

Technical Document TANSPEC Observation Manual

Version 2.0

Saurabh Sharma (ARIES), Nainital, DKOjha (TIFR), Mumbai and Douglas Toomey (MKIR), Hawaii $_{\rm July\ 25,\ 2022}$

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1 Introduction

This manual "TANSPEC-Observation-Manual.pdf" is for the night-sky observation through TANSPEC.

- (a) If you want to know about TANSPEC instrument, plz refer : TANSPEC-Instrument-Paper.pdf¹
- (b) If you want to do night-sky obsevations from TANSPEC, plz refer : TANSPEC-Observation-Manual.pdf²
- (c) If you want to know day-to-day TANSPEC operations, plz refer: TANSPEC-Operation-Manual.pdf³

Recent updates on TANSPEC are available at TANSPEC instrument Page⁴.

For any queries, please email: Dr Saurabh (saurabh@aries.res.in), ARIES or Prof D. K. Ojha (ojha@tifr.res.in), TIFR.

2 Configuring the Telescope

To get good point spread function (PSF), you need to switch ON the fans at the telescope floor in the evening itself to thermalize the telescope dome structure. You have to check for favorable night sky observing conditions, i.e.,

- (a) Humidity < 80 %,
- (b) Wind speed < 2-3 m/s
- (c) No clouds in the sky

| Teleso A Command | ope RIES T | Command 512 | d-Panel ! - Port Select | ion | | Breakout | Telescope Command-Panel ARES T Pointing Model T Previout | Telescope Command-Panel AIIE5 T S80 - MI Cover Command Response |
|------------------------|---------------------|----------------|----------------------------|-----------|------------|--------------|--|---|
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| 🗳 ARIES . | Active Optics Sy | /stem | | | | | | |
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| | E14 - Coma #2 | 0 | 0 | 0 | 0 🔲 🛛 | om WFE | Ra: Dec: | |
| | E15 - Sph. Ab. #2 | 0 | 0 | 0 | 0 | om WFE | Equipar | |
| | E16 - 4-fold X | 0 | 0 | 0 | 0 | om WFE | Equinox | 0.1 |
| | E17 - 11-fold Y | 0 | 0 | 0 | | J nm WFE | Parallav a arcsec Radial Velocity a km/s | ОК |
| | 203 - Fecus | 20800.0 | 0 | 0 | 0 121 0 | ZI on WFE | reader of the second reader of the second se | 02 |
| | 205 - Coma X | -295.6 | 0 | 0 | 0 🖌 | nm WFE | Proper Motions | |
| | 207 - Come Y | -658.5 | 0 | 0 | 0 🗹 | A NUME | rioper Motions | OK (CLEAR) OK |
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| | Deflection - TY | 2350.0 | 805.0 1 | 12.0 | | μm | Epoch: Vr | 20 |
| | Deflection - RX | -1539.0 | 90.0 | 190.0 | 0 4 | pm access | | |
| | Deflection - RY | -\$1.0 | 0 | 0 | 0 💌 | arcsec | Enter Target | Lustom |
| | | | | _ | | | | Dustom Apports |

Figure 1: The TCS configuration steps.

Telescope is to be power ON. Then, configure the telescope as below:

- (a) Open the slit of the dome and put dome on tracking.
- (b) Select main-port in TCS.
- (c) Select the TANSPEC pointing model in TCS and initialize the telescope.
- (d) Open the telescope mirror flap through telescope control system (TCS).
- (e) Move the secondary of telescope to a reading between 20600-20800 for focusing through active optics system (AOS). 5
- (f) For imaging, give the offset of 120 degrees to the rotator in the TCS.
- (g) For Spectroscopy, disable the rotator at -30 degree in the TCS.

⁵This is to be checked during the start of observing



Figure 2: Left: Setting for imaging (+120 offset in rotator) in TCS. Right: Setting for spectroscopy (-30 degree disabled rotator).

