Speckle Instrument GUI - Linux User Guide

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Contents

1. Introduction

The Speckle Instrument GUI has been developed by The Random Factory (Tucson, AZ) in collaboration with the Speckle Instrument PI (Steve Howell) and collaborators (Nic Scott, and Mark Everett - KPNO).

2. Installation

The GUI and accompanying packages are packaged using the **gzipped tar** archives. To install the package :

- *tar xvzf speckle-control-x.y.z.tgz*

where x.y.z is the appropriate version number.

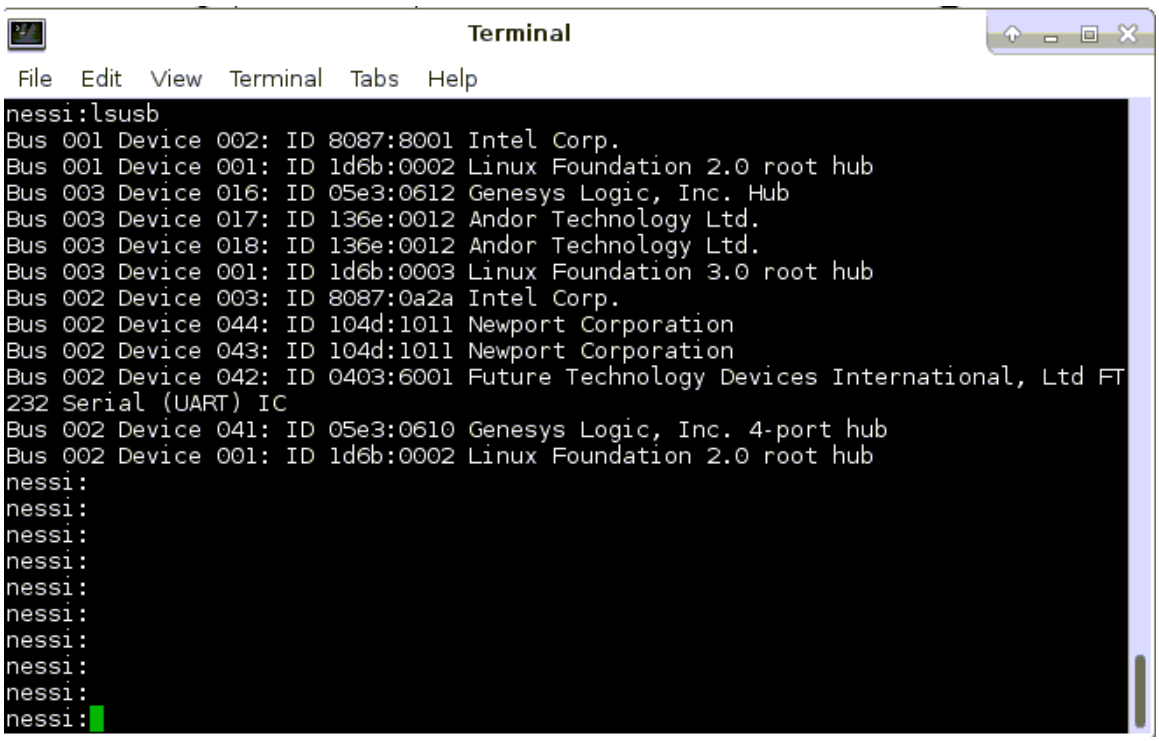
This installation will place the files in the directory ./speckle-control. Although it is possible to install the software to a different location, this is not recommended as it will be necessary to manually change the location in some of the scripts included with the drivers.

Run the Andor drivers installation script

./speckle-control/andor/TBD

Configure the USB devices for rw accessed

./speckle-control/setDevicePermissions



Once this setup has been completed, the interface can be started with the command

~/startspeckle2

These last two steps can also be done by double-clicking the appropriate desktop icons.

3. Graphical user interface.

The graphical user interface provides easy acces to the major functions such as image acquisition, temperature control, and device setup and configuration.

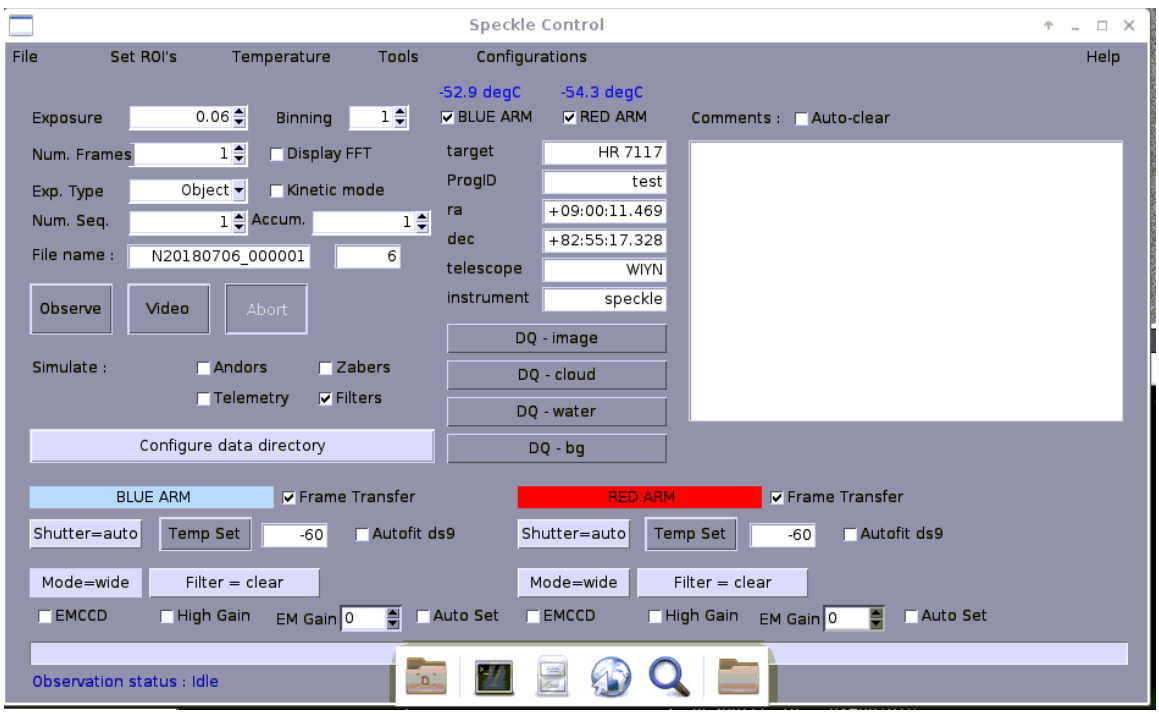
The program may be started from an xterm by typing (in the speckle-control directory)

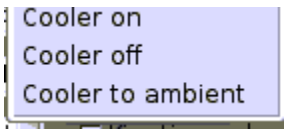
./startspeckle2

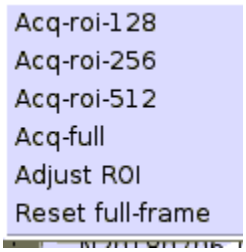
The program will open a small main window, and then create a message window which shows the progress of the system startup operations.

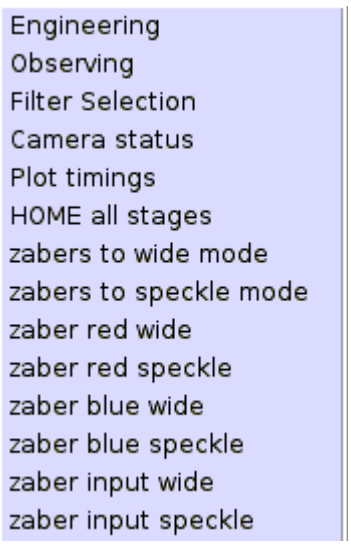
Once the message window closes, the system is ready for use. The camera is initialized, and temperature control has been switched on.

