

Oct 17 2009

(see electronic notes)

807 cm<sup>-1</sup> for H<sub>2</sub>O in DL Tau  
 804.202 is order 3  
 808.236 is order 6

DL Tau. 8056

DL Tau. 8057

DL Tau. 8058

Try DL Tau

DL Tau. 8059 nothing

8060 1" N

8061 1" S

8062 2" S

8063 3" S

8064 2" N

-8075

never found it

IC 342. 8077 on optical bright spot (?)

IC 342. 8078 7" W

IC 342. 8079 3.5" W

IC 342. 8080

IC 342. 8081

IC 342. 8082

shift echelon parallel to see red side

29 May 10 IRTF Andreas Laha Sam Dave

Aiming for Ne II long slit focus  
but got the wrong grating angleabout 0004 actually at 753 cm<sup>-1</sup>

rod along slit w/ 20" N 0.5" E

about 0005 same as above

about 0006

about 0007 central wavelength changed to 775.3 cm<sup>-1</sup> from 780.3 cm<sup>-1</sup>  
waveno (Doppler shifted [Ne II])

ngc 5953.0008 rod along slit w/ 20" N 0.5" E (as w/ Arcturus)

ngc 5953.0009 offset 1" E since did not see line

slaw to nearby 2MASS source as reference to NGC 5953.

ngc 5953.0010 new center position

ngc 5953.0011 offset 1" W since did not see line

ngc 5953.0012 offset 1" E from center position

ngc 5953.0013 offset 2" E from center position

~~ngc 5953.0014~~

(Calibration wheel continues to slip from centered position.)

Change center waveno to 780.4 [Ne II] rest freq.

gal 10p6.0014 Compact H II region

gal 10p6.0015 Offset 1" E from center position

gal 10p6.0016 Offset 1" W 5" N from center position



Now change to scan mode to find peak

gal10p6.0017 Fk does not exist. Number was skipped.

gal10p6.0018 } Nothing obvious in scans.  
gal10p6.0019 }  
~~gal10p6.~~

We moved calibration wheel 8° to re-center

gal10p6.0020 Rescanning same segment

gal10p6.0021 rescan

Slew to different compact HII region

g012p8.0022 scan

g012p8.0023 repeat scan

Slew to standard star, in nod mode (20°N, 0.5°E)

~~hr 7564~~  
hr 7564.0024 nod mode

Seeing was bad: 2". (Wind ~15 mph)

Slew to galaxy NGC 7469. Center wave no. 767.7  
(Serfort galaxy) (Fe II) Doppler shifted  
(on top of weak telluric water line)

NSum was set to 1, so obs probably bad

ngc 7469.0025 nod mode 20°N, 0.5°E

ngc 7469.0026 same nod mode. Offset 1" E from center position.

ngc 7469.0027 same nod Nsum=8. Offset 1" W

ngc 7469.0028 offset = 2" E from center position.

ngc 7469.0029 offset 4" E from center position

ngc 7469.0030 On center position

ngc 7469.0031 On center position again.

5/30/2010 UTC

- Had to adjust parabolid -90° so that observed lines are as depicted in atmospheric plots
- Seeing ~2" Wind 20-25 mph
- Slit wheel is rubbing against filter wheel
- Somehow(?) calibration star moved 16" W while adjusting focus.
- ~~Star~~ wobbles by 2" E-W by wind (20-20 mph) (edge-to-edge)
- Operator error: set Nnod = 16, Nwrite = 1 (not vice versa)

NB

titan.1002 is actually  $\nu$  Virginis at 853.6 cm<sup>-1</sup> used for pointing

Slew to Titan. Autoguiding using

Trouble pointing - had it early

Slew to star titan.1003 actually  $\nu$  Virginis Nodding 4" N ctr at 853 cm<sup>-1</sup>

titan.1004 } Nwrite = 16 (bad) on Titan  
titan.1005 }

titan.1006 } good on Titan  
titan.1007 }

titan.1008 aborted ctr at 809.0 cm<sup>-1</sup>



Change slit to  $100^\circ$  pos ( $10'' \times 8.6''$ )

titan. ~~1009~~ ctr wave no =  $909 \text{ cm}^{-1}$  on Tita  
rod 4"

titan. ~~1009~~ 1010 same as before to build S/N

titan. 1011 ditto.

pal. 1012 2 Pallas atmospheric comparison  
Echelle  
F-schelle shifted

pal. 1013 ignore. moving echelle

pal. 1014 ctr wave no =  $909 \text{ cm}^{-1}$

pal. 1015 ctr wave no =  $904 \text{ cm}^{-1}$   
Skew to Titan

titan. 1016 e  $904 \text{ cm}^{-1}$

titan. 1017 ditto

titan. 1018 ditto

Skew to Gal 08.67-00.30 HII region  
(Gal 8.67-0.36)