3 Configuring the TANSPEC instrument

TANSPEC will always be in power-ON condition to maintain its cold temperatures. Check-list before the start of observations are:

- (a) Check for temperatures of the TANSPEC at Lakeshore controller in the electronics rack on TANSPEC (A,B, C, D should be around 75-80 K).
- (b) Check compressor (pressure around 120-150 PSI), chiller and cryocold head are running.
- (c) Check Helium line at the telescope floor are well arranged.⁶
- (d) The hard switches of the Hall sensor, Motor, Arrays, Lamps should be power-ON before the observations (8 switches). 7



Figure 3: Left: Lakeshore temperature readings. Middle: Hard switches for Hall sensor, Motor and Lamps. Right: Hard switches for Arrays.

⁶There will be one helper to check this through the night observing

⁷The switches are in electronic rack on the TANSPEC instrument



Figure 4: Left: Compressor (Brooks high voltage model 9600). Right: Chiller (distilled water based).

4 Configuring the TANSPEC software

The software of TANSPEC instrument is in TANSPEC CENTOS based PC. The logging ID is sw and password is to be provided by the night time operator.

You have to power-ON the Hall sensor, Motor, Arrays through the webbrowser (http://10.0.1.10) based WTI switch. The logging ID and password will be provided by the night time operator

| | | | WTI - Network Power S | witch - Moz | tilla Firefox | | | |
|--|---------------------------|---------|-------------------------|-------------|------------------|--------|----------|------------------|
| <u>File Edit View History Bookmarks Tools He</u> | lp | | | | | | | |
| WTI - Network Power Swi × + | | | | | | | | |
| ←) → C' ŵ ③ 10.0.1.10/cgi-bin | /gethtml?plugcontrol.html | | | | | | | |
| 🌣 Most Visited 🔅 Centos 🖨 Wiki 🔅 Documentation · | 🔅 Forums 🧧 WTI - Netw | ork Pow | er | | | | | |
| | | | | | | | | |
| ut: | | | | | | | | |
| (HONE | | | | | | | | |
| LOGOUT | | | | | | | | |
| | | | | | | | | |
| STATUS | | | | PLU | GCONTROL | | | |
| PRODUCT STATUS | | PLUG | NAME | DEFAULT | BOOT/SEQ. | STATUS | PRIORITY | ACTION |
| PLUG STATUS | | | | | DELAY | | | |
| PLUG GROUP STATUS | | A1 | spectro-array-power | OFF | 0.5 Secs | ON | 1 | No Action ~ |
| ALARM STATUS | | L | | | | | | |
| LOGS | • | A2 | Guider-array-power | OFF | 0.5 Secs | ON | 2 | No Action ~ |
| CONTROL | _ | A3 | a3-unused_argon | OFF | 0.5 Secs | OFF | 3 | No Action ~ |
| PLUG CONTROL PLUG GROUP CONTROL | | | o 4 unuond | OFF | 0.5.5000 | OFF | 4 | No Astion 11 |
| CONFIGURATION | | A4 | a4-unuseu | OFF | 0.5 Secs | OFF | 4 | IND ACTION * |
| GENERAL PARAMETERS | • | A5 | Fan-power-rack-chiller | OFF | 0.5 Secs | OFF | 5 | No Action ∨ |
| SERIAL PORT CONFIGURATION | | A.C | Hall Dowor | OFF | 0.5.5000 | ON | G | No Action M |
| NETWORK CONFIGURATION | • | AU | nall-rowel | OFF | 0.5 Secs | ON | 0 | NO ACCONT * |
| PI LIG GROUP DIRECTORY | | A7 | Continuum-lamp1-Hot | OFF | 0.5 Secs | OFF | 7 | No Action ~ |
| PLUG PARAMETERS | | | | | | | | |
| REBOOT OPTIONS | • | A8 | Argon-Lamp | OFF | 0.5 Secs | OFF | 8 | No Action ~ |
| ALARM CONFIGURATION | | | | | | | | |
| DOWNLOAD UNIT CONFIGURATIO | N | B1 | Ethernet-switch | ON | 0.5 Secs | ON | 9 | No Action ~ |
| TEST | | B2 | b2-unused | OFF | 0.5 Secs | OFF | 10 | No Action ~ |
| | | B3 | h3-unused | OFF | 0.5 Secs | OFF | 11 | No Action ~ |
| | | - | | | | | | |
| | | B4 | Lakeshore | ON | 0.5 Secs | ON | 12 | No Action ~ |
| | | B5 | Fan-power-rack-chiller2 | OFF | 0.5 Secs | OFF | 13 | No Action \sim |
| | | B6 | Motor-Power | OFF | 0.5 Secs | ON | 14 | No Action ~ |
| | | B7 | Continuum-lamp2-cool | OFF | 0.5 Secs | OFF | 15 | No Action ~ |
| | | B8 | Neon-Lamp | OFF | 0.5 Secs | OFF | 16 | No Action ~ |
| | | | (All Plugs) | | | | | No Action ~ |
| | | - | ((0.90) | | | | C. | ofirm Actions |
| | | * = D1 | in PLICV state | _ | | _ | | Amenti Acuons |
| | | - 2 Pit | ig in boot state | T | | E) | | |
| | | | | rempe | rature is 94 * (| F) | | |