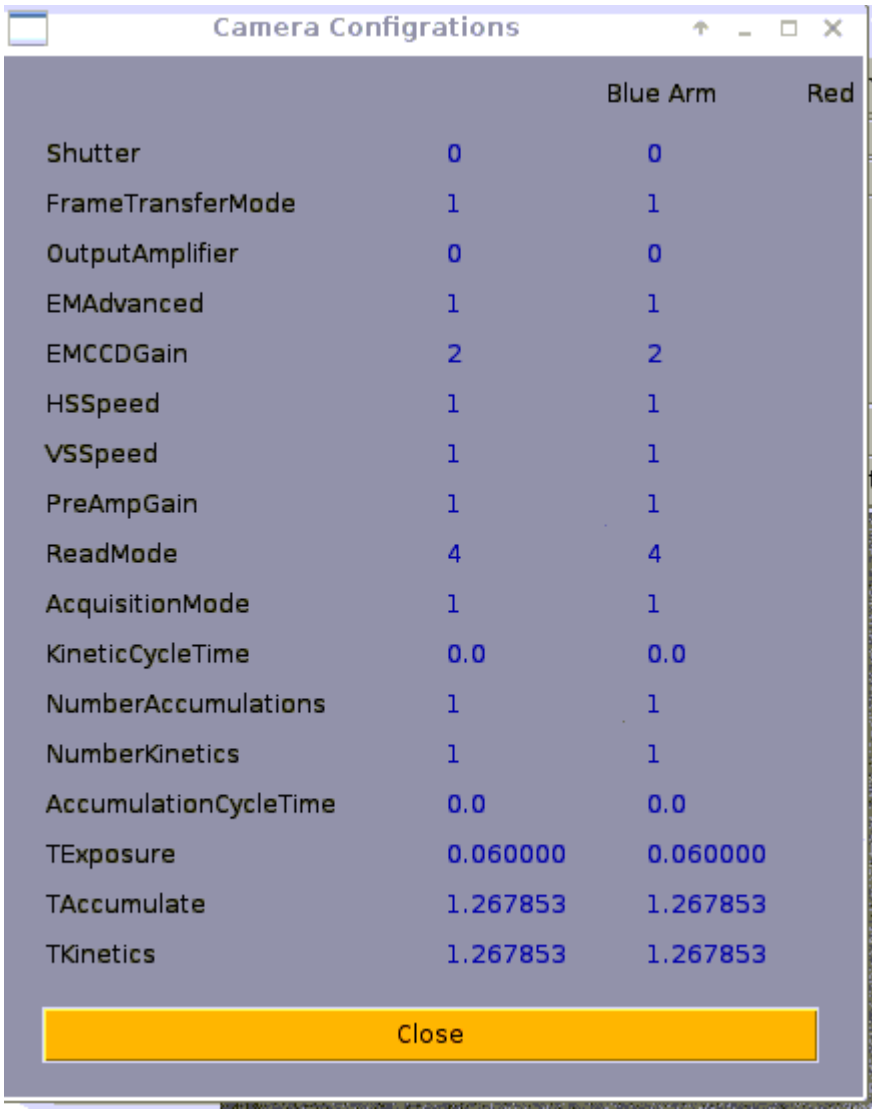
3.1 The main window

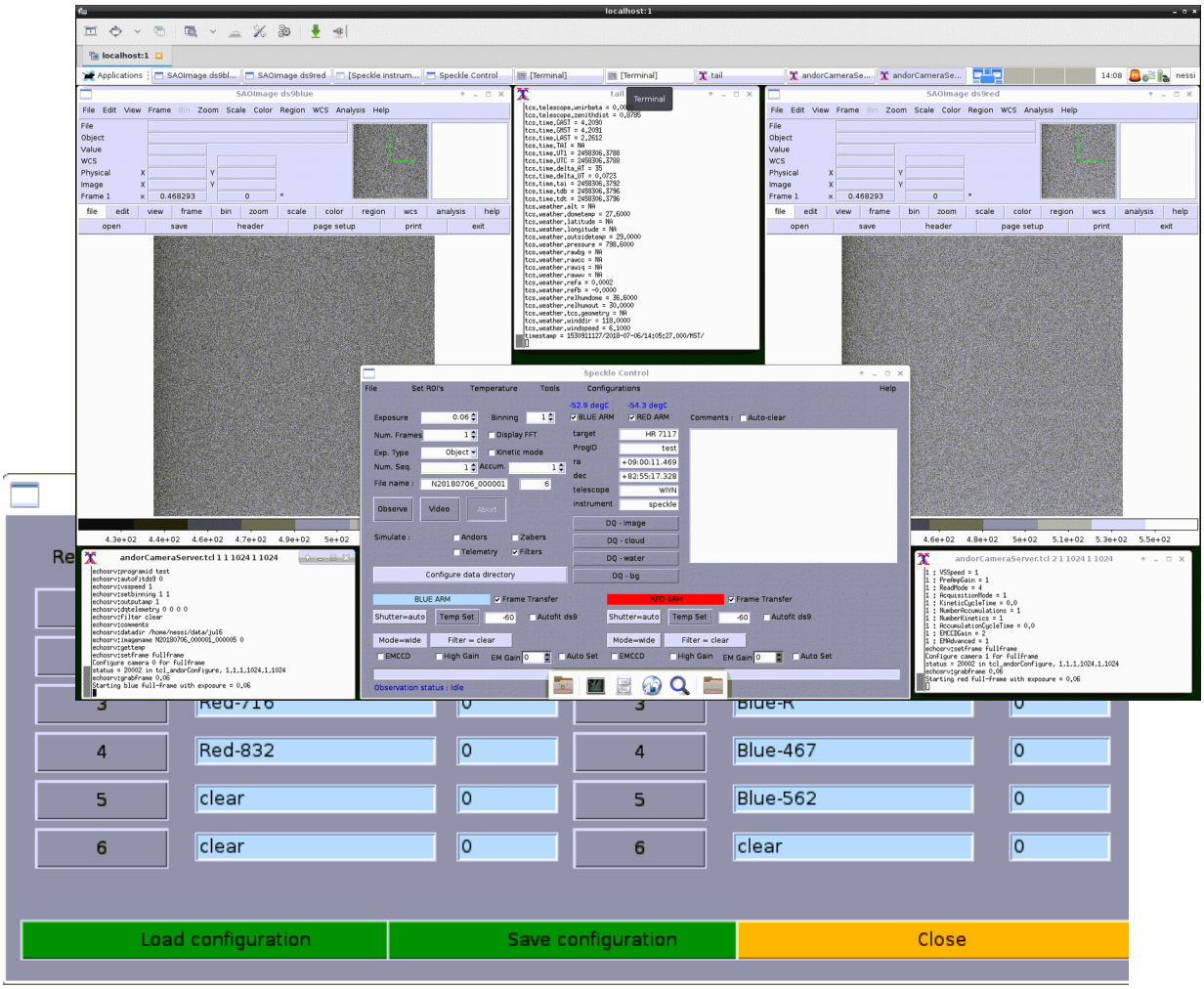


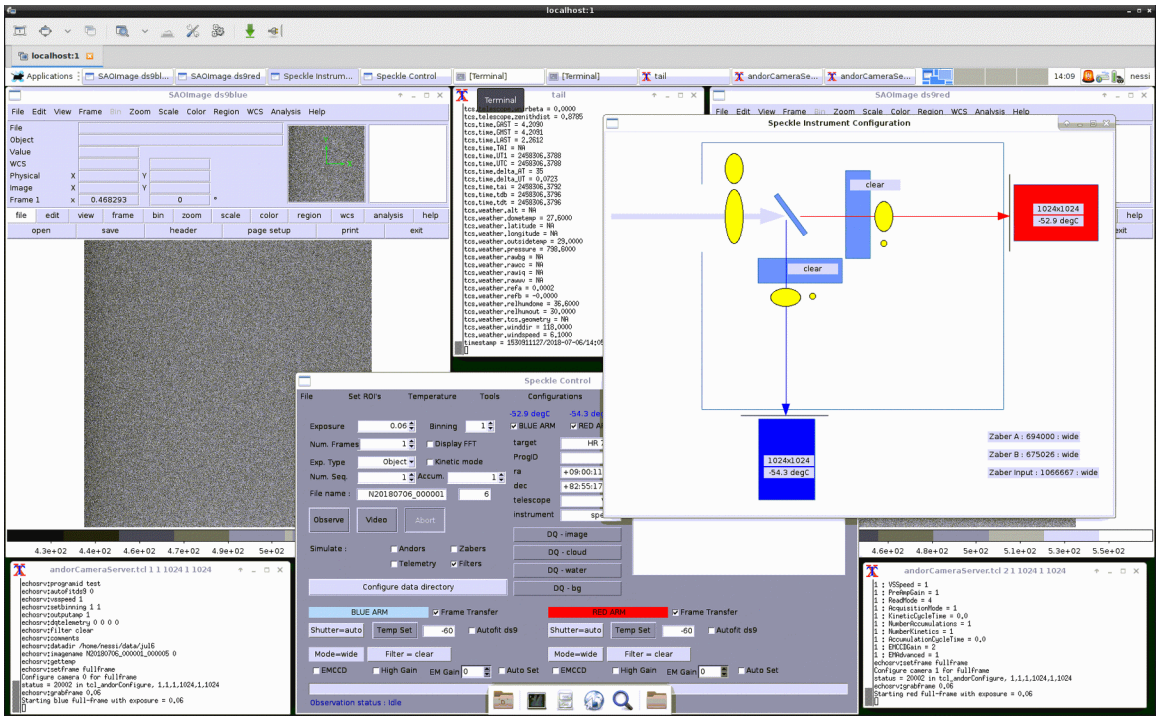

Cooler on
Cooler off
Cooler to ambient

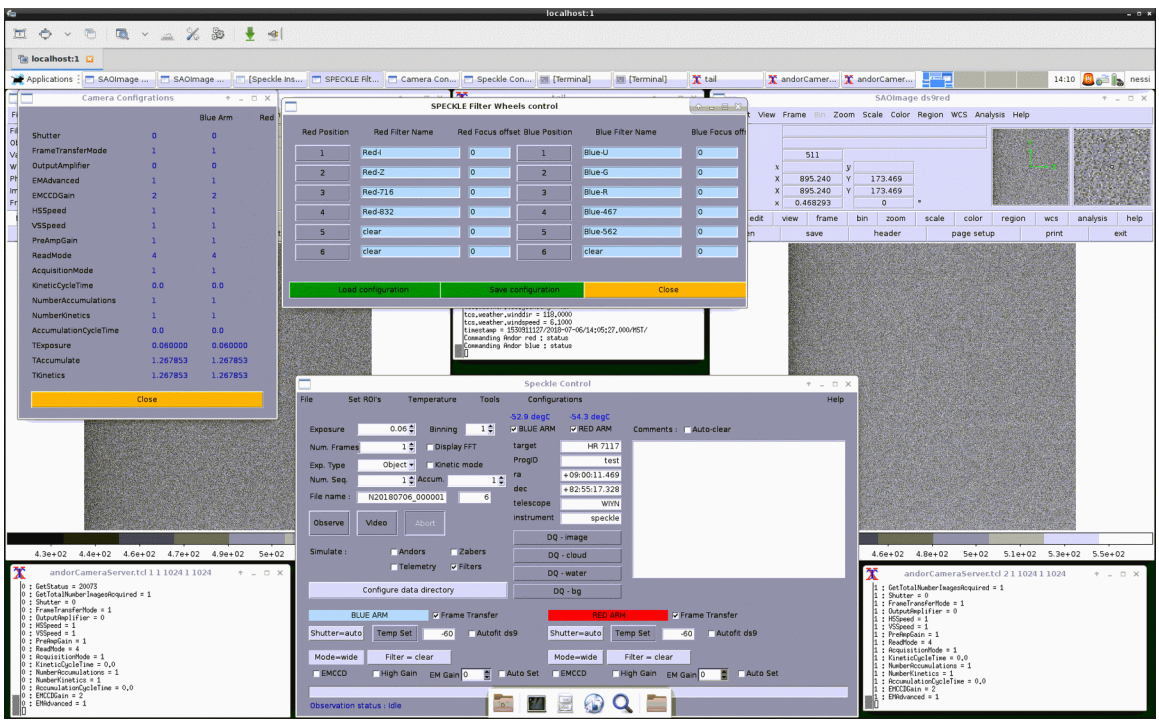

Acq-roi-128
Acq-roi-256
Acq-roi-512
Acq-full
Adjust ROI
Reset full-frame

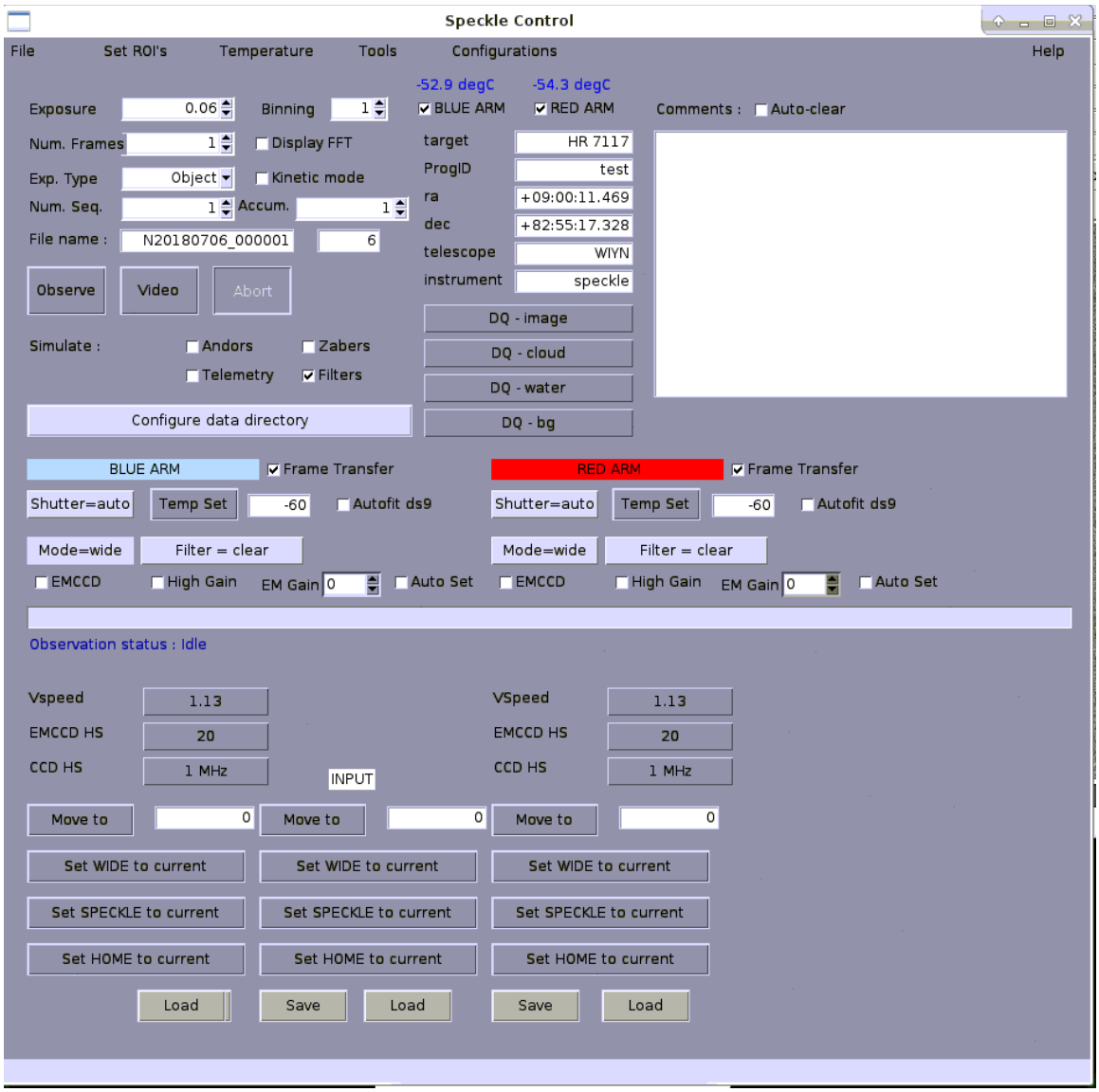

Engineering
Observing
Filter Selection
