

April 11 UT

IRTF

APRIL 10, 2007

MR, AK, SS, JB

Lost about 1 hour trying to connect to Stefan via root Texas (rsh)
Begin setup at ~ 7:30 pm

32 RH 1.4 mm H₂O @ CSO ~ 2 mm (1.5 mm) @ IRTF

data/apr07/11/

- * Setup in aori - Betelgeuse at 820 cm⁻¹ (ethane) bias = -4.2
- prepare for bore sight here & focus
- * change focus down to -1.5
- * going to RLEO. A.imas on aori too large (1.7)

WNO
9:00 pm

820 cm⁻¹

Focus = -1.92 (-1.9 was better than -1.95)

rleo.1001

nod 0 2.5

T = 268.7 K

nsum 4

nod 8

IT Time = 1.012

Vdet = -4.2

flats = 2 blacks followed by 2 skips
calib. wheel might not be centered

730.5 cm⁻¹

rleo.1002

focus -1.92 Chard to say. between -1.9 & -1.25

587 cm⁻¹

rleo.1003

focus -1.92 again - kind of hard def. between
-1.9 & -1.95

rleo.1004

focus -2.0 better

Temperature sensor reading too cold. Use temperature
from IRTF truss.

going to ALPHA Boo

Software problem. Go to zenith & restart.

go to A Boo

1150 cm⁻¹

-1.91 focus

aboo.1005

1231 cm⁻¹

aboo.1006

focus = -1.90

Rotating tube E-W

negative beam on top when tube rotated

Paraboloid was not centered here

aboo.1007 Guiding along slit during the first two pairs

Marked B cursor on boresight. Rotate back to NS.

Change to 557 cm¹. Focus -2.0

Back to α Boo as spatial PSF for α Her, α Sco

aboo.1008 scan mode. some sky variation, subtract along slit, too.
 .1009
 .1010 6 scans

Go to Bamberga for fellwic. Not bright.

Go to α Her, companion is 4.25" E of IR source.

aher.1011 some sky variation, stopped after 4 scans.
 move 1" S to center. Drifting EW. Adjust W rate.
 .1012 Looked better EW + NS. Slight adjustment to W rate.
 1013 Rate looks good
 1014 8 scans, scan 6-8 had slow steady sky variation
 Adjust pointing, drifting toward end of slit.
 1015 sky variation getting worse.
 1016 Looks like were drifting

Go to nod mode. Try to

aher.1017 some guiding
 1018 more guiding

Go to Vesta.

vesta.1019 pretty good
 1020
 1021 skip 1-3. clouds increasing

April 11 (cont'd)

Go to a Sco.

Bright line visible at start

asco. 1022

Go to scan mode. Scanning across star & then nebula.

asco. 1023

.1024

.1025

.1026

.1027

.1028

~~.1029~~

.1029

.1030

.1031

.1032

go to Vesta

.1033

.1034

.1035

check with mirror afterwards. move west.

moved 1" E before scan 2.

Looks like drifting ~~S~~ N.

move 1" S before scan 3

moves 0.6" S

(ready in)
during scan 1

moves 0.8" S

~~at~~ prior to scan 7

moves 0.7" S

prior to scan 5

moved 1" S

to center prior to scan 2
scan 4 appeared to show
star early

moved 0.8" S

prior to scan 7

moved 1" S

prior to scan 4

moved 1" S

prior to scan 6

1" E

conditions appear stable now

moved 0.8" S

prior to scan 2

0.8" ~~E~~

prior to scan 4

1" S

prior to scan 8

had to go ~ 45

more westish

pair 14 → end bed

pair 4 bad bounce, pair 8 has bounce.

so do others. Turn bounce on.

Drifted off. Pair 14 better.

(0.5° for
while detector
to move echelle)

Back to α Sco. Change to 408 cm⁻¹ No atmospheric features. Will go to 4th order later.

Line came in nicely for parab = 0.
Changed focus to -2.4. Maybe not perfect.

asco.1036 echelle = 51.398. Drifting N.
.1037 guiding throughout.

