Current Status

GIRAFFE has been mothballed following the failure of its control software, a lack of source code to delve into to fix it and a current lack of staff resources for creating a modern control programme. The instrument was undergoing a series of upgrades to improve performance and provide a data reduction pipeline. This is now on hold, with other instrument projects taking priority.

Brief description of GIRAFFE

The SAAO **G**rating **I**nstrument for **R**adiation **A**nalysis with a **F**ibre **F**ed **É**chelle - GIRAFFE - consists of two components:

(i) The head which is mounted at the Cassegrain focus to collect light from the star and direct it into the fibre;

(ii) The spectrograph, constructed on an optical bench in the Coude room, in which the light emerging from the fibre is dispersed and recorded by a CCD camera.

The CCD camera is controlled by a PC in the observing room. The software, called QUARTZ, has the task of setting the exposure time, reading and displaying the CCD image and also controlling various components on the GIRAFFE head, such as the arc lamp and flatfield lamps. At the end of the exposure the FITS file is transferred to the server and can be displayed and reduced via the thin client.

There are four PCs that the observer will use:

1. A Linux PC called *giraffe* running QUARTZ.

2. A thin client system for data storage *ltsp.suth.saao.ac.za*.

3. A laptop running a LabView program to display the APD counts, i.e. monitor the light intensity emerging from the fibre.

4. The Linux TCS PC for acquisition and autoguiding.

Data storage

The PC on which QUARTZ should not be used for any other purpose. The same applies to the TCS. GIRAFFE data should be automatically transferred from the *giraffe* PC to the server, which is accessible from the thin client (the monitor to the left of APD counting laptop), where data reduction software, ds9, web browsers, etc. can be used.

You should check that your data is being transferred by logging into the thin client

Username: ccd74 Password: label on monitor cd /data/74in/giraffe/data/image/yyyymmdd

Your files will be named *annnmmmm.fits*, where *nnn* is your run number.

Data reduction Software for Giraffe

Filling the cryostat

After filling the cryostat, you must wait 30 mins before beginning observations.

A technician will fill the cryostat at ~08:00 and ~16:00 (check on the log outside the Coude room that this has been done before you start observing). The observer must fill the cryostat either at ~19:00 and at the end of the night (avoiding the need to stop during observing), or at ~00:00, whether or not observations have been made.

The cryostat is filled from the dewar outside the Coude room. Check the pressure of the dewar - it should be ~10 bar, and must not exceed 15 bar. Open the right-hand blue tap to start filling, and watch the cryostat. Close the tap when liquid nitrogen starts to drip out of the cryostat.

The CCD "https://topswiki.saao.ac.zatank"https://topswiki.saao.ac.za temperature should be ~180K, and the "https://topswiki.saao.ac.zasink"https://topswiki.saao.ac.za temperature ~79K. The temperatures are displayed toward the bottom of the QUARTZ window.

Even in bad weather, the cryostat must be filled during the night. The last filling for the night should not be done before midnight.

Instrument & software startup

The instrument is controlled by the QUARTZ software on giraffe PC.

Starting the software

1) Log on as *ccd* (usual password)

2) *cd* to working directory

3) Enter command: *new_quartz*

4) In the pop-up CCD menu, select *MUS1*

5) In the second pop-up window, select *Local setup files* ? select *giraffe.gir* ? *Ready* ? *Ok*

Each GIRAFFE run is assigned a **run number**, that QUARTZ will now prompt you to enter. To determine your run number, look in the GIRAFFE log book located in the 1.9-m dome book rack and look for the last entry. Increase that run number by one. If you are a returning observer and wish to use the same directory, you will need to change your run number by deleting the file *disk.file* from your directory.

QUARTZ will now initialise the CCD controller and check the status of the GIRAFFE head. Do the following:

- Wait 2 minutes for it to finish initalising.

- Check that things are working, by reading out the CCD by selecting *Read CCD* from the *CCD* drop-down menu at the top right of the QUARTZ window. This will display information regarding the bias reading and the maximum CCD count.
- Select ?Filter? ? ?Init? at start of run, and again before every filter change.

Setting prism position & determining wavelength range

First determine the required prism position for your desired wavelength coverage.