Figure 5: The web-based WTI switches.

4.1 Starting the TANSPEC Software

The TANSPEC software is started up via command line in an xterm. There are two ways of doing this, the first by using the TANSPEC Software Manager in an xterm, the second by using multiple xterms and starting a TANSPEC process in each.

- (a) Starting the Software with the TANSPEC Software Manager Disabled currently.
 - i. Open an xterm.
 - ii. Run the command "tsm"

A set of start up notifications will be printed to the xterm, followed by the TSM status window being shown, and finally the the TANSPEC GUI being shown. From this point the system is connected and running.

| O Mate Terminal | \odot \sim \odot |
|-------------------------------------|------------------------|
| File Edit View Search Terminal Help | |
| [sw@tanspec_bin]\$ | |
| [sw@tanspec_bin]\$ | |
| [sw@tanspec bin]\$ | |
| [sw@tanspec bin]\$ | |
| [sw@tanspec bin]\$ tsm | |
| starting up starttemps | |
| starting up tsguider | |
| starting up h1rg_server | |
| starting up h2rg_server | |
| starting up startguideric | |
| starting up startspectroic | |
| starting up startgui | |
| | * |

Figure 6: The xterm from which the TSM is started.



Figure 7: The TSM Status Window.

| | | | | TANS | PEC UI v0.87 | | | | | | | - | |
|-------------------|--------------|---------------------|----------|-----------------|----------------------|---------|--------------|----------|----------|-------------|------------|--------|----|
| tatus | | | | | | | | | | | | | |
| ectrograph Ready | / | | | | lmager Ready | | | | | | | | |
| 0.0% | | | | | | 0.08 | | | | | | | |
| 0.0% | | | | | | 0.07 | | | | | | | |
| | | | | | | | | | | | | | |
| | | _ | | | | | | | | | | | |
| Spectrograph | | Temperatures | TCS | Status |) Par | allacti | c Angle: 0.0 | | | Imager | | | |
| Time Remain (s): | 49 | Guider: 75.4396 | HA | Dec 0:0 | 0:0.0 0:0:0.0 Pos | ition A | ungle: 0.0 | , | | lime Rema | in (s): | 8.6 | 31 |
| Total Time (s): | 47.368 | Cold Struct:75.52 | Rota | ator Angle: 0.0 |) | | | | | Total Time | (s): | 5.6 | 31 |
| Frame RO Time | 5.263 | Rad Shield: 81.2363 | Offs | et HA Dec: 0.0 | 0.0 | | | | | Frame RO 1 | lime | 1.8 | 77 |
| pectrograph | | | | | Guider/Imager | _ | | | | | | | |
| Go | | | | | Go | | | | | | Imag | er | - |
| eq. itime: | 50 | Act. itime: | 47.36 | 808 | Req. itime: | | 1.0 | | Act. iti | me: | 5.6315994 | 1 | |
| ax NDR: | 9 | Act. NDR: | 9 | | Max NDR: | | 1 | | Act. N | DR: | 3 | | |
| badd: | 1 | | SIF | | Coadd: | | 1 | | | | SIF | | _ |
| ycles: | 1 | Readout Mode: | SUR | - | Cycles: | | 1 | | Reado | ut Mode: | SUR | | - |
