RECENT DEVELOPMENTS IN THE LAB

Optics and Optomechanics

Judit Sturmann

IN 2018

- New CHARA alignment laser
- Computer controlled filter change in NIRO
- VEGA/CESAR
- MIRC upgrade to MIRCX
- Optical fiber test between telescope and lab by the ALOHA team
- JouFLU combiner not usable, waiting for upgrade
- New IR star imager and pupil camera on CLIMB table

PLANNED:

- CHARA reference camera upgrade > more sensitivity
- New delay line control
- New internal source IR and VIS by MIRCX and VEGA teams
- MIRCX/MYSTIC
- VEGA/SPICA

IN THIS TALK

- New CHARA alignment laser
- Computer controlled filter change in NIRO
- VEGA/CESAR
- MIRC upgrade to MIRCX
- Optical fiber test between telescope and lab by ALOHA team
- JouFLU combiner not usable, waiting for upgrade
- New IR star imager and pupil camera on CLIMB table

PLANNED:

- CHARA reference camera upgrade > more sensitivity
- New delay line control
- New internal source IR and VIS by MIRCX and VEGA teams
- MIRCX/MYSTIC
- VEGA/SPICA

NEW CHARA ALIGNMENT LASER

PROBLEMS WITH THE PLANNED TWO-COLOR FIBER LASER SETUP

- The green and the red paths would have required different alignment due to differential refraction through the system, especially LABAO.
- Even though using fairly high powered fiber lasers within reasonable budget, there was no gain in brightness compared to the former green diode laser setup.
- The wave-front was very rough out of the fiber + off-axis parabolic mirror arrangement.
- We proved since that there is no need to add complication by having a red laser too from the lab for AO setup.

SOLUTION: **BRIGHTER GREEN DIODE LASER** WITH THE OLD BEAM EXPANDER

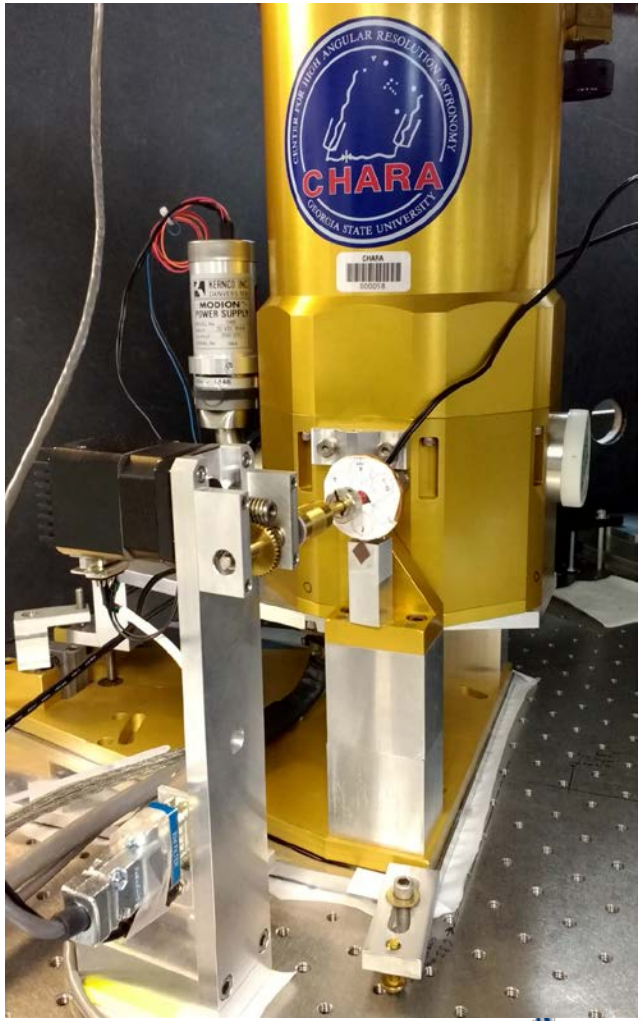
- Choosing LASERGLOW >200 mW diode laser (replacing old 65 mW) the alignment beam can be very bright and easy to use for any task.
- The spatially filtered expanded beam has a smooth flat wave-front.