Camera status
Plot timings
HOME all stages
zabers to wide mode
zabers to speckle mode
zaber red wide
zaber red speckle
zaber blue wide
zaber blue speckle
zaber input wide
zaber input speckle

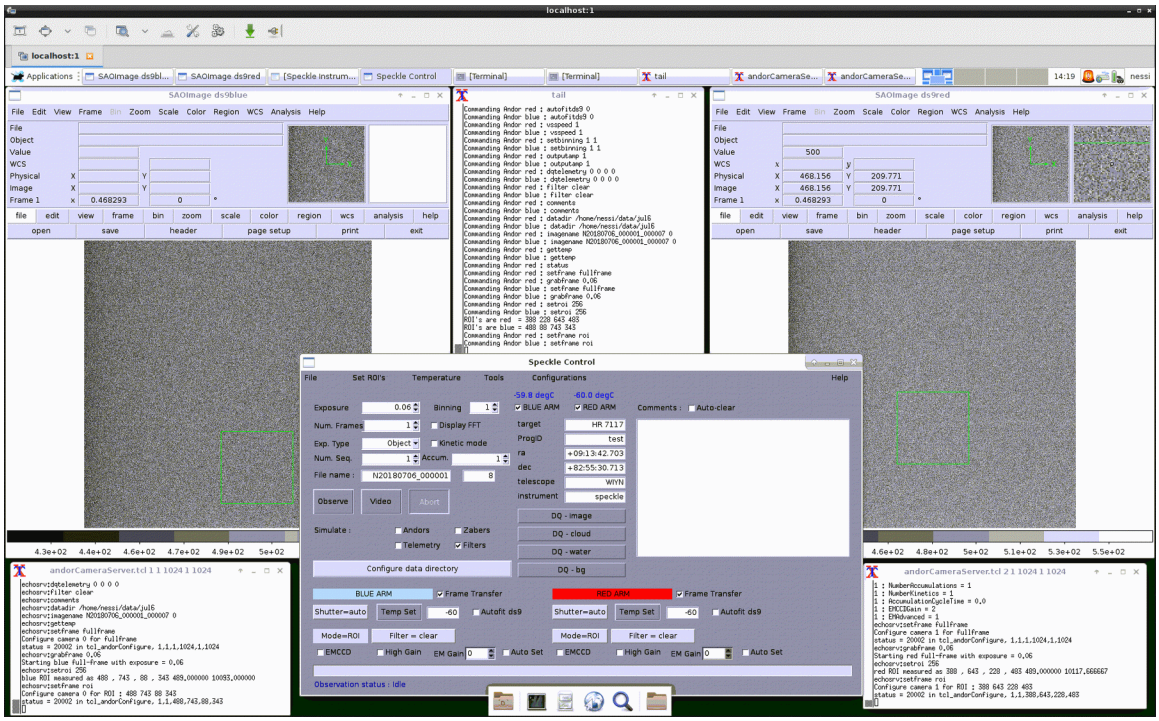

Camera Configrations
Blue Arm
Red
Shutter 0 0
FrameTransferMode 1 1
OutputAmplifier 0 0
EMAdvanced 1 1
EMCCDGain 2 2
HSSpeed 1 1
VSSpeed 1 1
PreAmpGain 1 1
