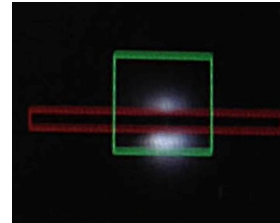
- Press PHD button to start guiding, and a green cross will appear.

- Center the green cross on the slit with the `Adjust Lock Position` buttons (under Tools).
    - Use `Save` when centered and `Restore` for auto-centering the next star.
    - If the star, during guiding, favors being up or down from the center of the slit, then nudge the cross a bit in the opposite direction from center, or lower "`Minimum Move`" (see p.5, Algorithms).
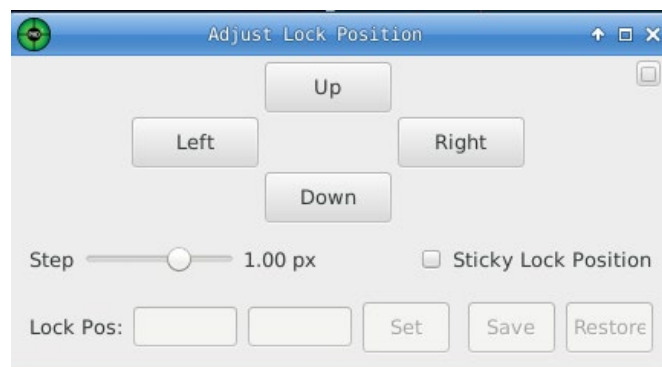
  Checking the "`Sticky Lock Position`" will prevent losing centering if re-calibration is done (automatically) after pressing the PHD button.
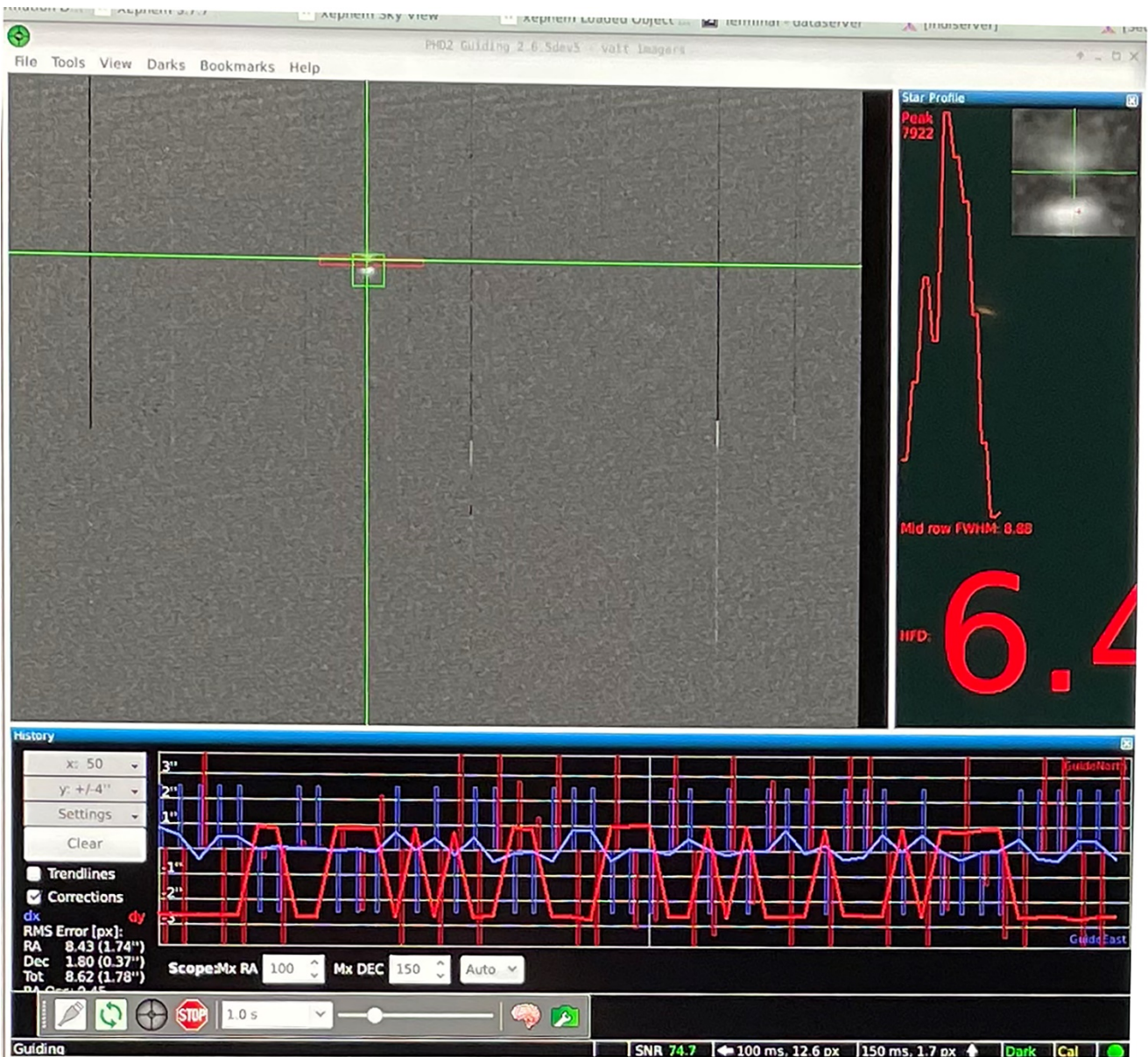
- If the star is lost, then the green box turns red until the star is found again.
  Regular beeping on turning red is "normal" when guiding on slit.
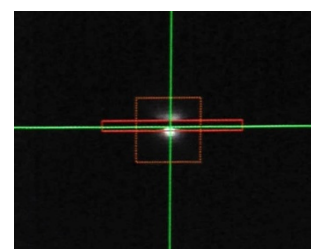
  NOW START INTEGRATING ON YOUR OBJECT AND RELAX!