ADDITIONAL BENEFIT

- The recently purchased green fiber laser is superior to what we had before for metrology alignment.

MOTORIZED NIRO FILTER WHEEL

Saves observing time: one click on the GUI versus trip to the lab



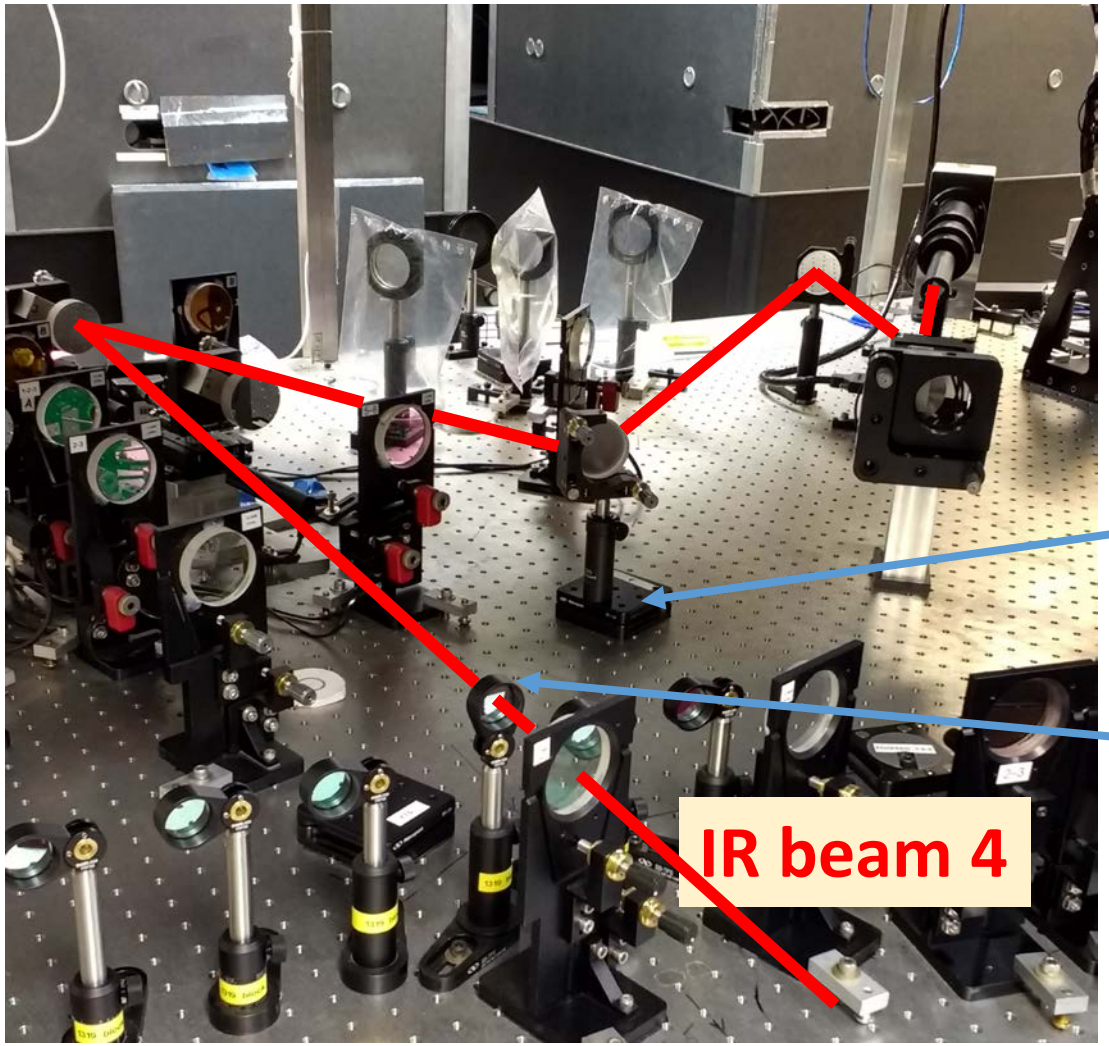
The reference dial is firmly* attached to the actual wheel and synchronously moves with the actual filter wheel inside the dewar.