| Full | Array | 0 2048 | | | Full Array | | SA P | upil | | SA Slit | 416 288 4 | 80 416 | _ |
| cs | | | | | | - | | | | | | | |
| eam Switching | | | | | Guiding | - | | | | | | | |
| eam Pattern: | A | - | | | Slit | | | | | | | | |
| | L | | | | | Cent | XY | 200 | | WH | 6.4 | | |
| Sub AB Enable | | Be | am Param | S C | A | 240 | | 208 | | 64 | 64 | | _ |
| Take Sky | | KA | <i>c</i> | 0 | B Guidar Gain X X | 1.0 | | 208 | | 04 | 04 | | _ |
| | | DL. | c | <u> </u> | Guider Gall X I | 1.0 | | 110 | | | | | |
| acros | 1 | | | | Spectrograph | Save | Info Gui | der/Imag | ger Save | Info | | | |
| | | | | | Path: /ł | nome | /sw/data/ | | | | | | |
| Macrol | Macro2 | Macro3 | | Macro4 | Filename: 2 | 0190 | 708/XD_Ne | | | | | | |
| | | | | | Filenum: 2 | | | | | | | | |
| Rup | | | | - Accian | DV Enable | | | | | | | | |
| Kuli | | | | * Assign | Path: ~/data/ | | | | | | | | |
| | | | | | | | | | | | | | |
| th:/home/sw/macro | os | | | | Obs TANS | PEC sa | aurabh | Ob | j TANSPE | C test imag | es | | |
| | | | | | Comment TANS | PEC In | nstrument o | n 3.6m D | OT | | | | |
| ECTROCRADU Aut | ocovo is ONU | | | | | Auto | ovo ic ONU | | | | | | |
| utosave On Aut | tosave Off | | | | Autosave On | Auto | osave Off | | | | | | _ |
| Argon OFF | CalMir | s | lit Whl | | Guider FltWhl | | Gra | ting Wh | 1 | sp | oectro Foc | | |
| Argon of | in | 5 | 0.5 | | Blank | | gra | ating1 | | 6 | 76:-1 | | |
| Neon ON | ready | | eady | | ready | | rea | dy | | re | ady | - | |
| Contl OFF | in | - | 50.5 🔻 | | Blank | · | gr | ating1 | • | | + - | | |
| Cont2 OFF | | | | | | | | | | | ++ | | |
| contra on P | | | | | | | | | | | | | |
| liston | | | | | | | | | | | | | |

Figure 8: The TANSPEC GUI Window.

(b) Starting the Software from Individual Xterms

While not generally recommended, the system can be started from individual xterms. This can be particularly useful when debugging. Open up 8 individual xterms, and in each, run one of the following commands, in the order listed:

- i. startguider
- ii. starttemps
- iii. startms
- iv. h2rg_server
- v. h1rg_server
- vi. startimageric

vii. startspectroic viii. startgui

The last three processes, items 6-8, expect the previous processes to be running. The User Interface will appear, as with the TSM, but without the TSM Status Window.

After the software is started, mechanisms should be initialized, and simple test images should be taken. Images are automatically sent to DV, the Data Viewer⁸, which can be started in an xterm using the "dv -l" command.



Figure 9: The data viewer.