Change to order 4 without changing instrument in order to wavelength calibrate.

asco.1038 want H₂O lines 3rd + 4th order down and near center.
nodding off slit. Dropped integration time.

Go to Vesta back in 408 setting. Integration back to 1 s.

vesta.1039 Didn't change instrument. Vesta is brighter.

April 12 UT DG, DC, KH, GH, AK, SS, JB, MR

Dave Crisp's Venus time shots telescope cable repair work.

Ken Hinkle's time cut short. No N_2 . Had to come off and fill with funnel. Back on pump.

When setting up, noticed clipping through chambers. Think we fixed that. They tipped the telescope for fixing things.

Missed BN. Go to IAC +10216.

$\tilde{\nu} = 952 \text{ cm}^{-1}$ (948.2635 cm^{-1} in first order)
Gain = 50 integ. time = 2. focus = -1.9

i10216.2001 falling off near end.
.2002 Guiding near start.

$\tilde{\nu} = 949 \text{ cm}^{-1}$ offset guiding

i10216.2003 moved along slit a pixel or so: pair 7 & 10
.2004

$\tilde{\nu} = 955 \text{ cm}^{-1}$

.2005 done in stare mode skip.
.2006
.2007

$\tilde{\nu} = 946 \text{ cm}^{-1}$ changed focus to -2.0

2008
2009

$\tilde{\nu} = 943 \text{ cm}^{-1}$

2010 moved along slit in pair 7
2011 noticed some seeing jumps

$\tilde{\nu} = 940 \text{ cm}^{-1}$

i10216.2012
2013

$\tilde{\nu} = 936 \Rightarrow \text{focus} = -1.95$

i10216.2014
2015
black goes up to 45,000 (25 int + gain 50)
lots of image wander
some sort of boresight shift near end of 2015.
skip 13(?) - 16

$\tilde{\nu} = 933$

2016
2017
seemed good

$\tilde{\nu} = 930 \quad -932 \text{ cm}^{-1}$

2018
2019
50,000 cuts in 10216 (25 int + gain 50)
glitch(?) in pair 8(?). DC is high.

$\tilde{\nu} = 927$

2020
2021

$\tilde{\nu} = 957 \text{ cm}^{-1}$

2022
2023

408 cm^{-1} HARPER
Went to a600 first.

gain 25 Hz, $\tau = 1 \text{ s}$

i10216.2024

focus set -2.0

Note: when going from 408-
do NOT change anything
for the filter!

816 cm^{-1}

more rebelle by ~ 0.06 to get same setting as last night

a600.2025
2026

water line calibration
trouble finding

$\tau = 0.5 \text{ s}$

a600 @ this wavelength very
hardly

408 cm^{-1}

(still 408 cm^{-1})

aboo. 2027

still really bad counts bounce. Counts ~ 25 on right side

hard to find source again at start. Bounce is making it impossible

1:30

DIP = 2.93

NSUM = 6

NNOD = 16

GOING TO AFTER

1:35

AHAE 2028

pair 12 - drifted too far E off of source

.2029

a line!

.2030

.2031

.2032

pair 2 bounce

.2033

(yay! repetition on a good source is nice) - an aside

.2034

.2035

{ pos, first bottom value, diff }
 { neg, " , " }

Tracking seems good. Have to hunt a little bit ± 0.1 " E or W. Seeing? Image shifting? Maximum counts still remain around ± 25 on side bar

cloud monitor very little, sky stable? Jun. 29

2:30

DIP = 3.25

go to VESTA

VESTA. 2036

bounce pair $\begin{matrix} 2 \\ 8 \end{matrix}$

hi DC early \sim pair 5

.2037

.2038

changed mod 05 \rightarrow 03

.2039

lots of bounce

.2040

pair 4, 5

humidity has been wrong all night.

g to ASCO

- asco. 2041
- 2042
- 2043
- 2044
- 2045
- 2046

pair 14 fringe?
 pair 7 "
 pair 10, 11

FRINGING is likely due to motion of the detector. I was trying to peak on my signal too frequently

Big cloud? tough to find star near end of exposure
 Good detection, but bad fringing

4:00 AM
 Go to AHER
 Dip: 3.26
 Dip: 3.25

1.45 = air mass
 1.0 "

A lot of clouds overhead.