~~g8p67.1019~~

Skew to VX Sgr

Moed  $\parallel$  parab  $-60^\circ$  to center on [Ne II]  
ctr wave no 780.424

g8p67.1019 file not saved / garbage, if saved

g8p67.1020 wave no 780.4 [Ne II]  
Scan start 4.9" W  
scan  $14 \times 0.7''$  E

g8p67.1021 n points changed from 14 to 20, otherwise same

g8p67.1022 n points = 20, ~~other~~ (same as before)

g8p67.1023 ~~ditto~~ n points = 20, using autoguiding

Skew to VX Sgr

vxsgr.1024 no autoguide, scan as before

initial focus = -1.5 for ~~the~~ scans 1+2

edge-to-edge stellar width  $\sim 2 \text{ pix.}$  in scan direction

focus = -1.6 for scan 3 (better than -1.5 along slit)

focus = -1.7 for scan 4 (comparable to -1.6 along slit)

vxsgr.1025 same as last, except focus

initial focus = -1.8 (worse in scan pos)

telescope drifting

focus for scan 2 = -1.8

sharp along slit, not along scan (astigmatism)

focus -1.6 for scan 3

focus -1.6 deemed as best

guided  $3.6''$  E to center star for scan 4  
Telescope drifting to west

vxsgr.1026

vxsgr.1027

} maps of star for ptsrc

Skew to Sgr A E d

gced.1028 scan same settings as ~~previous~~ compact

ctr on [Ne II], focus -1.6, <sup>yes</sup> autoguiding (g8p67 HII  
offset -4.9E, n points = 14,  $\text{tel. p} = 0.7''$ )

scan 2 max  $3.2''$  E bc obj appeared late in scan 1  
4 scans



gced.1029 same settings but 8 scans

gced.1030 same settings but telstep = 0.35E  
npoints = 28

Now scanning G012.8-00.3

g12p8.1031 npoints = 80 (steps) offset 10" ~~SE~~ E -33.80N  
telstep = -0.7E ON

At end of scan 5.2E, 2.4N to put <sup>guide (v=12)</sup> star (B=9) back on cross needed

g12p8.1032 npoints = 29 (steps)  
telstep = -0.7E ON  
offset 10E 9N

Go to VR Sqr

VX5gr.1033 put it on t and do the scan  
first 2 w/ focus -1.60  
#3 -1.7  
#4 -1.8 had chopper in beam  
#5 -1.5 Too blind to notice  
#6 -1.4  
#8 -1.6

VX5gr.1034 w/ chopper out, shorter scan  
g49p7.1035 scan across pt. source

.1036 scan across bright ridge

Slew to K3-SOA

k350.1037 } trashed (store mode when should be scan)  
k350.1038 }

k350.1039 Problem: .1039 saved in ~~1039~~ /data/may/29 when should be /30  
feature [NeII] waveno 780.424  
scanning over 35 steps in steps 0.7E  
offset -5E 4N

k350.1039<sup>40</sup> same as before but saved to ~~the~~ correct directory

.1041 shorter scan start 0E 4N

.1042 start 0E 8N scan 28x0.7E cloud in scan 2+ ?

.1043 try again same 2000 K350A is blueshifted by 24mi

.1045 scan hit by fog

5/30/10 (UT 5/31/10)

Note: nodwit must  $\geq 2$  It Time otherwise frames will be trashed as telescope moves

rleo.2001 bad guiding on it near end needing alot of N+E guiding  
249.58 in middle of order off right side good seeing  
845.8 cm<sup>-1</sup> for Titan bad guiding  
got on it late focus = -1.4  
autoguiding

2003

pallas.2004

pallas.2005 878.533 in order of bad guiding stopped early

2006 shorter nod guider messing up

2007

Tightened chopper wheel - had to take off <sup>TEXES</sup>

aboo.2009 garbage  
2010 Net at 775.5 for NGC 5713

ngc5713.2011 nodding on NGC 5713 (0.5E 20N)  
.2012 Nsm, nod changed



ngc5713.2013 ~~Offset 1"E~~ Ended prematurely - forgot offset  
Problem: saturating flats.

.2014 Offset 1"E

.2015

.2016

.2017 Scan of NGC 5713 starting -10"E Still good luck

.2018 Trashed (Ended early, had to restart quicklook)

.2019 Scan of NGC 5713 starting -10"E

.2020 Scan...

.2021 Scan... (have been autoguiding thru

.2022 hit shutter on 4th scan. <sup>night</sup>

chicyg.2023 Comparison star going to G033.9+00.1

g33p9.2024 Scan across retrieval of G033.9+00.1  
We did 18/32 steps before hitting source  
Change offset to 41"E -3"N

.2025 Cloud appears 5 steps into scan

Change offset to 40"E -3"N

.2026 (2 sets per scan)

~~.2027~~ Walking by 4"S, scan offset now

repeats of previous observation } .2028 ~~35"E -7"N~~  
.2029 Scan may be off by ~1" since forgot to guide star  
Forgot to use Load Next <sup>to</sup> pointing  
Scan ended prematurely

.2030 Walking by -4"N. Scan was offset by  
35"E -7"N

Now 4 <sup>scans</sup> per data collection event.

