	VEGA
Observatoire de la Côte d'Azur LABORATOIRE FIZEAU	

How to observe with VEGA

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Approved by:

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Summary

1 Starting VEGA

- For all the computers, you must use the login "observe" (same as for the CHARA computers) and the password 't00l0ng'.
- At least 48h before observations send the complete information about telescopes, POP, beams and observers at the CHARA group (setup@chara-array.org) and get the information about the night assistants that will operate the array (http://www.chara.gsu.edu/observers/observing-schedule).
- At least 24h before observations, switch ON all computers and the Chiller (see later).
- At least 30mn before observations, switch ON the thermal regulation of the detector (see later).
- CHARA Control Room: 00 1 626 796 8468.
- VEGA Control Room : 04 93 40 54 28 (Calern)
- SKYPE : Chris: farringt0n, Olli: Olli.majoi, Norm: norm.vargas1, Frédéric: live:fredmotard, Denis: denismourardobs
- CODE GI2T: C8506Y

1.1 ON SITE OBSERVING

1.1.1 In the control room: control's computers

1. Logon on PC-CTRLVEGA.
2. Start first the Servers by using the button SERVERS in the Menu
   a. Start **pwrServer**
   b. Start **ConfServer**: this application has the responsibility of sharing the information between all the applications and with CHARA.
   c. Start **m6Server** to have the control of the small VEGA mirrors used for the optimization of the flux.
   d. **StartPwdGui** in the GUI Menu to have all the information on the electrical components.
   e.

1.1.2 Starting the VEGA CONTROL SOFTWARE

Use the Menu 'RDPS' to connect to the three windows low-level computers

1.1.2.1 RDP SERVICE

1. With the "RdpSERVICE" shortcut, log in. Then start the applications with the shortcuts on the desktop: **ICSVEGA**, **TECHCAM** and **TRACKER**. Wait for the end of the init sequence on ICSVEGA. Do not forget to check the date and time of the computer. When done, close the Remote Desktop Connection window. If this is the first time for a run, do a complete INIT of the ICS by selecting 'COMMAND' then 'MODE' then 'INIT'. At the end, select 'COMMAND' then 'AXES' then 'CAUND' then 'MACRO' then 'INIT' to force a second init of the Neutral Density wheel.

1.1.2.2 RDP REDDET & RDP BLUEDET

1. On each computer, after login, start detector software **VEGADET**
2. Verify in the "Det State" field in "control vegaDet" window that the correct detector is detected on the corresponding computer (RedDet (192.168.3.161) & BlueDet (192.168.3.162))

3. If the "Light Alarm" is red, then click on the button "Restart Light Security". If no effects, check that the light is OFF in the lab…
4. Open the "/data/src" directory, and check that it is empty, as for the trash. The previous data should have been copied into the directory /data/save.
5. <u>Check date and time (UT) of the computer</u>.
6. Check the available space on "c:" disk. If necessary (space below 40Go) you could remove some of the data in the /data/save directory after control with the VEGA authorities. 50Go of free space is needed for a full night.
7. Close the "192.168.3.161/162 Remote Desktop Connection.

1.1.3 End of preparation

On PC-CTRLVEGA:

1. Open the "/data" directory (cd /data and ls), and check that it is empty, as for the trash. The previous data should have been copied into the directory /dataSave.

1.2 REMOTE OBSERVING (not complete at this time)

For CALERN: PC-CTRL=pc-ctrlvega-calern (192.138.132.111)

1.2.1 Initial configuration

1. First, log on **PC-CTRL** in the VEGA control room.
2. Use 'vncviewer 131.96.55.79:5' and the associated password sent by J. Jones to connect to Atlanta and use the remote observing facility at this site

1.2.2 Starting the VEGA CONTROL SOFTWARE

3. Use the 'Check SSH Tunnel' to verify or set the ssh tunnelling from Atlanta to Mt Wilson.
4. Identify the VEGAstart file on the desktop. Open it and run the first ssh command in a terminal to open the tunnels for the rdesktop application.
5. Use the second ssh command in a terminal to log on pc-ctrlvega. Once logged, start 'pwrServer'. Start another one in the same way to start 'm6Server', and finally to start 'confServer regular'.
6. Start the 'VEGA Power' application from the icon on the desktop and switch ON Optilab, ICS, TechCam, Chiller, HV Red, HV Blue. The four PC on the left side of the GUI should already be ON.
7. Run the 'rdesktop…' of the VEGAstart file to log onto the VEGA computers (account observe) and start the applications: VEGADET on algolr, VEGADET on algolb, and ICSVEGA TECHCAM and TRACKER on pc-service.