* Still do not touch the reference dial!

Never try to turn the wheel by hand while the motor is attached.

The server runs on the GPS computer; on restart it will reset the wheel to J BAND.

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

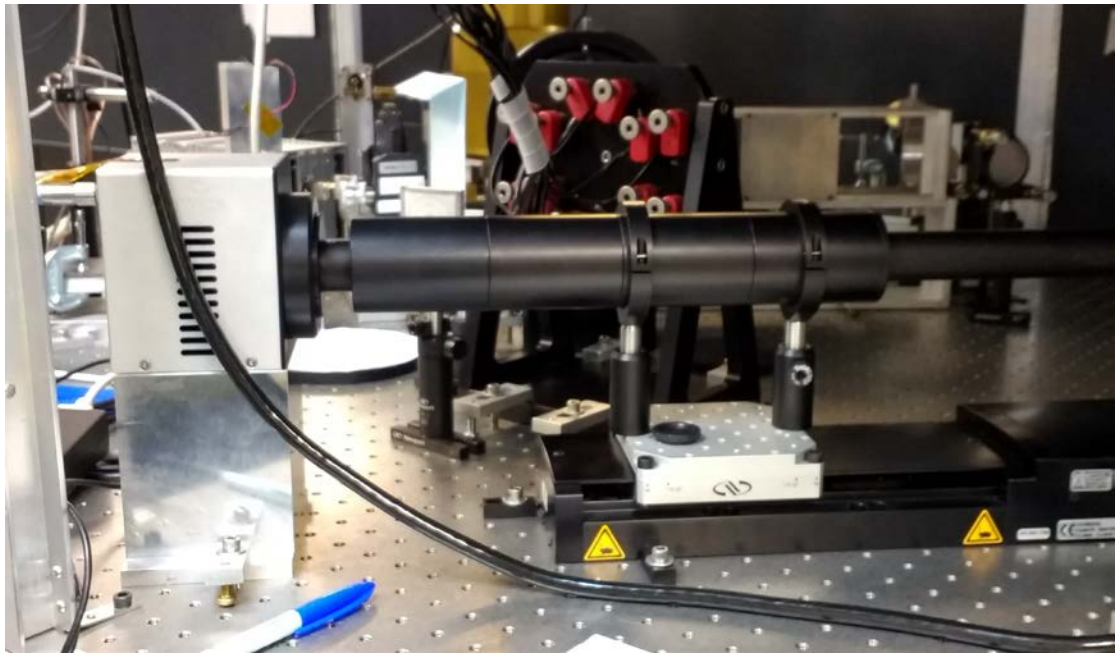


Set up on IR beam 4,
but CLIMB 2 could still be used.