Need to start scan more E

.2031 Guided star by ~2"

Offset now 38"E -11N

.2032 No need to guide star

Offset 38"E -14N (Should have been -15N)

.2033 Offset 38"E +1N

.2034 Offset 38"E +5N

Guide star was ~~off~~ by guided by  
5.4"E 0.9"N

call.2035 } Trak (setting up for Io/Callisto)

.2036

.2037

call.2038 nod 0'E 6"N

call.2039 nmod changed to 8

call.2040

io.2041

io.2042

io.2043

io.2044

.2045

.2046

Sunrise

call.2047

out of LN2 /sNe  
took TEXES off, refilled LN2  
refilled lble

HST 5/31/10 UTC 6/1/10

Refilled LN2 - had to take Texes off

~~file 3001~~ ~~perhaps~~ for pointing

Had difficulty pointing. Went to Arcturus  
to R Leo ← were in wrong star

Seeing ~2" wind ~30 MPH

titan.3001 878 cm autoguiding

.3002

more of same

.3003

.3004

not bright, but on it

.3005

.3006

.3007

decided to do take calib on P11-s after changing settings



titan - 3008

887.221cm<sup>2</sup> in ord 7  
888.643cm<sup>2</sup> in ord 9

probably  
3009  
3010  
3011

pallas

first 888  
dlen 878

ragl. 3020 first good R Agl  
✓ red [MAG] setup

- 35p2, 3022 scan 52x0.7"E lots of extable emission  
starting 63"W 5"S of same star
- 3023 63W 15 started 25"S of nebula
- 3024 63W 3N
- 3025 63W 7N catching bright stuff  
more interesting kinematics
- 3026 63W 11N
- 3027 63W 15N averaging ~2"E, 0.7"N  
needed per scan set  
guiding after every set
- 3028 63W 19N

Shift getting for blue shift on K3-50

- K350. 3029 scan across star start 10W  
scan 40x0.7E
- 3030 still need E guide  
5"W 4"N
- 3031 5"W 8"N
- 3032 5"W 12"N Guided 1"E
- 3033 5"W 16"N Guided 1"E
- 3034 5"W -4"N Guided 1"E
- 3035 5"W -8"N Guided 1"E

- 3036 Repeat 5"W -4"N by accident Guide 1"N, 2"E  
before
- 3037 5"W -12"N Guide 3.6"E, 0.6"N
- 3038 5"W 16"S Guide 5.6"E 0.9"N
- 3039 5W 20S moved S-C 0.6  
8E 0.6 ON after  
3039

530.4089cm<sup>2</sup> on left of bottom order  
peaking during observing  
3040 only 4 nads  
3041 repeating

Go to Io using offsets

- io. 3042 guiding 4 nsum
- 3043 guiding more 6 nsum
- 3044 lost it near end
- 3045 was pretty good
- 3046 may want to skip pair 6

move to Callisto with offsets. Rates entered.  
Guide camera off - sun light.

- Cal. 3047 skip 1-2
- 3048 12 pairs 4 sum



33 May 10 WT

CT, SG, SB, AK, MA

Starting with Sandrine's project: Saturn at  $1247.5 \text{ cm}^{-1}$

Blaze centered. CVF peaked. Focused on Vesta.

Gain = 50

ves. 4000 some 2<sup>nd</sup> deriv bounce.  
moving along slit a bit during pairs 11, 12

.4001 flat finished in about 50 seconds  
still have bounce

move crosshair to Vesta at center of slit.

Go to Saturn. Visually point. Find guide star. Aepoint on Saturn. Mirror out. Guiding. Take data. Guiding on Iopetus

sat. 4002 30 N nod. Lots of bounce.  
.4003

4004 change to 40" N nod to make sure guide object  
is out of guide box.

4005 Just over 6 min for 16 nod pairs

4006 Better job timing gives 6 min 30 sec for 16 pairs

4007

4008

checked pointing on Saturn after 4008. Moved ~~the~~ Telescope 1" N  
Back to guiding.

4009 no bounce.

4010 no bounce.

4011

sat. 4012 still looking nice

.4013

.4014

4015

4016

Check Saturn with camera. Move Telescope 1" W. data.  
Saw seeing motion on that scale. Back to guiding. Back to ~~Star~~.

sat. 4017 started a little later. Where's my roadrunner?

4018

4019

4020

4021

4022

Looks like orders have slipped up another pixel. Noticed before 4022  
Raise lower shutter (while guiding)

4023

4024

4025

done w/ saturn

visually check. Looks like another 1" W telescope motion.  
Go to BK Vir to check IA focus + boresight.

Looks like boresight was good to  $< 0.5''$

Looks like focus is  $-1.38 @ 0.3 \text{ C.}$

Go to Pallas. Nod OE 3.5N. Focus looks pretty good.  
Better than Vesta.

pal. 4026

.4027

peaking. skip = 1-3



33 May cont'd

change to  $775.3 \text{ cm}^{-1}$  in medium mode.  
Would like to go  $775.3$  to  $780.3 \text{ cm}^{-1}$ . Checks Not quite

Had no echo. Bright spot near L end of slit. Couldn't get rid of.