ReadMode 4 4
AcquisitionMode 1 1
KineticCycleTime 0.0 0.0
NumberAccumulations 1 1
NumberKinetics 1 1
AccumulationCycleTime 0.0 0.0
TExposure 0.060000 0.060000
TAccumulate 1.267853 1.267853
TKinetics 1.267853 1.267853
Close

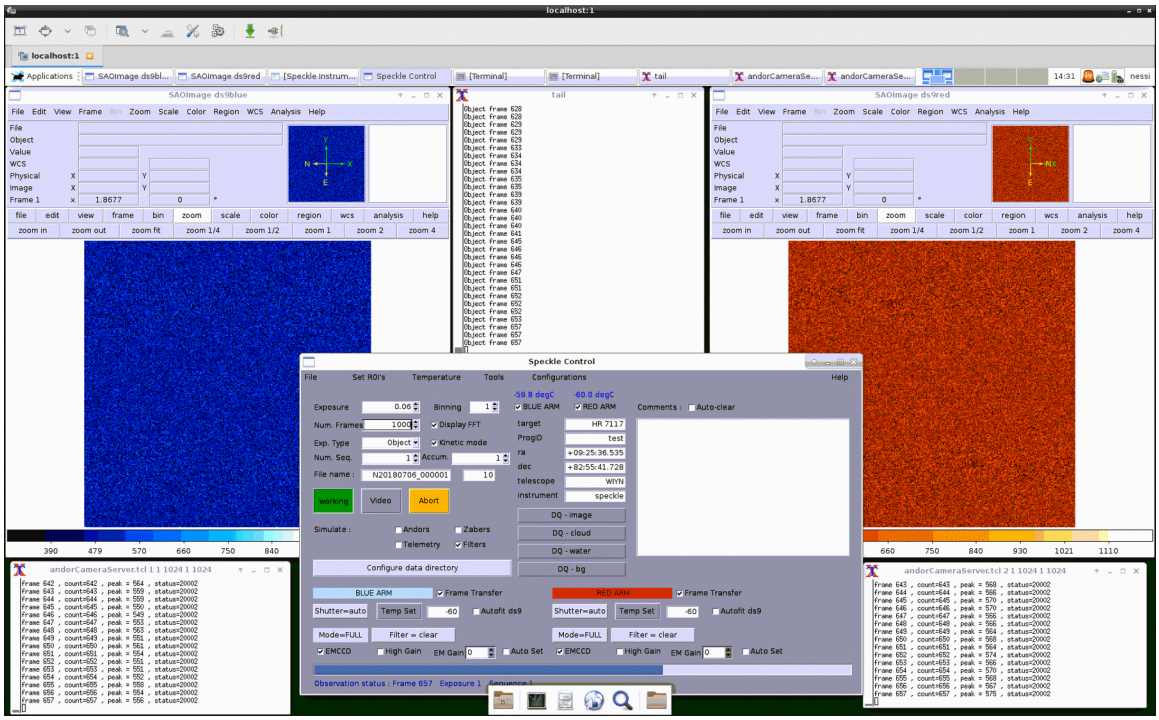

Speckle Control
Red-716
Red-832
clear
clear
Blue-R
Blue-467
Blue-562
clear
Load configuration
Save configuration
Close