4.2 Setting Up for Taking Data - Array Readout Configuration.

| Spectrograph Go | n | | | | Guider/Imager Go | | _ | Imager | - |
|--------------------|---------|---------------|----------|---|---------------------|----------|---------------|-------------|-----|
| Req. itime: | 1.0 | Act. itime: | 26.23464 | | Req. itime: | 1.0 | Act. itime: | 1.8771998 | |
| Max NDR: | 1 | Act. NDR: | 1 | | Max NDR: | 1 | Act. NDR: | 1 | |
| Coadd: | 1 | | SIF | | Coadd: | 1 | | SIF | |
| Cycles: | 1 | Readout Mode: | Single | • | Cycles: | 1 | Readout Mode: | Single | - |
| | | | | | | | | | |
| Ful | l Array | 0 2048 | | | Full Array | SA Pupil | SA Slit | 416 288 480 | 416 |

Figure 10: The TANSPEC Array Readout Configuration Panel

(a) Req. itime

⁸Data viewer by NASA Infrared Telescope Facility (IRTS), Hawaii, USA

This is the integration time requested by the user, and establishes the maximum amount of time that the array is read out after reset. The minimum itime is the amount of time to read out the array (5.263 sec for H2RG, 1.877 sec for H1RG), and the actual itime will be the amount of time to read out the number of times that will fit into the requested itime.

(b) Max NDR

This is the maximum number of readouts to perform for the pedestal or signal data collection in SINGLE or DOUBLE readout mode.

- (c) Coadd This is the number of coadditions to acquire and sum to create the final image product in SINGLE and DOUBLE mode.
- (d) Cycles

The number of times to repeat the imaging sequence.

- (e) SIF Check this box to write the individual frames read out from the controller to disk. This will produce extra data, and is primarily used for troubleshooting.
- (f) Readout Mode

Select the mode for reading out and handling the data collected from the array. In SINGLE mode, the array is reset, and then NDR count images are read out and summed into a final image.

In DOUBLE mode, the array is reset, and then NDR count images are read out to create a PEDESTAL, followed by NDR count images being read out to create a SIGNAL, with the difference between the PEDESTAL and SIGNAL data being written as the final image. In SUR mode, the array is reset, and then NDR count images are read out, with a running pixel by pixel slope calculation being applied, and the results written as the final image.

(g) Imager/Guider Selection

In Imager mode, the Imager is used to collect science images. In Guider mode, the Imager is used to collect guide images, which are then sent to the GUIDER.

(h) Interacting with the TCS

The TANSPEC software will interact with the ARIES TCS via the GUIDE Server.

(i) Full Array

H2RG provides windowing in Y-axis whereas H1RG provides windowing in both the axis.

For spectroscopy mode, by clicking on \langle Full Array \rangle , it will show '0 2048' in the box. This means that you are reading all 2048 \times 2048 pixels which will take 5.263 seconds to read. This setting is required for the XD mode. For low resolution prism mode, to avoid saturation due to 5.263 seconds of read time, you can put '750 280' in place of '0 2048' to read only 280 rows from row number 750. This is the region where the low resolution spectrum falls. The readout by this method will take only 1.2 seconds.

For imaging, the sky-image fall only in the center part of 1024×1024 pixels i.e., '416 288 480 416'.

| TCS Status | | | |
|----------------|-----------------|--------------------|-----|
| TCS Time: | 0.0 | Parallactic Angle: | 0.0 |
| HA Dec | 0:0:0.0 0:0:0.0 | Position Angle: | 0.0 |
| Rotator Angle: | 0.0 | | |
| Offset HA Dec: | 0.0 0.0 | | |

Figure 11: The TANSPEC GUI Window.

The GUIDE Server will collect status information from the ARIES TCS, and update this information to the GUI/Imager IC Server, which shares this information downstream for adding to the FITS headers.

4.3 Configuring TCS Operations for Taking Data

| Beam Switching | | | Guiding | | | | |
|----------------|---|---|---------------|--------|-----|-----|-----|
| Beam Pattern: | A | - | Slit | CentXY | | WH | |
| Sub AB Enable | | | A | 512 | 512 | 256 | 256 |
| | | | в | 256 | 256 | 128 | 128 |
| Take Sky | | | Guider Gain X | Y1.0 | 1.0 | | |

Figure 12: The TANSPEC GUI Window.

(a) Beam Switching

Beam switching allows for alternating readouts on target and on sky. The beam position is configured in the TCS.

(b) Beam Pattern

TANSPEC can be configured for taking data while in the A beam, while in the B beam, or doing a dithering like back and forth pattern,

switching between the A and B beams between data collection (AB mode).