1.2.3 End of preparation

On PC-CTRL

- Check that the remote mounting is ok. In a terminal, enter "mount" and find the entrance: 192.168.3.169:/data on /data. Same for /dataSave for ctrscrut:/chara and ctrscrut:/ctrscrut. If this line does not exist, try 'sudo mount –a' and if still unsuccessful reboot the computer.
- Open the "/data" directory, and check that it is empty, as for the trash. The previous data should have been copied into the directory /dataSave. If not move the data in a dedicated directory inside /data/save.
- Install the new StarList files in the directory /home/observe/StarList. You can either use a USB key or transfer it by ftp with the observe account.

On your personal computer, eventually with an additional screen:

1. Open a terminal window on **PC-CTRL** with the observe account.
2. Starting CHARA Controls:
   a. "**tiptiltgtk –d –D500 &**" displays the information of the tiptilt (tiptilt server should be ON). + click on STATUS. You can also use the SEEING button for a graphic display.
   b. "**opletab &**" and Start in Status page. It displays the information concerning the delay lines.
   c. "**telescopegtk E1&**" for displaying the status of E1 telescope. Same for other…
   d. "**weathergtk &**" displays statistics about weather conditions on telescopes. Do not keep this application open all the time for saving bandwidth.

2   Starting the Graphical User Interfaces

The following actions are done on PC-CTRLVEGA (on site observation) or on the remote observing computer in Atlanta (remote observing). The applications are accessible on the desktop or on the menu bar in the GUIs menu.

1. Start application "**StartICS**"
   a. Click on "**Get Config**" and check for possible errors (orange or red LEDs).
   b. In the View menu of the" ICS Window", select "**Open TECHCAM**"
   c. On the "TECHCAM" window, click on the following buttons and arrange the windows:
      i. "Display Images and Pupils"
      ii. "Pupil Alignment" and "Flux Optimization"
      iii. "Periscope Control"
      iv. "Shutters Control"
   d. Organize the GUI so that they are correctly located also on desktop.
2. Start application "**StartRedDet**"+click on Test (if KO try resetLightSecurity and Test again)
3. Start application "**StartBlueDet**"+click on Test (if KO try resetLightSecurity and Test again)
4. Start application "**StartTracker**"
5. Start application "**StartControl**"
6. Start **"StartESPGTK-BC1"** for the operation of cophasing as well as **"StartClimb"**. In the CLIMB GUI use the MAXERR-- button to reduce the MaxErr to 0. It improves the quality of the fringe tracking.
7. Keep apparent the three terminals windows (xt_PrimTrack, ALGOLNEW, ALGOLR).

For managing the observations, it is very useful to start the JMMC/ASPRO2 software and to open the asprox files that have been prepared for the run.

3   Observing

In remote as for the on-site observations, all operations have to be coordinated with the CHARA night assistant. The messages provided by the CONTROL GUI indicate **why it is waiting**. When you have done the action that the program is waiting, you should confirm that the observation could continue by clicking on the Next Step button.

3.1   Choose the VEGA configuration for the programme

On the "CONTROL" GUI, begin by Select File and then select your spectral configuration in the combo box "Current Observation". The information on the GUI is updated and the scheduler automatically executes the "Test and Init" and "GenerateScript" phases. If everything is ok, the scheduler is positioned on setup. Otherwise look at the errors on Control terminal. The default setup for the Tracker is 'Climb' but this can be changed for specific observations (with MIRC or VEGA+Climb, in 4T mode or just with VEGA).

3.2   "SETUP VEGA"

When ready to start, which means that the message "CHARA is on STAR" has been displayed in the ConfServer window, click the "Run" button. This will start the observing sequence. During this step all the devices of the instrument are set. The message Setting_ For_Pupil Adjustment is displayed.
The end of this step is indicated by a message displayed each second in the LOG Box:

CLICK_NEXTSTEP_WHEN_DONE_WITH_PUPIL_ADJUSTMENT

3.3   "Adjust Pupils"

VEGA is set to control and adjust the correct positioning of the pupils.
* Check that the CHARA shutters are correctly configured according to the VEGA configuration and that the VEGA Periscope is DOWN.
* Click on "Get Images" on the TECHCAM panel. You should now have the display of the pupils. If not check the configuration of the shutters and of the Periscope (DOWN). In the TECHCAM panel you can adjust the exposure time (default is 100ms) and the gain (default is 10). If necessary in the IMAGES & PUPILS DISPLAY, for the full resolution image, you can adjust the display gain with the vertical slider + click on 'Apply'. The errors are displayed on each field. You can now finely adjust the pupils.
* Adjust the pupils with the P6 GUI opened by the 'Pupil Alignment' button. Then select PERIB1 for Pupil on beam 1 (same for the others), select a step of 50 and use the buttons to move the pupil and centre it on the red cross.