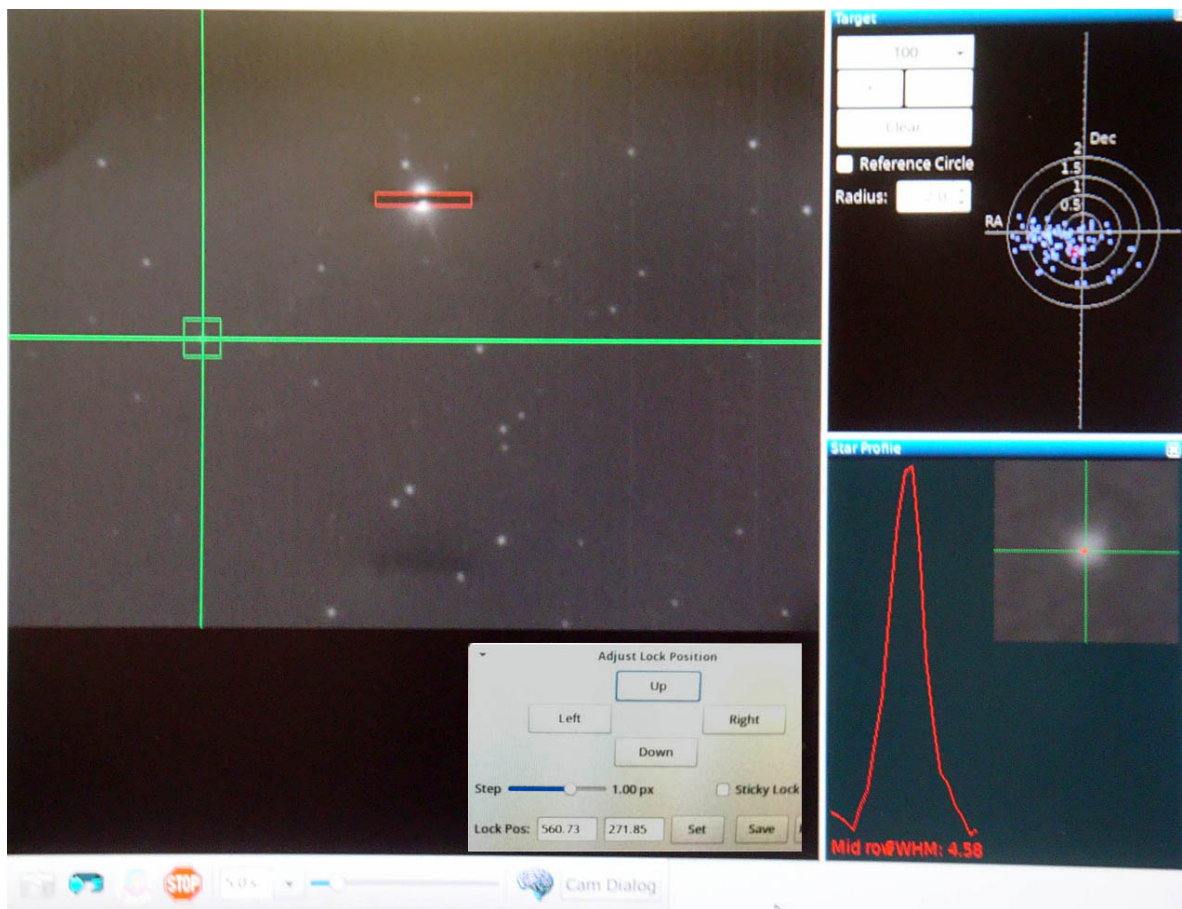The whole screen, when **on-slit guiding**, might look like this…

You could keep a check on the discussion of spilled-light / on-slit guiding at Google Groups'
Open PHD Guiding.

GUIDING ON A SUITABLE FIELD STAR,
away from the slit, is covered in the PHD2 manual.
The parameters for on-slit guiding are probably still suitable. The screen might look like this…

Please send comments on these VATTSpec specific notes to corbally@as.arizona.edu