Set bias to  $-3.6 \text{ V}$ . Gain = 25  
Frametime 0.22 sec. Nframe = 5

pal. 4028 30,000 in black

Did not focus. It looked pretty good.

n5953. 4029 atmospheric lines varying - bounce but in med?  
.4030

.4031 nodwait = 2.4. Better cancellation of lines.

.4032 pair 4 showed "bounce", pair 10, too.

move telescope  $1''$  E before 4033

.4033 bounce in pair 4, 12, probably others  
4034 no joy.

move telescope  $2''$  W before 4035. (obs pos is  $1''$  W)

4035  
4036 nada

Change to  $780.3 \text{ cm}^{-1}$  Go to Pallas.

pal. 4037 Quicklook died. Stop after 10.  
4038

Check boresight on  $\alpha$  Cyp. Adjust crosshair. Had  
to move telescope  $1''$  E +  $1.6''$  S to center star in pos/ang beams.

Go to NGC 6946. offset guiding.

n6946. 4039 see some signal  
.4040

move  $1''$  W from start position

n6946. 4041  
4042

move another  $1''$  W. Now at  $2''$  W from start

.4043  
.4044

move to  $1''$  E from start position.

.4045 emission looks stronger  
.4046 something shifted around pair 12(?)  $\rightarrow$  pair 1)  
DC level changed and diff makes it look  
like slit maps to different pixels.  
Worried about boresight.

.4047

moved telescope  $4.8''$  E +  $2''$  N to get back on star

Start at  $1''$  E from nominal center.

.4048

move to  $2''$  E from nominal center

4049 faint emission  
4050

move to  $3''$  E from nominal

4051  
4052

moved to nominal center

4053



33 May cont'd

Change to hi-med mode. Changed bias, frame time, nframe. Moved 9" N to try bringing pos beam to center of med. slit. Move parab so  $780.3648 \text{ cm}^{-1}$  safely on.

n6946, 4054 nodding off slit, nothing apparent,

move 4" S from 4054.

.4055

move to 4" N of 4054,

.4056

move 1" W of 4056

.4057

Go to Callisto for divisor. Found it pretty easily.

cal. 4058

Switch to  $530 \text{ cm}^{-1}$ . Focus = -1.64 T = 1.7C

cal. 4059  
.4060

noticed a dark spot (on filter?). Couldn't get rid of it with small changes in angle.

Go to Io via offsets. Found it.

io. 4061 nsum = 4  
4062 nsum = 6

4063

4064

4065

4066

4067

4068

4069

4070

cal. 4071

4072

not guiding enough early in file.

Done

34 May sp, sb, ct,

Saturn at  $1247.5 \text{ cm}^{-1}$

Blaze centered, CVF peaked, Gain 50

Went to pin hole slit to check for stray light. At 8pm, it looked like we might have had a light leak, but the extra light was 4.5 orders between interlopers so it didn't make sense. Using the pinhole slit didn't show any problems.

light. 5000

going to 4 pixel slit - fixed length. slit = 40

Go to Vesta

Had trouble finding Vesta. <sup>-too bright to see in TV</sup> Went to 3rd order and found it. Tried to focus. Lost Vesta. Went to VY Leo. Got star. Focus = 1.18 (T = 5°C). Back to Vesta

ves. 5001 quicklook died ~pair 10.

put crosshair at center of slit. Vesta looked pretty good. Hope 5001 was OK

Go to Saturn. Visually put in center. Offset guiding on Iapetus.

sat. 5002 strong bounce  
.5003 bounce not as bad  
5004 bounce gone

5005

5006

5007

5008

5009

recheck pointing visually. move telescope 1" N

5010

5011

5012

5013



May 10 / 34 cont'd

sat. 5014  
5015  
5016  
5017

check pointing visually. move Telescope 1" W

5018  
5019  
5020  
5021  
5022  
5023  
5024

check pointing visually. move telescope 0.5 W 1 N

Go to Pallas. found it easily, focus looks nice

pal. 5025 skip 1 & 2 due to guiding  
5026

change to  $780.3 \text{ cm}^{-1}$  for galaxy in hi-med  
Adjust blaze to see  $780.5038 \text{ cm}^{-1}$  at blue end of order.  
focus looks good @  $-1.18 (T=34C)$

pal. 5027

Put Pallas in center of slit. adjust crosshair.  
Go to X Cyg for bore-sight closer to galaxy.  
Focus wasn't so good. changed to  $-1.4 (T=35C)$   
Have some time. Take ccyyg

ccyyg. 5028

move X Cyg to center of slit and adjust crosshair.  
Go to galaxy. nod off slit. Offset guide.

n 6946. 5029 stop after 8 pairs. nod took guide star to edge of guide box. caused 'problem.'

recenter visually on galaxy. nod now OE 20N

5030  
5031

move telescope 2.5" N before 5032

5032

move telescope 1" E from 5032 position

5033  
5034

move telescope 1.3" S from 5034 position

5035  
5036  
5037

ended after 2 pairs. Quicklook died after Matt tried to remove first frame from accum.

move telescope 2" W from 5037

1W 1.2N from start

5038 skip pair 16 -echelon dispersion shift  
5039

move telescope 1" W from 5039

~~2W~~ 2W 1.2N from start

5040 bounce showed up in  
5041 beam

move telescope 1" W from 5041

3W 1.2N

5042  
5043

move another 1" W

(4W 1.2N)

5044



May 10/34 cont'd

n6946. 5045

move 6" E from 5045 (2E 1.2N)

n6946. 5046 still bouncing  
5047

Go to Vega as divisor

alr. 5048 strong bounce. lost it during file  
.5049 more bounce. more guiding issues.