Removable fold mirror on magnetic base

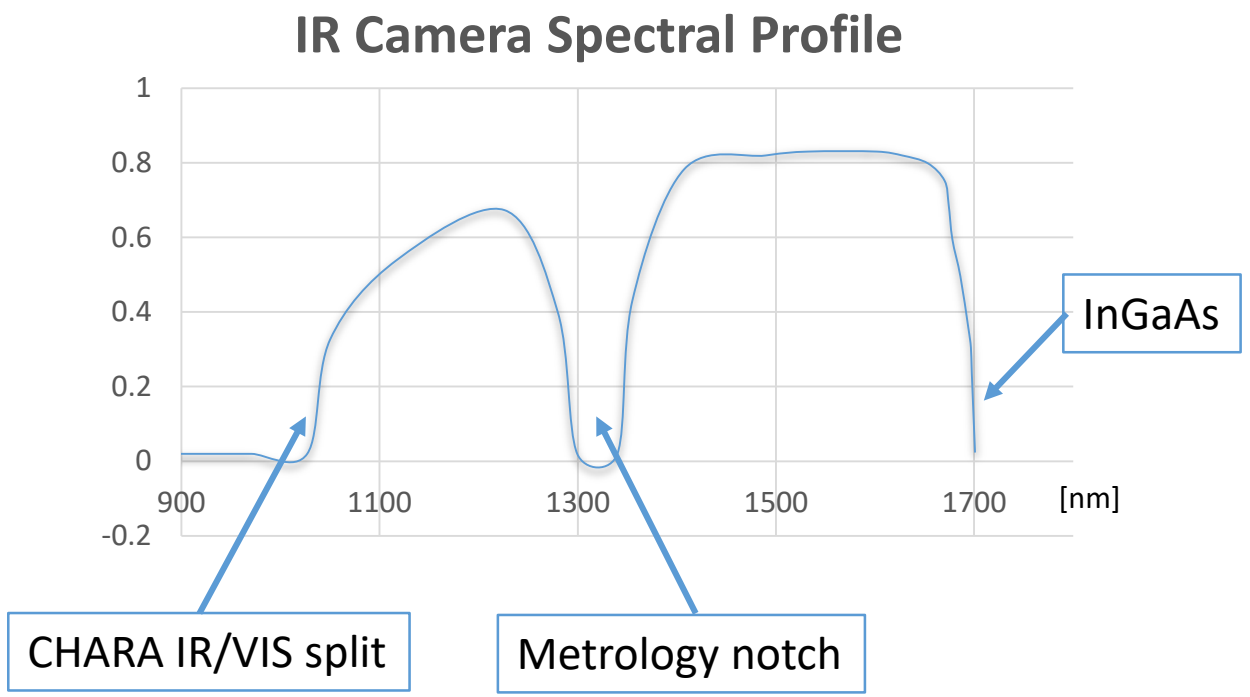
When the metrology laser is ON,
notch filter is necessary.