(c) Sub AB Enable

Sends a command to DV after each image is taken to subtract off the sky image.

(d) Take Sky

Commands the TCS to B beam, takes an image, sends image to DV's B buffer, commands the TCS to return to A beam.

- (e) Guiding
- (f) Slit

Standard guiding with the guide object on or near the slit.

(g) Offset

Guiding with the guide object away from the slit, which introduces a rotational component which becomes more significant closer to zenith.

- (h) The A and B Guideboxes There is a guidebox configuration for both the A and B beam locations. The guider will attempt to steer the telescope via applying TCS offsets to keep the guide object in the center of the guide window for the current beam.
- (i) CentXY

The center pixel coordinate for the guide box.

(j) WH

The width and height of the guide box.

(k) Guider Gain X Y

This is a gain factor applied to the changes in offset to be sent to the TCS.

4.4 Macros

Macros are a low level interpreted language with a small set of basic commands that allow the user to create command sequences that configure and control the TANSPEC software.

| Macros | | | | Macros | 1 | | 1 |
|------------------|--------|--------|----------|------------------|--------|--------|----------|
| Macrol | Macro2 | Масго3 | Macro4 | a.tsp | Macro2 | Macro3 | Macro4 |
| Run a.tsp | | | ▼ Assign | Run a.tsp | | | ▼ Assign |
| Path: /home/sw/r | macros | |] | Path://home/sw/r | macros | | |

Figure 13: The macros panel.

(a) Macro Selection

At start up the TANSPEC UI will look in it it's macro path and create a dropdown list of the macro files found at that path. In the above image, the "a.tsp" macro is selected.

(b) Run

The run button will start the selected macro (as selected in the drop down list).

(c) Assign

The assign button allows the user to assign the Macro1-4 buttons to the currently selected macro file. In the above configuration, clicking the <Assign> button and then the <Macro1> button will assign the 'a.tsp' macro start up to the <Macro1> button. After this, clicking the <Macro1> button (now labeled with the name of the assigned macro) will start that macro.

More information on TANSPEC macros will be updated soon.

4.5 File Information

| Spectrog | raph Save Info Guid | der/Imager Save Info | 1 |
|--|---|----------------------|---|
| Path: Filename: Filenum: ☑ DV Ena | /home/sw/data/ : ts_spectro 001 able | | |
| Obs Comment | TANSPEC Observer TANSPEC Instrument | Obj TANSPEC Target | t |

Figure 14: The TANSPEC GUI Window.

The path for saving data is hardwired. The user is expected to relocate data after between sequences. The filename is designated by the user, and the

user may set the file number as well. The file number is incremented as data is collected.

(a) Obs, Obj, Comment

These are user entries that are forwarded down stream to be added to the FITS file headers.

(b) Saving Data

Data saving for either array controller can be turned off/on.



Figure 15: The TANSPEC GUI Window.

4.6 Mechanism Status & Control



Figure 16: The mechanism status and control panel.

The GUI connects directly to the mechanism server. As status information comes from the mechanism server it is reflected in the Mechanism Status and Control Panel. For each of the primary mechanisms there is a "home" at the bottom of the position list, which tells the mechanism server to conduct a homing operation for the mechanism. This is required at startup when the server does not know what position it is in.

4.7 Lamps

TANSPEC have Argon, Neon, Continuum1 (for shorter wavelenght) and Continuum2 (for longer wavelenght) lamps. In addition to the mechanism status and controls, the Mechanism Status Control Panel contains a set of buttons for turning on and off the calibration lamps. When black, the lamp is off, when yellow, the lamp is on.

5 Observing through TANSPEC

This section will briefly discuss the steps to follow for observations through TANSPEC. To know details about the TANSPEC instrument, plz refer : TANSPEC-Instrument-Paper.pdf⁹

5.1 Imaging mode observation

By giving the off-set of +120 degrees to the rotator through TCS, the north will be up and east will be in the right direction of the image. ¹⁰

- (a) Put Cal-mirror in 'OUT' position, 'mirror' in the Slitwheel, and desired filter in the Guider wheel.
- (b) Point the telescope. Give the RA and DEC to the telescope target in TCS to point the telescope to the desired location in the sky.
- (c) Track the telescope.
- (d) Take exposure through imager array.