Switch to medium mode and 778.28  $\text{cm}^{-1}$

using longer nodwait to improve sky sub.  
alr. 5050 12N nod. near center for pos.  
.5051 20N nod. more symmetric about center.  
seems like slit is rotated on sky.  
Need to go 20.4" E when going 20" N

Adjust cross hair. Go to NGC 7331.  
Bias -3.6V. offset guiding

n7331. 5052  
.5053

move 1" E after 5053

.5054

5055 adjusting focus based on TV. -1.34

move 2" W before 5056 (1" W of center)

.5056 nada

check boresight on beta Peg. looks good.  
back to galaxy. Try 1 file per position.

5057 2" E of center  
5058 4" E

Give up on galaxy. start setting up for Io.  
paraboloid seeing a little more blue  
focus on Callisto -1.6 T=2.9c

cal. 5059

Go to Io with offsets.

io. 5060

Want to change wavelength scale. seeing slightly redder

io. 5061

.5062

.5063

5064

5065

5066

Back to Callisto

cal. 5067

Back to Io

io. 5068

5069

5070

5071

5072

5073

5074

pair 13 has ~~stipple~~ bounce. some others have a little bounce

stopped to move shutter  
skip 1-4. watching accum. bad guiding.

bad bounce on pair 7. short to finish by 6 AM

Done



May 35

Doing [S IV] observations of galaxies  
for Sara Beck

Focus -1.25

Blaze centered, Gain 50

Starting with Vesta

Ves. 6000 pair 12-14, adjusted along slit  
Ves. 6001 not seeing any drift

Going to W Hydra to set bore sight

~~Might see gala~~ ~~Going to NGC 5253~~

Going to NGC 5253  
Moved to what we think is the galaxy  
Getting a guide star

n 5253.6002

n 5253.6003

n 5253.6004

n 5253.6005

6006

6007

6008

6009

6010

6011

6012

6013

6014

Using nod OE 12N  
Seeing a little bit of source in 6002  
identical to 6002  
repeat

Moved 1" W before 6005  
repeat

Moved another 1" W, total 2" W  
from nominal center

still see [S IV] line  
going another 1" W, total 3" W

back to nominal center

1" E of nominal center

6015

← moved 1" E from 6016, total 2" E from  
nominal center

6016

6017

← moved 1" S to see if we see anything  
a bit of source in nod 2 of 6016, not 6

Going to Pallas

Changing to 530.9 cm<sup>-1</sup> to view

[S III] towards NGC 5713

Focus = -1.4

pal. 6018

peaking, seeing fringing

Going to A Boo

A Boo. 6019

same getting in way

Going to NGC 5713

n 5713.6020

n 5713.6021

6022

← were seeing lots of fringing in each pair

started pointing on brightest, sloshy area

we've probably been seeing 2nd order bounce  
The skylines aren't subtracting well

n 5713.6023

6024

6025

← moved 2" E before 6023  
raised nod wait to 2.3, still seeing  
bad sky subtraction

n 5713.6026

6027

6028

← moved 6" W, so 4" W from nominal center



Changing projects, looking at [NetI]

in G12.43-0.05

Going to Phyllis

pt. 6029  
.6030

last star, junk!  
peaked up

marked bore sight for center of slit

Going to G12.43-0.05

making nframe=2, nwrite=2

g12p43.6031  
6032

didn't check bore sight near target  
not seeing anything in scan, piping behind  
so doing 5" N offset scan

6033

7E 5N offset

6034

still didn't see anything  
7E -5N offset

moved paraboloid to see if line was between orders  
still didn't see anything

going to a nearby star to establish bore sight

bore sight was good, going back to G12.43-0.05

g12p43.6035

scanning

g12p43.6036

new offset, 10E ON, nmod=4  
thought we saw something near beginning of scan  
not seeing anything stopping scan  
after 3 scans

Going to GAL 5.89-0.39

Trying to scan

g 5p89-6037

Don't see anything

Going to start looking at [NetII]

towards N7469 NGC 7469

going to Vega first

Vega.6038

A and B beams don't line up with slit  
so when A is good, B is bad  
made compromise between beams

vega.6039

Going to E Peg to check bore sight

epeg.6040

have time before next target is up, so took it

Going to NGC 7469

n7469.6041

6042

6043

6044

moved 1"E before 6044

6045

6046

6047

~~6047~~

← Moved 1"E again, 2"E from normal center

6048

6049

6050

6051



Going to NGC 7714  
Looking at [Ne II] at  $773.14 \text{ cm}^{-1}$

7714.6052  
6053  
6054

6055 Moved 1" E before 6055  
6056  
6057

6058 moved 2" E before 6058, so 1" E from nominal center  
6059  
6060

Going to Callisto for divisor  
6061 is Callisto, accidentally misread

never changed bias

6061 peaked up, got on it about 6th pair

Going to Jupiter to look at meteor impact  
Looking at NH<sub>3</sub>

931.0015 ~~is in~~ ~~full~~ ~~order~~ is in ~~full~~ ~~order~~  
~~932.9605~~ is in third order

Centered blaze,  $G_{\text{lin}} = 50$

focus looks good still  
still on Callisto

Cal. 6062 nodwait was too short.

after 6062 put cal in center of slit and adjust crosshair.