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE



Airy disk ~ 3.5 px , at 1600 nm
1 arc sec seeing → 4.3 px

29 px < Pupil image < 77 px , depending on pupil distance



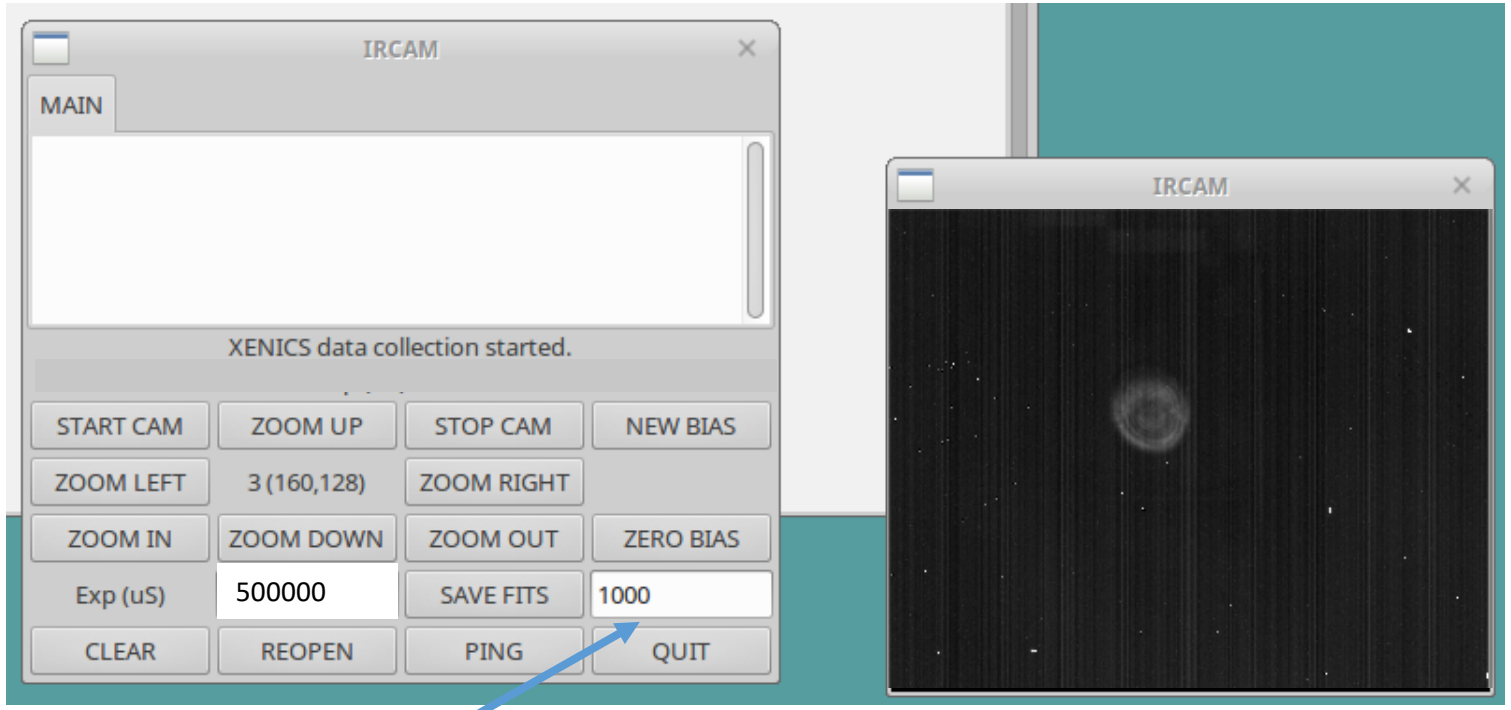
Major Parts:

- Xenics XEVA camera, borrowed from JouFLU
  320 x 250 px, 30 µm/pixel edge, InGaAs array
- f= 500 mm Ø1" plano-convex uncoated CaF_2 lens
- ESP translation stage with 100 mm travel

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

The Software:

- IRCAM is running on JouFLU computer
- GUI from command line: xenicsgtk IRCAM

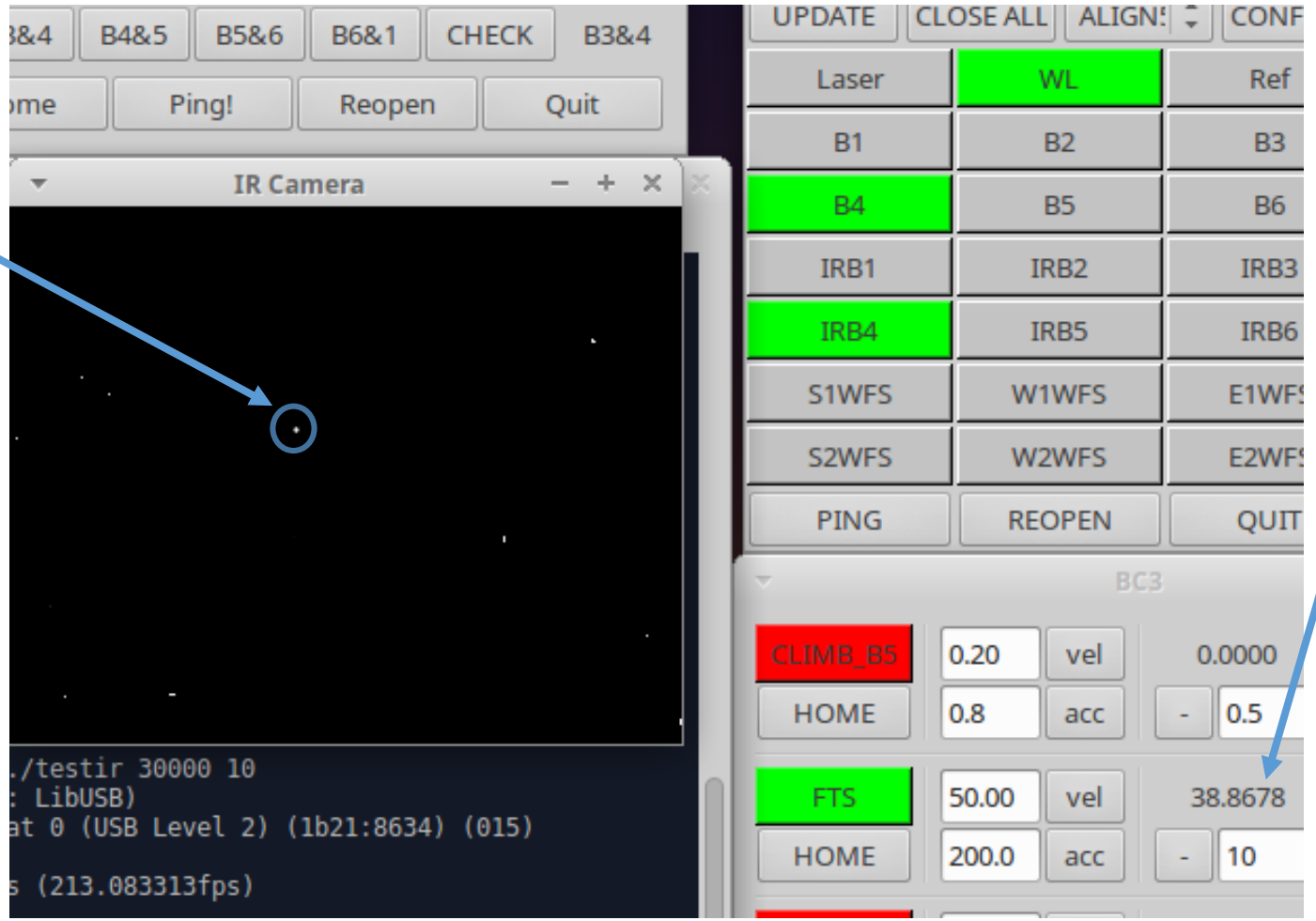


Unbiased full size frame showing the lab white light returned by the small corner cube from S2 table.

- Chosen number of frames may be saved in /ctrscrut/chara/data/YYYY_MM_DD_IRCAM_nnn.fit

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

Unbiased full size frame showing the image of the lab white light returned by the small corner cube from S2 table.
Exp = 30000 μs



(Screen shot was taken using the test version of the software.)