When you are done, click on "Stop Get I" and then click the "Next Step" button.

CLICK_NEXTSTEP_WHEN_FLUX_ON_DETECTORS_IS_OK

3.4   "Check Camera Flux"

VEGA is now ready to switch on the HV gain of the science detector. Perform the following actions:
* Go to the AlgolNewR and AlgolNewB GUI
* Click on "StartGetImg". Some information is updated and the frame number count should change regularly.

✖ Check the number of photons. If you reach a flux higher than 3500 photons (take into account the local saturation for emission lines), use the neutral density with actions on the ICS Console (GET_CONFIG, configure Density Filter, SEND_CONFIG).

When ready **click the "Next Step" button**. If you have not selected the pupil control at the selection of the observing block, go directly to step 3.7.

CLICK_NEXTSTEP_WHEN_DONE_WITH_FLUX_OPTIMISATION

3.5 "FLUX OPTIMIZATION"

This operation has to be done after each change of configuration (beams, telescopes) or after a long slew on the telescopes. This is done obviously on one detector only: AlgolNewR!
Follow the procedure:
1. Select one beam (action on the SHUTTERS panel)
2. On the AlgolNewR GUI, in the Frame Display tab Click on "Alignment".
3. Click on "Integrate Frame On" and check the vertical centering of the image. Adjust with Y+ or Y- after selection of the Beam (V1-V2…) in the M6 GUI Panel. (Click twice on Integrate Frame On to clear and integrate again). Step of 80 is ok.
4. Back on the General Control tab: adjust Photscale to correctly see the photometry. Adjust X+ and X- of the M6 GUI to maximize the flux (check the beam on which you are working).
5. Select another beam and perform again steps 3 and 4.
6. Open the shutters on all the active beams.
7. Adjust the Photscale and in the Frame Display tab, click on 'Full Size'.
8. When observing in low resolution mode the tracking window should not be superior to one third of the window.

When ready **click the "Next Step" button**.

CLICK_NEXTSTEP_TO_START_RECORDING_WHEN_FRINGES_OK

3.6 "FRINGE TRACKING" (this step is not necessary with CLIMB tracking except in case of 4T observations and VEGA tracking on beams 3&4)

VEGA is now ready for fringe tracking. Perform the following actions on the TRACKER GUI:
✖ **Click on "Get Tk Conf"** and verify in the upper right part of the panel that the setting is correct (Telescopes, Spectral band, beams, and delay lines, reference cart). The Primary Detector is usually used.
✖ **Check the configuration:**
    o SnrTresh box: the correct setting is '6'
    o ConsOPD box:
        ▪ 2T: +50µm in LR, +150µm in MR, +750µm in HR.
        ▪ 3T-MR: FT1 = +150µm, FT2 = -300µm
        ▪ 3T-HR: FT1 = +750µm, FT2 = -1500µm
        ▪ 4T-MR: FT1 = +300µm, FT2 = -150µm, FT3=-450µm
    o OPLE man: Click on ON
    o OPLE Offset (mm): enter the expected value and click on Set. Control on OPLE that the corresponding delay line jumps and stabilizes.
    o Do not click on Tracking On at that time

- o   Track Rate in sec: set the initial value to 1s
- ✘   **Click on "Set+StartTrack"**.
- ✘   Then iterate on the following actions to find the fringes:
  - o   Set the **offset** (in mm) and click to **SET**. Scan by step of 200µm in LR, 500µm in MR and 2mm in HR. Click on **Erase FT1**
  - o   Check for fringes on the TF display and on the HF profile plots. If necessary adjust the line position **(PosProfil box)**.
- ✘   When fringes are detected and SNR> Threshold, click on **Tracking "ON"** and then **"OFF"** as soon as the command has been sent. Wait for a new valid correction (SNR>Threshold) and do again "ON"/"OFF". Continue until the residual error is small (20µm in MR).
- ✘   If the fringes go in the wrong direction, change the sign of the correction in the **"Coeff"** box.
- ✘   Set the Track Rate to about 10s and click on Tracking ON. Watch if the correction is correctly sent every cycle. If not change the track rate or click OFF and continue manually by sending the correction manually as in the centering phase.
- ✘   Note that if fringes are not found, you have to check various things:
  - o   errors of the delay lines should not be larger than 0.01µm
  - o   check the CHARA clocks (Lost T/S on the OPLE SERVER Window)
  - o   check seeing

If VEGA is ready to record: click the "Next Step" button.

RECORD_DATA_IN_PROGRESS

3.7   "RECORD DATA"

During the recording, fill the diary, check tip/tilt (r0 indications) and fringes.
Check the flux, the frame number and the block number and wait for the last message. You can increase or reduce the number of blocks: use NbBlock box and Send button on the Control Panel.