Go to center of Jupiter ~~on TV~~ using offsets from Callisto. Look for offset guide star.

Rough calculation says impact site should be at SW 35 at 14:45 UT

Guiding on Ganymede.

jup. 6063 Con has detailed notes. will print + paste.

6064 random map

6065 random map

6066 stepped map 4 pairs per 1" E

6067 stepped map 4

6068 scan  
- change to C<sub>2</sub>H<sub>6</sub> 819  $\text{cm}^{-1}$

6069 crop guiding

6070 no guiding. put center on visually

- change to H<sub>2</sub>S(l). see far to red of order  
change offset to 1N  
visually center ~~be~~ before

6071



May 30

Going to R Leo to get focus

Focus -1.05 Temp 5.9C

Going to Vesta for telluric calibrator  
set up at 1247 cm<sup>-1</sup> for CH4  
peaked on blaze, and CVP, Gain = 50

~~Going to Vesta~~

Ves. 7000

Ves. 7001

Going to return to look at CH4

Don't have a guide star, so we'll repeat pointing

Sat. 7002 is <sup>junk</sup> ~~bad~~, ignore

Sat. 7003 had to move 1E 0.5 N after 7003  
adjusted tracking rates

Sat. 7004 had to move 0.5 E 0.3 N  
adjusting tracking rates

Sat. 7005 found a guide star, were guiding!

.7006

.7007

.7008

.7009

.7010

.7011

.7012

checking pointing after 7012  
~~moved 3" W~~ not much movement  
don't know shift.

.7013

.7014

.7015

.7016

.7017

.7018

.7019

checked offsets before 7020 0.5" W 0.5" N

Focus = -1.10'

Moved lower shutter after 7020

Sat. 7020

7021

7022

7023

7024

7025

finished, checked pointing, looks good!

Going to Pallas

peaking up, change focus to -1.2

temp = 2.9C

pal. 7028

switched to 780.424 cm<sup>-1</sup>

to look at [Ne II] towards ~~the~~ HII regions for 2hr

focus -1.3, taking Pallas for telluric

pal. 7029

- file got corrupted & wouldn't pipe

Going to VX Sag as a pointing star

Going to GAL 12.21 -0.10

we tried a scan without seeing, saw nothing  
Now we're trying nodding

offset guiding

9 12 p 21, 7030

7031

7032

Moved 3" W after 7030  
moved to 3E compared to 7030  
see some emission at top of slit.  
move 1.5" N before 7033

7033

Try a scan with nwrite = 2

7034

not impressive. Take another while piping



May 36 (con'd)

g12 p21. 7035  
.7036

scan w/ nwrite = 2 see it at 3E  
nwrite = 1 frametime = 2  
not as sure were on it  
go back to nods, start at 3E again.

bounce

.7037  
.7038 4.5" E  
7039 6" E Going off northern part of slit  
7040 7.5" E  
7041 ~~7.5" E~~ 6" E 4.5 N (moved 1.5W, 3W)  
7042 4.5" E 4.5 N  
7043 3.0 E 4.5 N  
7044 1.5 E 4.5 N almost done  
7045 0 E 4.5 N not much if anything

Go back to Pallas. Earlier file wasn't piping  
couldn't find it. Go to a Her. Came right in.

aher. 7046

Go to Vega for divisor

alyor. 7047 peaking through 6  
.7048

adjust crosshair for center of slit.

Go to G19.61-0.23 complex  
Test scan shows nice emission

2 scans g19 p61a. 7049 14E -3N 41 points good stuff further south  
.7050 14E -7N 31 points didn't really get off  
end after 1 scan.  
7051 ~~21E -7N~~ 41 points no load next. same as 7050  
7052 21E -7N  
7053 21E -11N  
7054 21E -11N 1 scan no load next  
7055 21E 1N need more north (less East)

g19 p61a. 7056 7E 5N 21 ~~pts~~ points 2 scans  
.7057 7E 9N 21 points

Go to Callisto for divisor

cal. 7058

change to 530. Focus -1.5

cal. 7059



135 920  
136.8 910

May 3<sup>7</sup> TL, AK, SP, SB & teachers

Going to Rho for focus

Setting up at 956.5 for Titan obs

A

~~Temp 5.3C~~  
Temp 5.3C  
focus = -1.15

going to Vesta

Ves. 8001

Ves. 8002

Titan

7pm45 tit. 8003

good file ± 7 on side bar to bright to use guide camera still

tit. 8004

tit. 8005

first half of file is poor  
got good pair 12

tit. 8006

good file

tit. 8007

tit. 8008

good pair 6

tit. 8009

last half much better -

tit. 8010

guiding on Mimas pair 10

→ Guiding !!

tit. 8011

tit. 8012

Change Wavelength to about 962 cm<sup>-1</sup>

be careful of last settings possible wd leak?