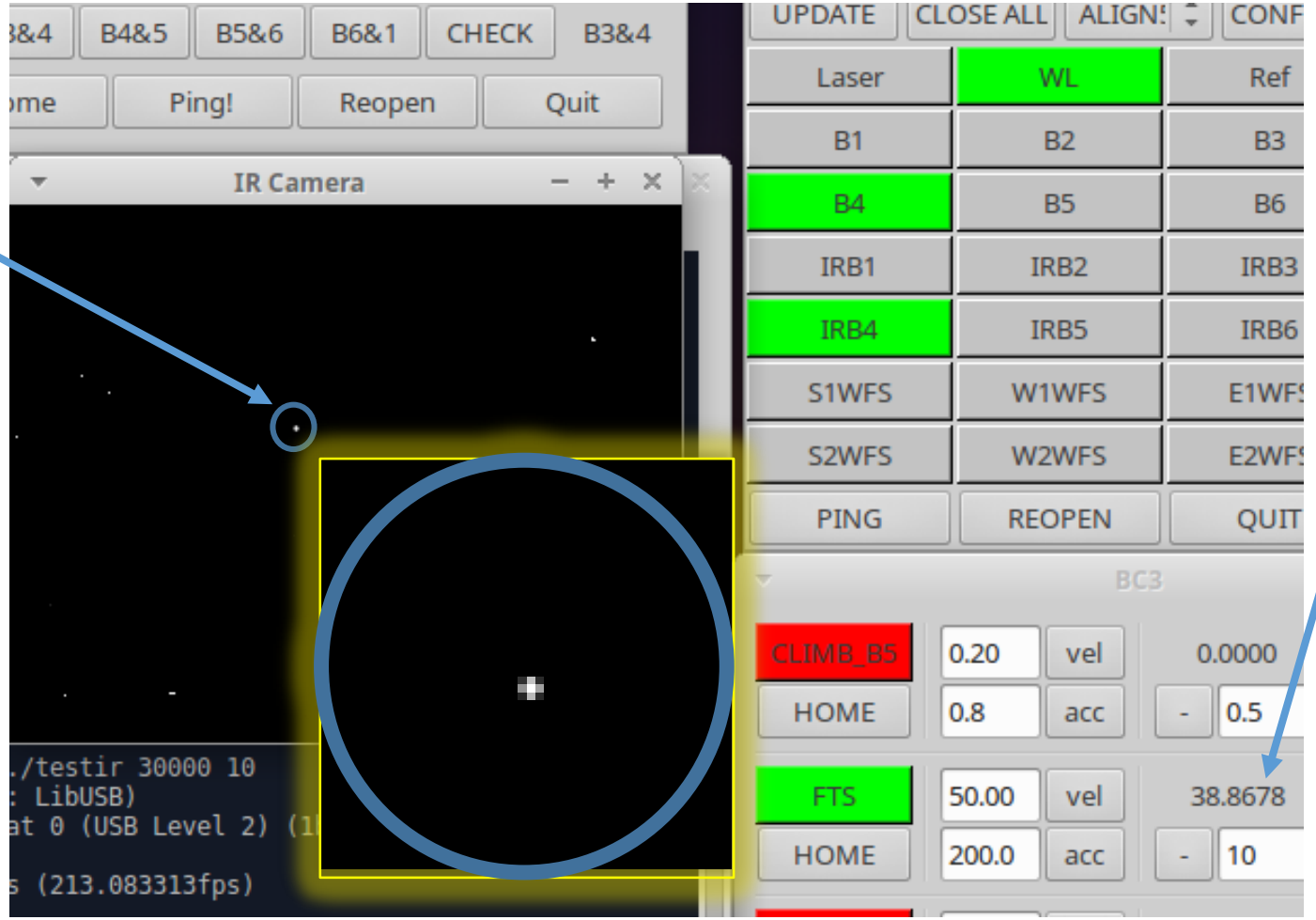
Focusing is done by moving the ESP stage connected to BC3 at FTS axis.

Best focus found here. IRCAM focused to infinity.

Pupil images are at smaller numbers, move in negative direction to find.

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

Unbiased full size frame showing the image of the lab white light returned by the small corner cube from S2 table.
Exp = 30000 μs



(Screen shot was taken using the test version of the software.)