816 cm^{-1} same an image here

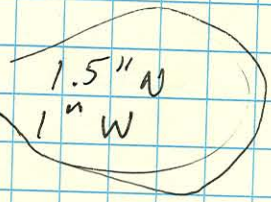
aher-2047 a lot of cloud here. Doing another 2 calibration here

nml. 2048 nml cygn1 can see it!
 peak around 2623 counts

408 cm^{-1}

- nml. 2049
- 2050
- 2051
- 2052

road 8, 15um 4
 road 16, 15um 8
 pair 14 shift + had
 lots of bounce.



816 cm^{-1}

Go to mwc 349

~~M349. 2052~~
 M349. 2053

calibration data set

408 cm^{-1}

~~2054~~ computer threw us out. Hard reboot fixed it.

Tried to get to AFGL 2591, but didn't find it at $24 \mu\text{m}$.

Dip 3.36 @ 6 AM ^{1st Mass} \Rightarrow about 0.1/hr.

April 13 (UT) AK, DC, SS, JB, GH, MJA.

Problems with computer. whine & smoke smell.
 Turned off after shutdown didn't work. Pulled
 out of rack by removing digital box & removing
 rack mounting hardware. Let cool. Tested alone.
 No problems. Eventually reload in rack.

LHe storage dewar had ice plug in annulus.
 Eventually got it fixed. Net result was Crisp
 got ^{essentially} no time on Venus.

$$\bar{\nu} = 791.5 \text{ cm}^{-1}$$

EW slit

Go to center of Venus on screen. offset 7" W.
 Test showed we were off. Back to nominal center.
 Nod OE 120" N. Nod wait should have been ~5.

venus. 3001 mistake in stare mode.

venus. 3002 1 pair. appear to be on limb.

→ need to
 use B crosshair
 with EW slit.

drive telescope 7" S

venus. 3003 Pretty good. counts < 20,000

set Mars flats to 4

venus. 3004

Now having telescope issues. seems fixed.

Going to x CMA. Back to normal flats.

$$\bar{\nu} = 1231 \text{ cm}^{-1}$$

Gain = 50 still EW slit.
 using B cross hair. peaked CVF.

acma. 3005
 3006
 3007

peaking through pair 16.
 peaking through pair 8
 good

MARKED POSSIBLE ($\frac{1}{2}$ Nod \rightarrow 1.5 E on guide paddle) center crosshair B

Go To SATURN
Set up scan parameter

.3008 Not good \rightarrow in "Nap" rather than scan mid scan 1

.3009 \leftarrow No obvious scan off by 0.6 W 0.1 N

.3010 1 Frame 2 MIRAGE is after every time

.3011 \rightarrow 0.9 E 0.1 N offset
1.6 W 0.4 S offset

.3012 Definitely want to say I see emission \sim 25 km/s shift from 1230.3 (blueward) ~~??~~
0.4 W 0.6 S offset prior to ~~??~~

.3013 Also see emission blueward of 1233.46 cm^{-1}

.3013 Emission comes on at bottom about frame 9 or 10
.3014 1.9 E 0.2 N offset

Temp \sim 276.3 K
perhaps seeing the 1229.3 cm^{-1} shifted emission? seemed particularly apparent & just as obvious as the 1230.3 emission
1.0 W 0.6 S offset prior to .3015

.3015 might see methane emission at south pole appear sort of a continuum from the first 4 orders + then the last 2

.3016 1.1 W 1.2 S offset prior
10 pm dip = 1.28
Arms = 1.02

~~.3017~~ .3017 1.9 W .4 S prior to .3017

.3018 1.1 W 1.7 S prior to .3018

.3019 1.0 W 0.1 N prior to ~~the~~ 3019

.3020 1.1 E 0.1 N " " 3020

vertical line in 3rd order scan map (not pixel) (only first scan)