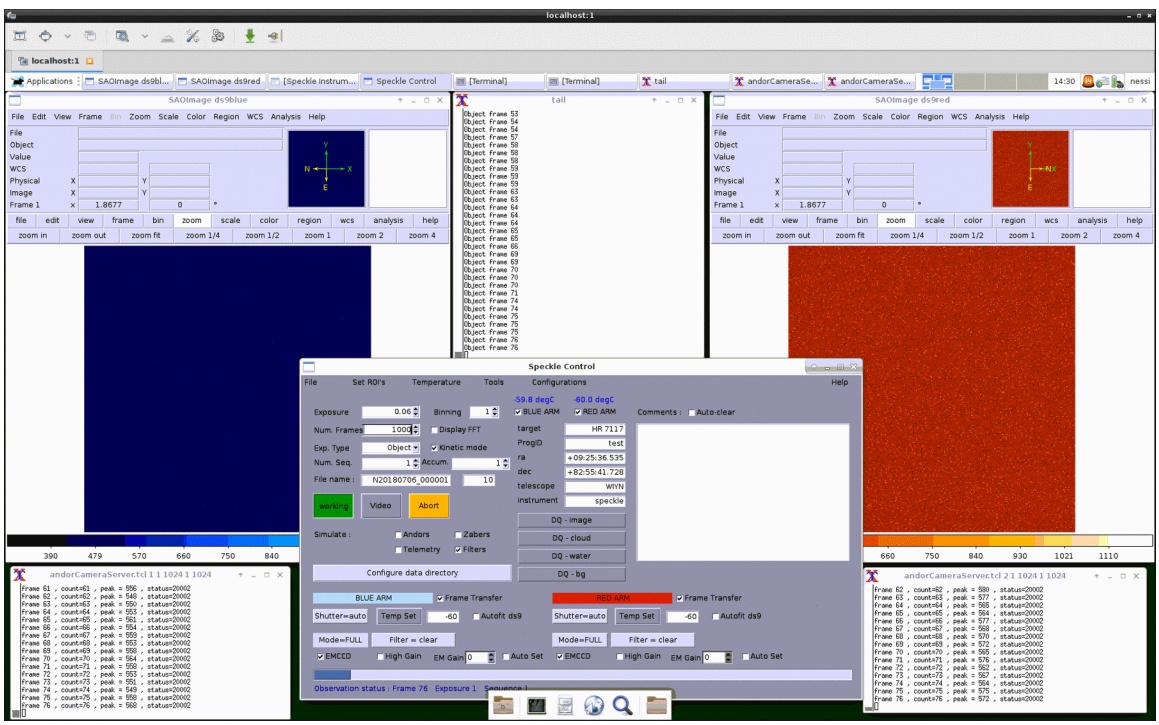

localhost:1
SAOImage ds9blue
SAOImage ds9red
Speckle Instrument Configuration
clear
clear
1024x1024
-52.9 degC
1024x1024
-54.3 degC
Zaber A : 694000 : wide
Zaber B : 675026 : wide
Zaber Input : 1066667 : wide
Speckle Control
Observe
Video
Abort
Configure data directory
BLUE ARM
RED ARM
Frame Transfer
Observation status : Idle
andorCameraServer.tcl 1 1 1024 1 1024
andorCameraServer.tcl 2 1 1024 1 1024

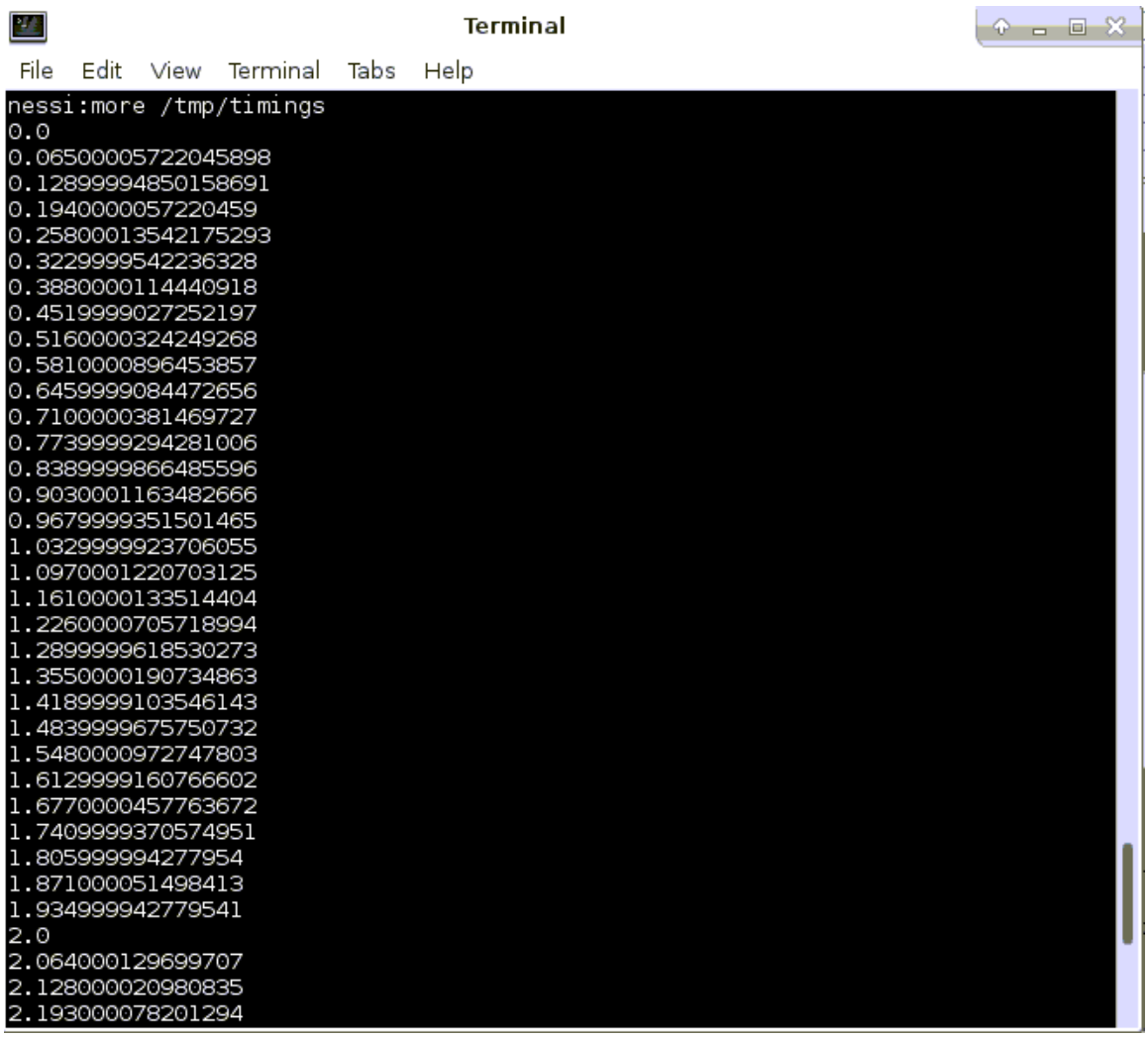

localhost:1
Camera Configurations
SPECKLE Filter Wheels control
Red Position
Red Filter Name
Red Focus offset
Blue Position
Blue Filter Name
Blue Focus offset
Lead configuration
Save configuration
Close
SAOImage ds9red
Speckle Control
Observe
Video
Abort
Configure data directory
BLUE ARM
RED ARM
Frame Transfer
Observation status : Idle
andorCameraServer.tcl 1 1 1024 1 1024
andorCameraServer.tcl 2 1 1024 1 1024