Then **at the start of the run or after a software crash**, follow these steps using options available by clicking on the ?Init? button at the top right of the QUARTZ window:

1) Initialise the prisms: select ?Init? ? ?Find reference? and wait for ?Finding reference...? window to close

2) Select ?Init? ? ?Define red? or ?Define blue? depending on the prism you wish to use and enter prism position

3) Select ?Init? ? ?Red/blue position go? and wait for ?prism movement? and ?detector motion? messages to clear

4) Check and note down the prism position in the ?Prism? status box at the bottom of the QUARTZ window.

5) Take a fibre flat and an arc exposure (follow steps in Calibrations section).

6) On ltsp, run the data reduction software on the flat & arc files to determine the orders present in the image and the wavelength range.

If the calculated orders are far from those expected, the prisms will need initialising. Repeat steps (1)-(6) until the expected orders are in the frame. When this happens, the correct prism position is usually achieved over 3 initialisations, but it is important to move the prism after an initialisation, i.e. always follow steps (1) with step (3) (you can skip step (2) because you already defined your desired position); don't do step (1) twice in a row, or GIRAFFE will get quite upset.

Focus

Spectrograph focus

You can check the spectrograph focus on an arc image by clicking the "https://topswiki.saao.ac.zaGauss Fit"https://topswiki.saao.ac.za button left of centre below the image display, then clicking on arc lines across the image. The FWHM in X & Y are displayed in the information box (ideally, X=Y and is approximately constant across the field). Focus the camera by turning the knob on the camera stage in increments of a quarter turn (duck under the cryostat filling pipe inside the Coude room and locate the silver knob with vernier scale on the camera stage). Take an arc, measure the lines, move the focus and iterate.

Telescope focus

If GIRAFFE has been used for the week before your run, you can probably assume that the telescope focus is about right. However, after an instrument change the focus might be quite far off. Good focus with GIRAFFE tends to

fall in the range 1800-2100, depending on temperature. On the TCS, set the telescope focus to somewhere in this range. You can look in the scruffy A4 notebook stored in the "https://topswiki.saao.ac.zaLog Books"https://topswiki.saao.ac.za section of the book shelf for a recent history of telescope focus values.

Calibrations

Camera Flats

Taking camera flats involves interacting with the components on the bench in the Coude room. **Please be extremely careful not to touch anything except the flatfield screen and the lamp**.

At the start of the run, or after a software crash, obtain camera flats as follows:

1) Enter the Coudé room, duck under the liquid nitrogen pipe and lift the large black cover over the side of the bench

2) Holding the handle of the white screen, slide it in front of the camera.

3) Go to the opposite side of the bench, switch on the small lamp from the shelf below and turn the intensity to very low. Carefully place the lamp directly in front of the screen, so as to illuminate it as uniformly as possible.

4) In the QUARTZ ?Control? panel, select ?ND Pos 1? and ?Mir Pos 3?.

5) In the bottom left window of the QUARTZ software, type *CAMERA

6) Click the ?Expose? button in the ?Control? panel on the right of the QUARTZ window and enter the exposure time (likely a couple of seconds for red prism). Counts should be as high as possible (<50000) without saturating.

7) After readout, check the information box on the bottom left ? if saturated pixels are reported, reduce the exposure time. Flats with saturated pixels cannot be used. If satisfied, save to disk.

8) Check image is transferred to the thin client *ltsp.suth:/data/74in/giraffe/data/image/yyyymmdd*, and check header info to ensure it is your file (not an old file with the same name). If data is not found on ltsp, check */data/image/yyyymmdd* on the giraffe PC, and call IT (**113) to set up image transfer to ltsp.

9) Expose and save 10 camera flats.

10) Carefully remove the lamp and screen.

Fibre Flats

At the start of an observation, take ~7 fibre flats as follows:

1) Rotate the silver knob on the GIRAFFE head on the telescope to the IN position, to insert a colour filter into the beam.

2) Select ?ND Pos 1?, ?Mir Pos 3? and ?Lamp? in the QUARTZ ?Control? panel.

3) Click the ?Expose? button in the ?Control? panel on the right of the QUARTZ window and enter the exposure time. Counts should be as high as possible (<50000) without saturating. Depending on prism setting, it may be necessary to use a different ND filter.

4) After readout, check the counts in the image and the information box on the bottom left ? if saturated pixels are reported, reduce the exposure time.

5) If satisfied, save to disk. Expose and save 3 fibre flats.