.3021 0.4 W 0.1 N prior to 3021
GEMINI laser on sort of close to Saturn

.3022 1.0 W 0.4 S prior to 3022
maybe hot pixel (horizontal) in 3rd scan order

OFFSET

.3023 SE 0.12N prior to 3023
 $N_{W00} = 2$ (from 4)
 .3024 2.0E 1.1S prior to 3024
 $N_{W00} = 2$ (~~from 4~~)
 .3025 1.1E 0.1N prior to 3025
 $N_{W00} = 2$

10:30 pm

$T = 276.4 \text{ K}$

$RH = 14\% \quad \tau_{CO_2} = 0.09$

.3026 No offset needed; used to 4 windows
 sky seems to be varying a little bit,
 constant sky variability (cloud?)
 Bounce during ~~second~~ ^{3rd/4th} scan

.3027 ~~2.2~~^{1.9}W 0.5S prior to .3027
 Reduced N_{W00} to 2
 cloud variability still noticeable
 Bounce Scan 1
 Bounce Scan 2
 shift in echelon dispersion

.3028 0.9W 0.3S offset prior to 3028

.3029 1.4E 0.3S prior to 3029

.3030 1.4E 0.1S prior to 3030
 Some more sky variability noticeable at
 cloud monitor

.3031 2.2E 0.1N prior to 3031

$AIRMASS = 1.39$

Switch ~~back~~ near end of scan 2

3.0W 0.9S

FOCUS TO FOCUS → GO TO Alpha Boo
 Mode Mode

Camera focus looks good

NOPE
 Mode

also .3032

image taken with focus we were using
 drifted off last set pair ~300 counts
 focus best @ -2.0

.3033

~1400 counts on sidobar

Go To Juno. Determine whether it is a good telluric
divisor. Juno does not work. Barely seen.

at zenith to rotate to NS slit.

Dipped on rack = 1.57
on computer = 1.52 } at zenith.

$$\tilde{\nu} = 408 \text{ cm}^{-1}$$

focus = -2.1 (from last night)

Gain = 25 Go to α Boo

Find α Boo at $12 \mu\text{m}$ with $24 \mu\text{m}$ setting

Use the A crosshair.

$$\tilde{\nu} = 816 \text{ cm}^{-1}$$

aboo. 3034 0.5 sec. As for 408 cm^{-1} except for filter.
Guiding lots.

$$\tilde{\nu} = 408 \text{ cm}^{-1}$$

Back to 2nd order. move only filter.

aboo. 3035 can see in diffs. Lost near pair 14. jump?
3036 DC drop ~ pair 8. coincident with large bounce.
Star still there. skip = 8-11
3037 skip = 10-16. strong bounce.
3038 upped nodwait. maybe help bounce?
bounce in pair 4, 11
3039 background climbing. may want to skip.
3040 bounce = 2^T, move along slit. skip = 1-8

Go to Vesta.

$$\tilde{\nu} = 816 \text{ cm}^{-1}$$

find it & save short one.

vesta. 3041 nodwait back to 2.3s

April 13 (cont'd)

$$\tilde{\nu} = 408 \text{ cm}^{-1}$$

focus = -2.4

vesta. 3042
3043
3044

peaking

Go to α Her

$$\tilde{\nu} = 816 \text{ cm}^{-1}$$

for wavelength cal + locating

aher. 3045

$$\tilde{\nu} = 408 \text{ cm}^{-1}$$

~ 4x fainter than α Vesta

aher. 3046
.3047
3048
3049

peaking early

pair 14 has awful bounce. skip.