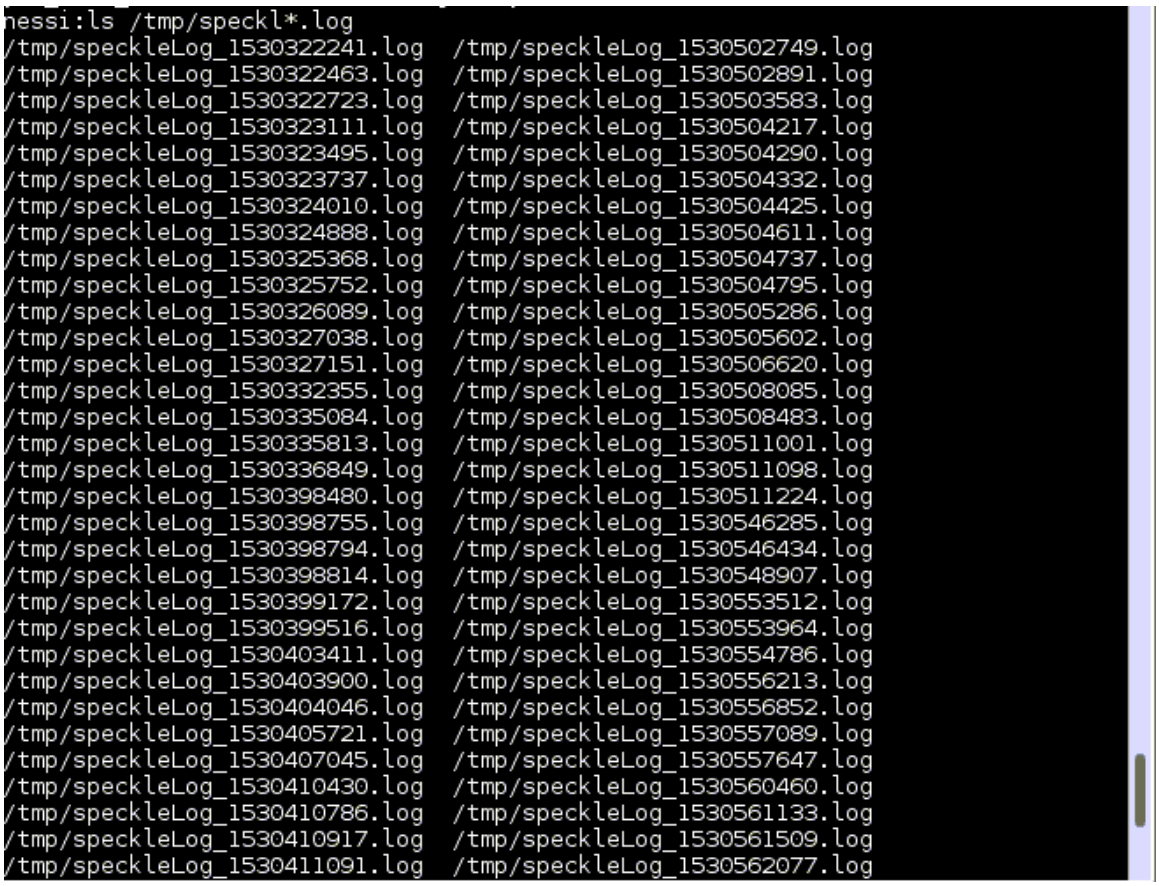

Speckle Control
File
Set ROI's
Temperature
Tools
Configurations
Help
-52.9 degC
-54.3 degC
Exposure
0.06
Binning
1
BLUE ARM
RED ARM
Comments :
Auto-clear
Num. Frames
1
Display FFT
target
HR 7117
Exp. Type
Object
Kinetic mode
ProgID
test
Num. Seq.
1
Accum.
1
ra
+09:00:11.469
File name :
N20180706_000001
6
dec
+82:55:17.328
telescope
WIYN
instrument
speckle
Observe
Video
Abort
DQ - image
Simulate :
Andors
Zabers
DQ - cloud
Telemetry
Filters
DQ - water
Configure data directory
DQ - bg
BLUE ARM
Frame Transfer
RED ARM
Frame Transfer
Shutter=auto
Temp Set
-60
Autofit ds9
Shutter=auto
Temp Set
-60
Autofit ds9
Mode=wide
Filter = clear
Mode=wide
Filter = clear
EMCCD
High Gain
EM Gain
0
Auto Set
EMCCD
High Gain
EM Gain
0
Auto Set
Observation status : Idle
Vspeed
1.13
VSpeed
1.13
EMCCD HS
20
EMCCD HS
20
CCD HS
1 MHz
INPUT
CCD HS
1 MHz
Move to
0
Move to
0
Move to
0
Set WIDE to current
Set WIDE to current
Set WIDE to current
Set SPECKLE to current
Set SPECKLE to current
Set SPECKLE to current
Set HOME to current
Set HOME to current
Set HOME to current
Load
Save
Load
Save
Load


localhost:1
SAOImage ds9blue
tail
SAOImage ds9red
Speckle Control
andorCameraServer.tcl 1 1 1024 1 1024
andorCameraServer.tcl 2 1 1024 1 1024


localhost:1
SAOImage ds9blue
tail
SAOImage ds9red
Speckle Control
andorCameraServer.tcl 1 1 1024 1 1024
andorCameraServer.tcl 2 1 1024 1 1024


localhost:1
SAOImage ds9blue
tail
SAOImage ds9red
Speckle Control
andorCameraServer.tcl 1 1 1024 1 1024
andorCameraServer.tcl 2 1 1024 1 1024


Terminal
File Edit View Terminal Tabs Help
nessi:more /tmp/timings
0.0
0.06500005722045898
0.12899994850158691
0.1940000057220459
0.25800013542175293
0.3229999542236328
0.3880000114440918
0.4519999027252197
0.5160000324249268
0.5810000896453857
0.6459999084472656
0.7100000381469727
0.7739999294281006
0.8389999866485596
0.9030001163482666
0.9679999351501465
1.0329999923706055
1.0970001220703125
1.1610000133514404
1.2260000705718994
1.2899999618530273
1.3550000190734863
1.4189999103546143
1.4839999675750732
1.5480000972747803
1.6129999160766602
1.6770000457763672
1.7409999370574951
1.805999994277954
1.871000051498413
1.934999942779541
2.0
2.064000129699707
2.128000020980835
2.193000078201294


nessi:ls /tmp/speckl*.log
/tmp/speckleLog_1530322241.log
/tmp/speckleLog_1530322463.log
/tmp/speckleLog_1530322723.log
/tmp/speckleLog_1530323111.log
/tmp/speckleLog_1530323495.log
/tmp/speckleLog_1530323737.log
/tmp/speckleLog_1530324010.log
/tmp/speckleLog_1530324888.log
/tmp/speckleLog_1530325368.log
/tmp/speckleLog_1530325752.log
/tmp/speckleLog_1530326089.log
/tmp/speckleLog_1530327038.log
/tmp/speckleLog_1530327151.log
/tmp/speckleLog_1530332355.log
/tmp/speckleLog_1530335084.log
/tmp/speckleLog_1530335813.log
/tmp/speckleLog_1530336849.log
/tmp/speckleLog_1530398480.log
/tmp/speckleLog_1530398755.log
/tmp/speckleLog_1530398794.log
/tmp/speckleLog_1530398814.log
/tmp/speckleLog_1530399172.log
/tmp/speckleLog_1530399516.log
/tmp/speckleLog_1530403411.log
/tmp/speckleLog_1530403900.log
/tmp/speckleLog_1530404046.log
/tmp/speckleLog_1530405721.log
/tmp/speckleLog_1530407045.log
/tmp/speckleLog_1530410430.log
/tmp/speckleLog_1530410786.log
/tmp/speckleLog_1530410917.log
/tmp/speckleLog_1530411091.log
/tmp/speckleLog_1530502749.log
/tmp/speckleLog_1530502891.log
/tmp/speckleLog_1530503583.log
/tmp/speckleLog_1530504217.log
/tmp/speckleLog_1530504290.log
/tmp/speckleLog_1530504332.log
/tmp/speckleLog_1530504425.log
/tmp/speckleLog_1530504611.log
/tmp/speckleLog_1530504737.log
/tmp/speckleLog_1530504795.log
/tmp/speckleLog_1530505286.log
/tmp/speckleLog_1530505602.log
/tmp/speckleLog_1530506620.log
/tmp/speckleLog_1530508085.log
/tmp/speckleLog_1530508483.log
/tmp/speckleLog_1530511001.log
/tmp/speckleLog_1530511098.log
/tmp/speckleLog_1530511224.log
/tmp/speckleLog_1530546285.log
/tmp/speckleLog_1530546434.log
/tmp/speckleLog_1530548907.log
/tmp/speckleLog_1530553512.log
/tmp/speckleLog_1530553964.log
/tmp/speckleLog_1530554786.log
/tmp/speckleLog_1530556213.log
/tmp/speckleLog_1530556852.log
/tmp/speckleLog_1530557089.log
/tmp/speckleLog_1530557647.log
/tmp/speckleLog_1530560460.log
/tmp/speckleLog_1530561133.log
/tmp/speckleLog_1530561509.log
/tmp/speckleLog_1530562077.log