Saw an obvious wd leak at this setting  
Went to CVF (took a while)

tit. 8013

962 cm<sup>-1</sup>  
crappy file - got it by very end  
ignore file but should  
be good now

tit. 8014

tit. 8015

tit. 8016

(this is good)

lost guiding - ended early  
Somehow Tiele jumped a long way  
E/W. I don't know why.

tit. 8017

~~tit. 8017~~ went to titan, got guide going

tit. 8018

couldn't find it

tit. 8019

trying again

moved 1" N after pair 5  
just can't get it  
going to Pallas  
get divisor + will come back

pal. 8020

changed focus to -1.25  
Temp = 2.8

going back to Titan

tit. 8021

offset guiding  
everything looks good

tit. 8022

files looking really good

tit. 8023

some guiding towards end - but majority of  
file is good



521.966

Tit. 8024

.8025

.8026

.8027

Tit. 8028

.8029

Tit. 8030

Going to Pallas

Pal. 8031

one file at a better air mass match  
actually prob worse air mass match  
1.009 oh well

skip pair 8

Changed to med mode Ne II

761.32

focus looks good at -1.25  
looked worse at -1.4

bias 4.0

Pal. 8032

Pal. 8033

go to 2 sec to check pointing  
looked good

NGC 6240

NGC 240. 8034

boresight centered on Southern blob  
bod - didn't change bias

Changed bias to 3.6

NGC 240. 8035

pad was at 77

n 6240. 8036

.8037

.8038

n 6240. 8039

1" East of nominal

.8040

.8041

.8042

n 6240. 8043

nominal position

.8044

n 6240. 8045

moved 1" West from nominal  
water varying a lot

.8046

.8047

.8048

.8049

.8050

Pal. 8051 Pallas



Setup up at 534.2 S III  
focus = -1.5 Temp 1.6

pal. 8052

going to Chi cyc to check ptng

NGC 6946

- n 6946. 8053
- . 8054
- . 8055
- . 8056
- . 8057
- . 8058

NGC 7469

change wave# → 767.69  
Ne II

Ceres for focus + division

Cer. 8059 garbage ~~hit~~ hit continues ended early

Cer. 8060 really nice

. 8061

going to B peg to check boresight

NGC 7469

- n 7469. 8062
- . 8063
- . 8064
- . 8065
- . 8066
- . 8067

- n 7469. 8068
- . 8069
- . 8070
- . 8071
- . 8072
- . 8073

1" east of Nominal

- n 7469. 8074
- . 8075
- . 8076
- . 8077
- . 8078
- . 8079

2" east of Nominal

- n 7469. 8080
- . 8081

3" east of Nominal

- n 7469. 8082
- . 8083

nominal position

- n 7469. 8084
- . 8085
- . 8086
- . 8087

1" west of Nominal

prob took last half of file.  
possible shutter issue  
background  
rose fast

. 8088

- n 7469. 8089
- . 8090

2" West of Nominal  
lost guiding around pair G  
ended early

moved to Callisto  
changed wave to 931 cm<sup>-1</sup>

cal. 8091



Jupiter at NH3 Q branch  
med mode

jup.8092 scan npt. = 40  
 .8093 " " npt. = 65  
 .8094 " " " 2 mod

38 TRG, Ak, SB, SP

Start out at 968.5 cm<sup>-1</sup>  
hi med mode

go to R Leo to focus  
focus -1.15  
Temp 7.0c

Going to Vesta

Ves. 9001 nmod 16

Ves. 9002 nmod 8

Titan to bright to guide

TRG: 50<sup>HST</sup>  
Tit. 9003

Tit. 9004  
 .9005  
 .9006  
 .9007  
 .9008  
 .9009

poor until pair 7

pair 6 - 8 are poor  
 pair 3 bad garbage mirror got in  
 4 bad the way  
 going to try & set up guide

guiding on Enceladus

tit. 9010 bounce

.9011  
 .9012  
 .9013  
 .9014  
 .9015  
 .9016

think RA rate was wrong between moons  
 flipped sign and testing before  
 shift wavelength



~~still~~ Switch wavelength one ~~to~~ detector to shorter wavelength

$w_{no} \approx 975.5$

g. 935  
t.i. 9017  
.9018  
.9019  
.9020

just shifted order + started taking data  
bounce is bad > guiding is good

ended early - guiding died  
jumped to other moon

.9021 upointed  
garbage - couldn't find titan

going to Pallas

pal. 9022

focus for some reason was at -1.08  
I don't know why it changed or when.  
moved focus to -1.2 in middle of file  
much improved

I think I've changed it  
when setting up guiding back  
9010 - (I didn't realize)

pal. 9023

guiding around 1-4 (pairs)  
9023 - was a pretty poor file  
tweaked focus to -1.17

pal. 9024

going back to titan

t.i. 9025

pointed right to it / guiding  
some H<sub>2</sub>O variation

.9026

.9027

.9028

water variation  
changed nsum to 3  
guiding is working well

.9029

water variation not much better at nsum = 3  
next file will change to nsum = 4  
the pipe subsidy - time is doing a  
good job removing variation.