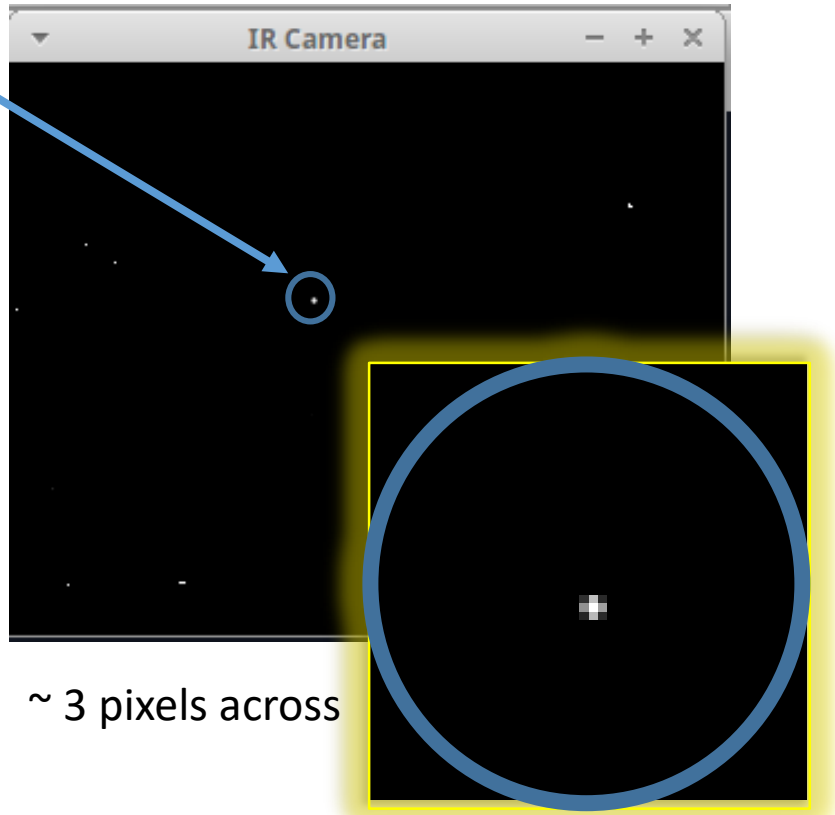
Focusing is done by moving the ESP stage connected to BC3 at FTS axis.

Best focus found here. IRCAM focused to infinity.

Pupil images are at smaller numbers, move in negative direction to find.

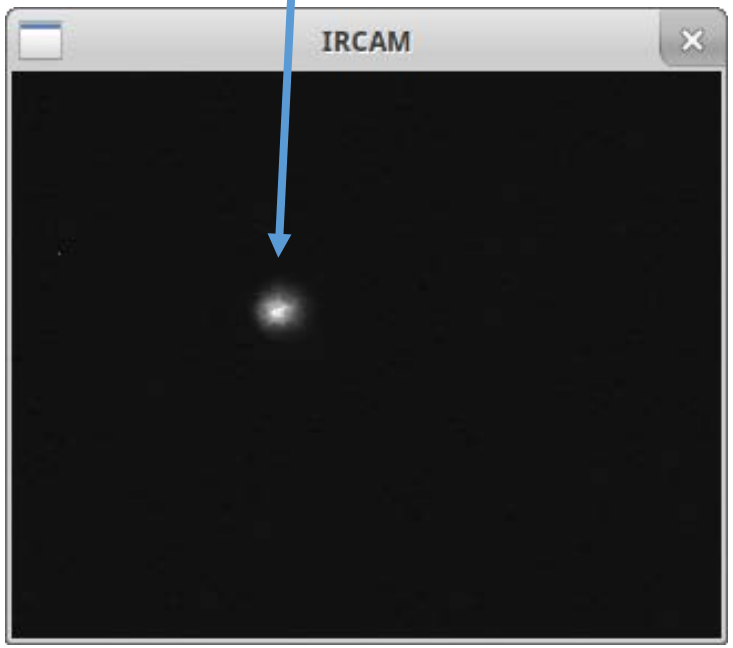
IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

Lab white light source in focus, Exp= 30 ms



~ 3 pixels across

Alpha Hya (H= -1.06) at same focus, Exp= 500 ms



Star in focus, dancing in bad seeing.
Zoom level = 1 (Is that the full screen?)

IR STAR IMAGER AND PUPIL CAMERA ON CLIMB TABLE

In focus,
bad seeing 03/14/2019

Alpha Hya H= -1.06, Exp= 500 ms
Zoom level = 5

Pupil image,
through pop 5, expected ~ 30 pixels