4. Command Line usage

There is a rich set of commands to allow interactive and scripted usage.
To access the command line it is necessary to source the *startspeckle-cmds* script from the speckle-control directory and then type

source gui-scritpts/gui2.tcl

The following commands are available

Filter Wheel :

loadFiltersConfig [filename]
saveFiltersConfig [filename]
echoFiltersConfig
selectfilter arm filter-number
findWheels
resetFilterWheel arm

Zaber stages :

loadZaberConfig [filename]
saveZaberConfig [filename]
echoZaberConfig
zaberPrintProperties
zaberConnect
zaberDisconnect
homeZabers
zaberCheck

zaberSetPos name position

zabersStopAll

zaberGoto name station

Pico Stages :

loadPicosConfig [filename]

savePicosConfig [filename]

echoPicosConfig

picosConnect

picoCommand axis cmd

picoSet axis parameter value

Andor Cameras :

Command may be issued from the GUI command line, scripted , or optionally by telnet to ports 2001, 2002. When using the command line the syntax is

commandAndor arm "command and parameters"

or commandAndors "command and parameters"

accumulationcycletime seconds

acquisition index

autofitds9 0/1

baseclamp 0/1

comments comment1|comment2|....

configure hbin vbin vstart vend hstart hend preamp vsspeed ccdhss emccdhss

datadir data-directory

dqtelemetry rawiq rawcc raqwv rawbg

emadvanced index

emccdgain 0/1

fastVideo exposure xs ys dim

fitsbits data-format
forceroi xs xe ys ye
frametransfer index
gettemp
grabcube exposure xs ys dim
grabframe exposure
grabroi exposure xs ys dim
hsspeed amp index
imagename image-name
kineticcycletime seconds
locatestar smooth dim
numberaccumulations count
numberkinetics count
outputamp index
positiontelem input-zaber field-zaber filter
preampgain index
programid program-id
readmode index
reset mode
setexposure seconds
setframe mode
setroi mode
settemperature degrees
shutdown
shutter index
status
version
vsamplitude index
vsspeed index
whicharm

5. Recompiling the shared libraries

Low level functionality is provided in C/C++ for speed , and this code is

wrapped using tcl and loaded into the interpreter at runtime.
To move the code to a different version of Linux it may be necessary to recompile the libraries in the following directories. Each has either a Makefile or a set of build steps (e.g. andor/buildAndorWrap).

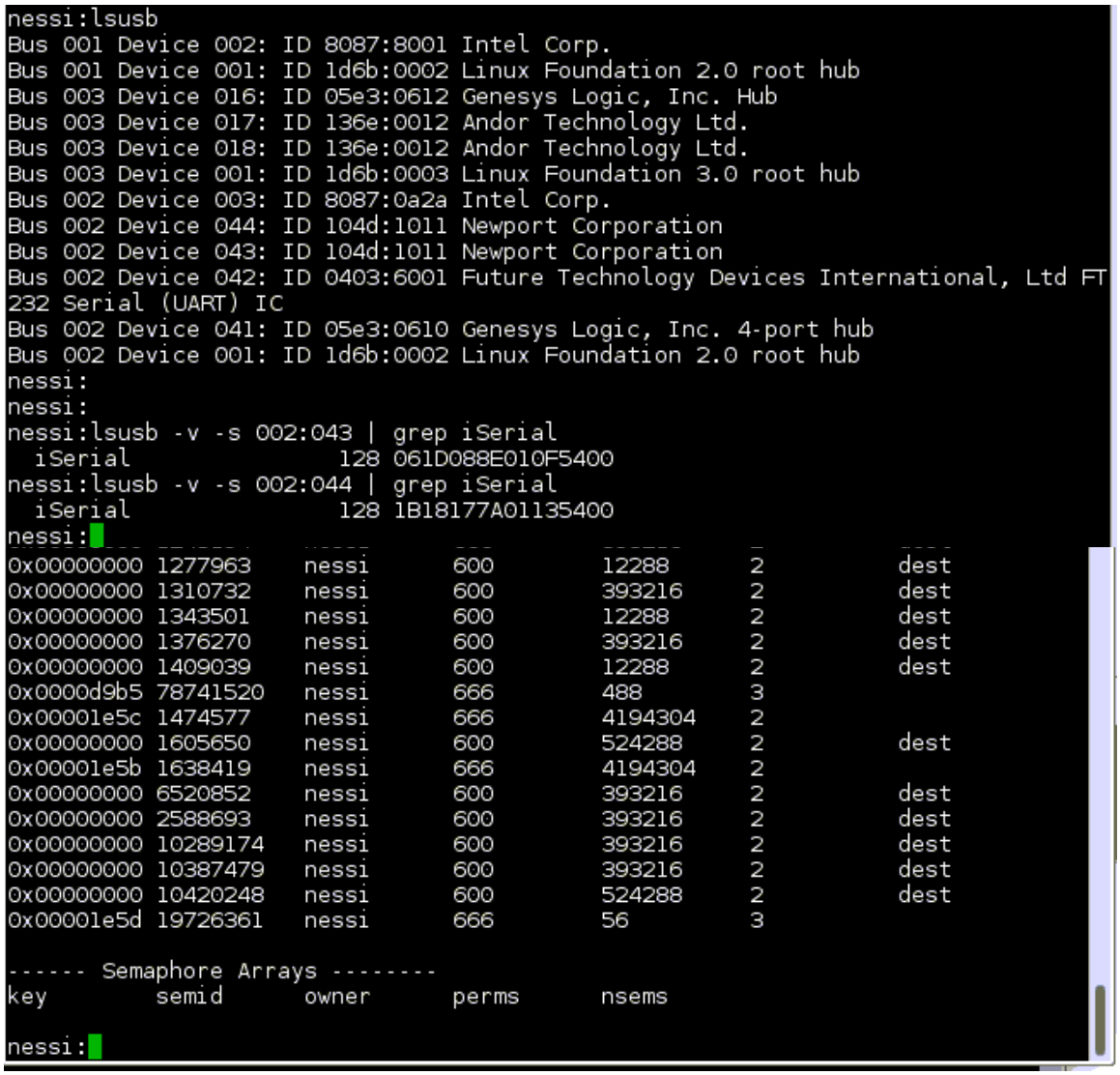
The Vips library may present more difficulty due to it's many dependencies.
The package can be recompiled using the GNU standard incantations