Take image though TANSPEC software on the imager array and display the image (file ending with .Z.fits) on DV in the TANSPEC PC. One pixel corresponds to 0.245 arcsec of the sky.

(e) Offset the telescope

To move the star to the center of the field-of-view, give RA and DEC offsets to the telescope through TCS.

(f) Dithered pattern imaging.

Generate dithered-coordinates by using the image downloaded from the data archive such as NASA SKYVIEW¹¹. Give this dithered position as target coordinates in the TCS.

5.2 Spectroscopy mode observations

By disabling the rotator at -30 degree will keep the slit parallel to the paralytic angle. This is required to keep the star in the slit for the broad wavelenght range of TANSPEC.

(a) Put Cal-mirror in OUT position, desired slit in Slitwheel and grating1(XD mode)/gratin2(prism mode) in the Gratingwheel.

 $^{^{9} \}rm https://aries.res.in/sites/default/files/files/3.6-DOT/TANSPEC-Instrument-Paper. pdf$

¹⁰DV will display it flipped in Y-axis.

¹¹https://skyview.gsfc.nasa.gov/current/cgi/query.pl

(b) Point the telescope

Give the RA and DEC to the telescope target in TCS to point the telescope to the desired location in the sky.

- (c) Track the telescope.
- (d) Take exposure through imager array. Take image though TANSPEC software on the imager array and display the image (file ending with .Z.fits) on DV in TANSPE PC.
- (e) Offset the telescope

To move the star to the slit, give offset to the telescope through TCS. 12

- (f) Take spectra using the spectrograph array and display it on DV (file ending with .Z.fits).
- (g) Move the star along the slit for sky subtraction.

5.3 Lamps and Darks

TANSPEC have Argon, Neon, Continum1 (for shorter wavelenght), Continuum2 (for longer wavelenght) lamps. To take these lamps you have to follow below steps:

- (a) Put Cal-mirror in 'IN' position, desired slit in Slitwheel and grating1(XD mode)/gratin2(prism mode) in the Gratingwheel.
- (b) Switch ON the desired lamp through TANSPEC GUI.
- (c) Take spectra using the spectrograph array and display it on DV (file ending with .Z.fits).

TANSPEC has two different arrays, i.e., H1RG (1024×1024 pixel square) for imaging, H2RG (2048×2048 pixel square) for spectroscopy. The Darks for these arrays can be taken by following steps:

- (a) Put Cal-mirror in 'IN' position.
- (b) Put mirror in Slitwheel (for dark of H2RG array).
- (c) Put 'Blank' in Filterwheel (for dark of H1RG array).
- (d) Take dark images through H2RG or H21RG.

 $^{^{12}}$ As the rotator is disabled, the offsets will be different for different sky location, a calculator (under development) will be provided to the observer to calculate these offsets.

6 End of observations

You have to follow below steps to stop the observing.

- (a) Put Cal-mirror in 'IN' position.
- (b) Stop the TANSPEC software by Contr-Z to each of the eight terminals.
- (c) Switch-OFF the Hall sensor, Motor, Arrays through the webbrowser (http://10.0.1.10) based WTI switch.
- (d) Switch-OFF the hard switches of the Hall sensor, Motor, lamps and Arrays (8 switches). ¹³
- (e) Copy your data from the TANSPEC PC.
- (f) Fill the 3.6m DOT night log.¹⁴
- (g) Check the temperatures of the TANSPEC at Lakeshore controller in the electronics rack on TANSPEC (A,B, C, D should be around 75-80 K).
- (h) Check compressor, chiller and cryo-cold head are running.
- (i) Check Helium line at the telescope floor are well arranged.

 $^{^{13}\}mathrm{The}$ switches are in electronic rack on the TANSPEC instrument

¹⁴https://old.aries.res.in/intranet/eadmin/nightlog 3p6/nightlog 3p6.php