.9030 nsum = 4

t.i. 9031

.9032

.9033

.9034

.9035

.9036

water variation getting worse

airmass over 1.7 for entire file

Pallas

pal. 9037

change wavelength to  
8007 m<sup>-1</sup>

pal. 9038

ended a bit early - plenty S/N

GSS 30 IRS~~2~~1 pointed to alpha sco then

GSS30. 9039

blind to GSS (had to move -3.2E and  
-2.5N to get an  
source)  
guiding  
water mark pair 10 (Falry per  
Bursq)  
set bounce = true

.9040

.9041

.9042

.9043

.9044

.9045

951.4

ended early - didn't see anything  
in previous sums

Ceres - change to 951.4 SIV  
focus = -1.15 Temp 5.8C

cer. 9046

seeing seems poor



NGC 6822

n6822.9047 garbage

n6822.9048 skip pair 2  
guiding by pair 6

.9049

.9050

changed nodwait from 1.5 to 3.0  
This improved things a lot  
- really nice

.9051

.9052

.9053

n6822.9054 moved 1" east Nominal

.9055

.9056

.9057

n6822.9058 moved 2" east of Nominal

.9059

.9060

.9061 (nothing obvious here)

n6822.9062 nominal position

n6822.9063 moved 1" west of nominal

.9064

.9065

.9066

n6822.9067 moved 2" west of Nominal

.9068

.9069

.9070

~~Sta~~Changed to hi-med  
nodding off slit

n6822.9071 not sure if we see it

Ceres

Cer. 9072 skip 1-4  
ended early plenty flux

back to n6822

n6822.9073 looks good

.9074

.9075

.9076

.9077

Callisto 530  $\text{cm}^{-1}$   
hi-med

Cal. 9078

10.9079 water vapor is all over the place  
tweaked focus to -1.4 - got better

.9080

.9081

.9082

.9083

.9084

.9085

.9086

.9087

.9088

.9089

.9090

.9091

water  $\approx$  5mm

lounge

Cal. 9092

.9093

Callisto  
skip = 1-3



29th TG, AK, SB, HS, SP

Cloudy!

found  $\Delta$  Boo at 9pm focused  
focus = -1.15  
temp = 4.5C

setup at 836 cm<sup>-1</sup> for Titan

trying to go to Pallas

Pallas

pal. 1501

still cloudy  
sky variation pair 3-  
pretty good pair 15-22  
moved Ne<sub>2</sub> pair 29

Titan

sky is bad but I figured I would try

~~tit. 1500~~

Never could get calm sky

gone to  $\Delta$  Sco to setup on Zhu's Ne II  
setting 780.4

going to Ceres  
airmass 1.84

focus = -1.35

Cer. 1502  
1503

big sky  $\times$  203rd pair  
big sky pair 12-end  
ship 12-16

going to Gal 10.15-0.34

gal 1015.1504

nod mode nod 20" N see if we  
see anything  
bad sky variation

guiding now

going to watch sky a bit saw a little Ne II

Clouds

gal 1015.1505

- looked pretty good

setup a scan

gal. 1015.1506

scan 4

ended early 1st scan  
started on Ne II

.1507

20E steps -0.70 # steps 60  
still started on Ne II emission  
ended after 1

.1508

-20E, 0.70, 40, 2 scans  
ended after 1 still on source

.1509

-30E, 0.70, 84, 2 scans

moved 4" North to see if it works

.1510

do this while setting up for next source  
I'm afraid we can't ever find a null  
Ne II position

switch to hopefully a smaller source

Gal 28.29-0.36

guiding!

g 2829.1511

really cool!  
scan offset step # steps nod  
10 0 -0.70 29 2

.1512

same nod = 4  
bad clouds frame 60  $\rightarrow$  102  
Clouds  $\ddot{\smile}$

.1513

try again good 1st scan  
cloud in 2nd scan

need to remove background using some  
other clear order



gal 2829.1514 offset 4" N from nominal & scan

.1515 we saw it, but the scan was a mess of clouds

.1516 offset 4" S from nominal pos.

.1517 repeat

Gal 7583 + 0.40

gal 7583.1518

offset 20 0 60 steps  
looks big to me from the radiocont map  
cloudy  
ended early - cloud trouble  
guide died

found better guide star

gal 7583.1519 retry msd = 2  
ended early  
socked in

try again

gal 7583.1520

clouds  
I think we may be off source due to  
~~lost~~ lost guiding earlier

went to SAO star to re-point  
we're guiding again

~~gal~~ gal 7583.1521

on the source now  
saw a bit at beginning then Clouds