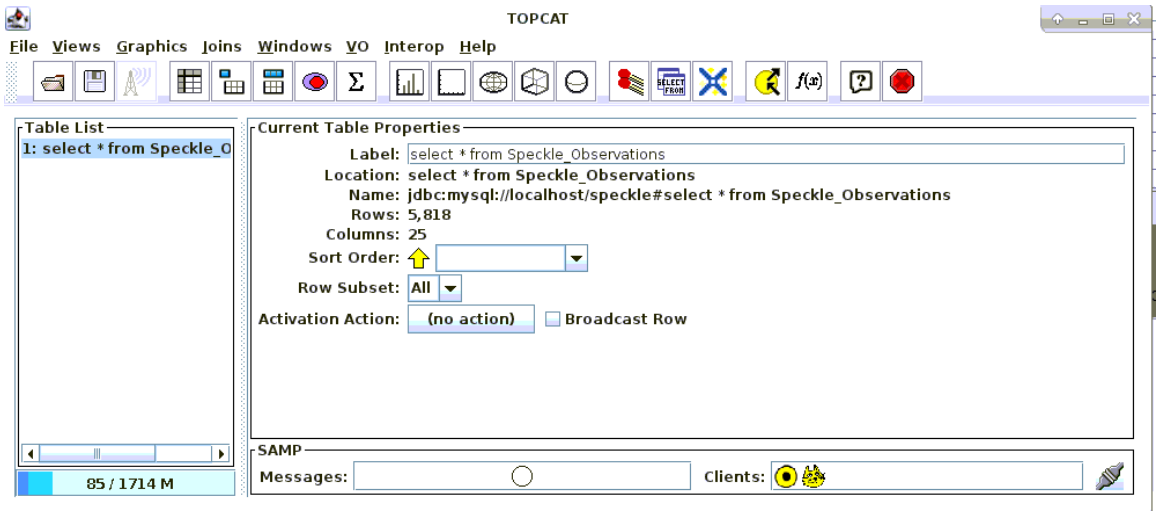
./configure --prefix=some-installation-directory --without-python
make install

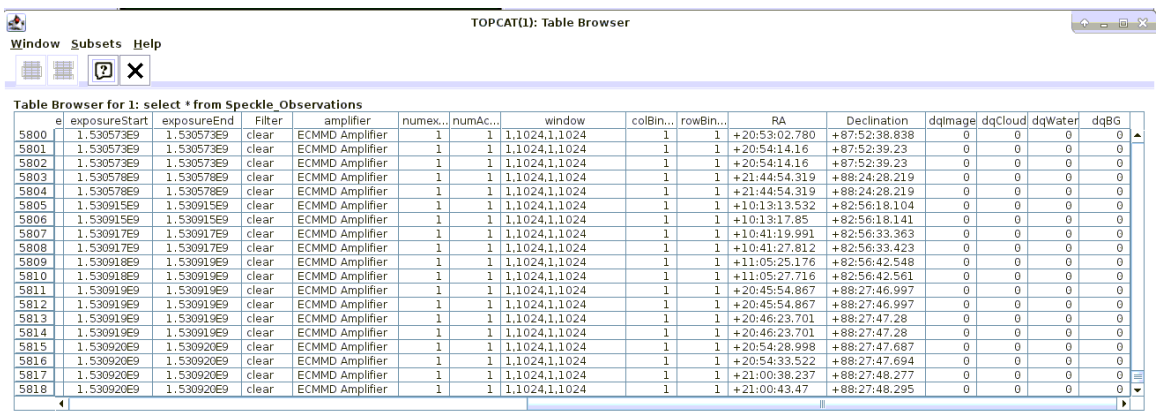
If the configure step does not work , try

sudo apt install automake autogen m4
libtoolize
aclocal
automake --add-missing
autoconf

then try the ./configure step again.


nessi:lsusb
Bus 001 Device 002: ID 8087:8001 Intel Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 003 Device 016: ID 05e3:0612 Genesys Logic, Inc. Hub
Bus 003 Device 017: ID 136e:0012 Andor Technology Ltd.
Bus 003 Device 018: ID 136e:0012 Andor Technology Ltd.
Bus 003 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 002 Device 003: ID 8087:0a2a Intel Corp.
Bus 002 Device 044: ID 104d:1011 Newport Corporation
Bus 002 Device 043: ID 104d:1011 Newport Corporation
Bus 002 Device 042: ID 0403:6001 Future Technology Devices International, Ltd FT
232 Serial (UART) IC
Bus 002 Device 041: ID 05e3:0610 Genesys Logic, Inc. 4-port hub
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
nessi:
nessi:
nessi:lsusb -v -s 002:043 | grep iSerial
iSerial 128 061D088E010F5400
nessi:lsusb -v -s 002:044 | grep iSerial
iSerial 128 1B18177A01135400
nessi:
0x00000000 1277963 nessi 600 12288 2 dest
0x00000000 1310732 nessi 600 393216 2 dest
0x00000000 1343501 nessi 600 12288 2 dest
0x00000000 1376270 nessi 600 393216 2 dest
0x00000000 1409039 nessi 600 12288 2 dest
0x0000d9b5 78741520 nessi 666 488 3
0x00001e5c 1474577 nessi 666 4194304 2
0x00000000 1605650 nessi 600 524288 2 dest
0x00001e5b 1638419 nessi 666 4194304 2
0x00000000 6520852 nessi 600 393216 2 dest
0x00000000 2588693 nessi 600 393216 2 dest
0x00000000 10289174 nessi 600 393216 2 dest
0x00000000 10387479 nessi 600 393216 2 dest
0x00000000 10420248 nessi 600 524288 2 dest
0x00001e5d 19726361 nessi 666 56 3
------ Semaphore Arrays --------
key semid owner perms nsems
nessi:





e	exposureStart	exposureEnd	Filter	amplifier	numex...	numAc...	window	colBin...	rowBin...	RA	Declination	dqImage	dqCloud	dqWater	dqBG
5800	1.530573E9	1.530573E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:53:02.780	+87:52:38.838	0	0	0	0
5801	1.530573E9	1.530573E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:54:14.16	+87:52:39.23	0	0	0	0
5802	1.530573E9	1.530573E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:54:14.16	+87:52:39.23	0	0	0	0
5803	1.530578E9	1.530578E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+21:44:54.319	+88:24:28.219	0	0	0	0
5804	1.530578E9	1.530578E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+21:44:54.319	+88:24:28.219	0	0	0	0
5805	1.530915E9	1.530915E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+10:13:13.532	+82:56:18.104	0	0	0	0
5806	1.530915E9	1.530915E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+10:13:17.85	+82:56:18.141	0	0	0	0
5807	1.530917E9	1.530917E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+10:41:19.991	+82:56:33.363	0	0	0	0
5808	1.530917E9	1.530917E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+10:41:27.812	+82:56:33.423	0	0	0	0
5809	1.530918E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+11:05:25.176	+82:56:42.548	0	0	0	0
5810	1.530918E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+11:05:27.716	+82:56:42.561	0	0	0	0
5811	1.530919E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:45:54.867	+88:27:46.997	0	0	0	0
5812	1.530919E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:45:54.867	+88:27:46.997	0	0	0	0
5813	1.530919E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:46:23.701	+88:27:47.28	0	0	0	0
5814	1.530919E9	1.530919E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:46:23.701	+88:27:47.28	0	0	0	0
5815	1.530920E9	1.530920E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:54:28.998	+88:27:47.687	0	0	0	0
5816	1.530920E9	1.530920E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+20:54:33.522	+88:27:47.694	0	0	0	0
5817	1.530920E9	1.530920E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+21:00:38.237	+88:27:48.277	0	0	0	0
5818	1.530920E9	1.530920E9	clear	ECMMD Amplifier	1	1	1,1024,1,1024	1	1	+21:00:43.47	+88:27:48.295	0	0	0	0