"END OF OBSERVATION"

If the selected observation is a calibration, the steps 3.3, 3.5, and 3.6 are skipped as well as the "Next" step in the "Record Data On Vega" situation. DO NOT FORGET to close the shutters B1, B2, B3 and B4 before starting the calibration to avoid pollution of the calibration by stellar light.

3.8   The different possibilities after the end of an observation

- •   The next star is on the same program: click NewObs and go back to 3.2.
- •   The next step is the spectral configuration: click on Sp.Cal and go back to 3.2
- •   This was the last star/calibration of this programme: click on NewProg and go back to 3.1

EndNight sequence

3.9 Electronic & informatics side

1. On the five (5) GUI (AlgolNewR, AlgolNewB, TRACKER, TECHCAM and finish by ICS), use the button "**Close Server**" to shutdown all the server programs. Close the windows if they did not disappear by themselves.
2. Close the CONTROL GUI and finish the confServer and m6Server in their respective terminal windows (CTRL-C).

3.10 Preliminary check (take your time to do that…)

- ✖ Check for the bad data directory on the pc-ctrlvega (on site) or **PC-CTRL** (remote)
  - o **cd /data** and **ls –ltr**
  - o Open a new terminal and log onto pc-datarvega
    - ▪ **ssh –Y pc-datarvega**
    - ▪ **cd /RedDet/src** and **du –sh ***
- ✖ Check in the first window the list of data directories, according to the journal of observation. Remove the directories that have been aborted during the observation but check in the second window that their size is small (2.9 Mo usually, instead of hundreds of Mo).
- ✖ Remove the same directories in the second terminal window and check for consistency between the two directories (pc-ctrlvega:/data or **PC-CTRL**:/data and pc-datarvega:/RedDet/src)
- ✖ In the pc-datarvega window
  - o **cd /BlueDet/src** and **du –sh ***
  - o And remove the same directories and check the consistency with /RedDet/src
- ✖ In the pc-ctrlvega window (/data) or **PC-CTRL** (/dataRemote), edit all the obslog files:
  - o **gedit *logobs** and check carefully the entrances in these files, so that they are coherent with the data directories. Use the journal of observations for that. Check carefully that the spectral calibration directories are correctly attached to the correct data directories.
  - o When ok, remove the unnecessary obslog files if any.
- ✖ Finally proceed to a last control
  - o On pc-ctrlvega or **PC-CTRL**: **ls –ltr /data (copie Manuelle pour Atlanta)**
  - o On pc-datarvega: **ls –ltr /RedDet/src** and **ls –ltr /BlueDet/src**
  - o And check that everything is conforming to the journal of observations.
- ✖ Check that the last processing of the previous night is ended correctly. On pc-datarvega, check that /data/tmpauto and /data/AUTO directories are empty. If not, copy the files in /data/tmpauto somewhere and send the error.txt file to DM and JMC. Remove all entries in these two directories after that.

3.11 Starting the backup on PC-DATARVEGA

- ✖ In the pc-datarvega window, '**cd /datadisk1**'
  - o **autoAutomate.sh YYYY-MM-DD retrieve US local**
- ✖ All the data are then transferred on /datadisk1 with a copy on /datadisk2.
- ✖ Have a good sleep…
- ✖ When back and if no "errors message"
  - o **cd /datadisk1**

- o Check whether /data1 or /data2 is the current archiving disk; then **cp –R YYYY-MM-DD /data?/YYYY**, but check previously the free place on /data? (du –sh). If pb ask DM/JMC.

4 Preparing the data for the reduction pipeline

- ✗ When the transfer is completed, you could prepare the data for the reduction pipeline.
- ✗ Perform the following tasks using the datamgr account (luneRouge)
  - $ cd /datadisk1/yyyy-mm-dd and identify the directories you want to process, including the associated spectral calibration.
  - $ cp –R directory1 directory2 …. /data/STAR/temp
  - $ cd /data/STAR/ temp
  - $ prepare.sh /data/DISP/D_mydisp /data/GRID/GRILLE-NULLE 1 VEGA (2T)
  - $ prepare.sh /data/DISP/D_mydisp /data/GRID/GRILLE-NULLE 4 CLIMB (3T)
  - Perform the spectral calibration task using calib software :
    - idl
    - idl >@compileCalibGui
    - idl>vegaCalibGui
  - Sans faire la calibration spectrale, éditer le fichier .inp des repertoires à traiter dans /data/STAR/yyyy.mm.dd en indiquant une calibration spectrale existante (ls /data/DISP/*/*.disp)
- ✗ Follow the data reduction procedure.