6) On QUARTZ, click to switch OFF ?Lamp?. At the telescope, rotate the silver knob on the GIRAFFE head to the OUT position.

Arcs

At the start of an observation, take 2 arc exposures as follows:

1) Select ?ND Pos 1?, ?Mir Pos 3? and ?Arc? in the QUARTZ ?Control? panel

2) Click the ?Expose? button in the ?Control? panel on the right of the QUARTZ window and enter the exposure time. It is ok to saturate a few pixels of an arc exposure.

3) Switch on APD: click ?APD? button in QUARTZ ?Control? panel.

4) After readout, check counts on the image & in the QUARTZ info box on the bottom left. Counts should be as high as possible (<50000).

5) If satisfied, save to disk. Expose & save 2 arcs. Switch OFF ?Arc?.

6) Switch OFF the APD when slewing/taking camera or fibre flats.

Observing

Acquiring a target

Before attempting this, you should read about using the APD.

The shabby A4 notebook stored on the bookshelf contains previous "https://topswiki.saao.ac.zared marker"https://topswiki.saao.ac.za positions on which to locate a target with the guide mirror in beam. **Current latest red marker coordinates:** (218,50) on 23/01/2015. Note that this position shifts slightly after each instrument change, and when pointing far from zenith.

To acquire a target:

1) On the TCS, with guide mirror in beam, place a red marker on the acquisition image in the previously recorded position (e.g. 218,50).

2) Point the telescope to the target and centre it on the red marker.

3) On QUARTZ "https://topswiki.saao.ac.zaControl"https://topswiki.saao.ac.za panel, click "https://topswiki.saao.ac.zaAPD"https://topswiki.saao.ac.za to turn on the avalanche photodiode.

4) On TCS, move guide mirror out of beam, and "https://topswiki.saao.ac.zaGo To"https://topswiki.saao.ac.za XY-slide position (590, -12900) to view the fibre. Set acquisition camera exposure time ~2s.

5) On "https://topswiki.saao.ac.zaPiet's Old Laptop"https://topswiki.saao.ac.za, run the APD plotter by clicking on the white arrow and wait for the counts to stabilise.

6) With the hand paddle switched to "https://topswiki.saao.ac.zaGuide"https://topswiki.saao.ac.za speed, adjust the telescope pointing to centre the star on the fibre.

You should see an illuminated disc on the acquisition image, which is the reflection of the star from the small mirror inside the GIRAFFE head (although after an instrument change you may not see this yet). The technique to centring the star is to make small movements of the telescope and use the rising/falling APD counts and brightening/dimming acquisition image to help you centre the star on the fibre.

As the star becomes better centred, the APD counts will increase, and a bright disc will appear on the acquisition camera image.

7) Set up a guide star, as per the TCS manual, start target exposures with QUARTZ, and keep an eye on the APD counts to ensure that the target isn't drifting off the fibre over time.

Exposing on a target

1) Select ?ND Pos 1? and ?Mir Pos 1? in the QUARTZ ?Control? panel

2) Type ?*target_name? in the text box at the bottom left (e.g. *TPyx)

3) Click the ?Expose? button in the ?Control? panel on the right of the QUARTZ window and enter the exposure time.

4) Take an arc at the beginning and end of observing a target, and at ~20 minute intervals on that target.

Troubleshooting & avoiding trouble

- Do not touch the *giraffe* PC while it is busy with a procedure - especially during readout - as QUARTZ is likely to crash.
- If QUARTZ crashes, and complains of a Merlin/transputer error, you will need to go to the Coude room, duck under the coolant pipe, locate the blue Merlin transputer on the shelf below the optical bench and press the ~central red button. Then restart QUARTZ.
- If the orders do not match the requested prism position, initialise the prism with "https://topswiki.saao.ac.zaFind ref"https://topswiki.saao.ac.za and move to the requested prism position again. You may have to repeat this a couple of times for the prism/camera to reach the requested position.

Instrument shutdown

- Ensure that the APD and all lamps are switched off.
- Ensure that the fibre flat filter (silver knob on telescope) is out of beam, or you may forget it the following night.
- Leave the QUARTZ software running (the technicians need to check the temperature of the detector during the day).
- Stop the APD count plotting software and shutdown the windows laptop.
- If the cryostat was last filled before midnight, please fill it before you leave.
- Shutdown the telescope using the printed recipe, stuck to the shelf above the TCS.