Go to γ Herstart at $\tilde{\nu} = 816 \text{ cm}^{-1}$. Nod off slit to make piping easier.

gher. 3050

change to $\tilde{\nu} = 408 \text{ cm}^{-1}$

gher. 3051
.3052
.3053

← pair 3 bounce
bad bounce throughout

.3054

upped nod wait 4.3
peaked a bit early trying to find star
Bounce

bounce

.3055

.3056

.

pair 10 - Finger print
pair 15 bounce

.3057

.3058

pair 2 bounce, bounce throughout
pair 11 bounce, pair 15 bounce

.3059

pair 1 - 10 garbage
 pair 13, 15 source
 pair 8 source, 12, 14

.3060

alpha sco

816 cm^{-1}

asco. 3061

tweaked echelle to show longer λ

408 cm^{-1}

asco. 3062

good

fine

asco. 3063

pair 4 (pos beam only)

moved echelle

pair 12 drifted off for east

- 1.3

moved echelle - 0.2

416 cm^{-1}

hard to find

trying to find
~~the~~ recognizable
 water feature

~~asco. 64~~

~~begin~~ not sure in right location

asco. 65

~~asco. 66~~

begin

aher. 67

68

} cancelled one of these. Didn't write down
 should be obvious.

aher. 69

good most likely

aher. 70

good
 good

. 71

Wavelength RLP = 2.91

I screwed up. I should have moved paraboloïd to get the good water line on an order rather than falling in between. It still good the Fe I line well centered on a good clean order. Integrated for a while. Probably not enough. No obvious line

April 14 UT CDC, AK, MR, SS, JB)

Going to Venus in hi-lo mode for spectral survey.

Tipped x-disp screwdriver 2 to center hi-lo orders.

Lo-res grating zero point set for camera. seems $\sim .75$ degrees too high.

Go to α Tau for focus.

On Venus, will go 6.57 W from center.

Loaded in Mars flats = 4

Couldn't find α Tau spectroscopic. Go to camera. Lo-res angle = 31.027 for spectrum.

Focus to -1.9, but too tough to be certain. Go for Venus' center instead of ~~the~~ ~~the~~ limb. Next time start at clear region of atmosphere.

Go to Venus.

nodding 120" N. Gain = 25

venus. 3072 \Rightarrow edit file number later ~~for~~ to 4001
coverage $\sim 723 \text{ cm}^{-1}$ to 734 cm^{-1}

want to get more coverage. Try going faster

recentered $\sim 1.5''$ each way	venus. 4002	\Rightarrow coverage	731 to 742 cm^{-1}	0.5 degrees
	.4003	\Rightarrow	739 - 750 cm^{-1} waveno 0 wrong	0.35 degrees
	4004		746 - 758	0.35
	4005		753.5 - 766.5	recentered.

forgot to nod hi after checking sky. used paddle. First pair may be affected.

Sat. 4021
.40220.4 W ON/S after 4021
NNOD=6

0.7 W 1.3 S after 4022

.4023
.4024

0 W 0.8 S

after 4023

Nodwait=5. (may help bounce)

1.1 W 0.8 S

Go To Titan

Titan.4025

No focus change, Nodding nunit = 2.3

730.5 cm⁻¹ C2H2
.4026

NNOD=8

NSUM=4

checked focus before leaving 919 cm⁻¹. Looks good @ -2.05 = 2728.5 cm⁻¹ up at top of detector → almost off screen. 6 full orders. ~~See~~ last order 732.5 cm⁻¹BACK TO SAWEN

Sat. 4027

Bounce 4027

Scan Mode

E/W	
offset	OE -14 N
1elstep	OE 0.7 N
Npts	40

.4028

1.6 E 0.2 N

offset after 4027

Bounce

.4029

1.1 E 0.2 S

after 4028

.4030

1.1 E 0.2 N

after 4029

Scan 1 Bounce

" 2 "

.4031

0.7 E 0.9 S

after 4030

.4032

2.9 E 0.2 N

after 4031

Sat. 4033 2.4E 0.2N after 4032

.4034 2.6E 0.5S after 4033

.4035 0.6E 0.2N after 4034
NNOD=6

.4036 2.6W 0.6S 4035
NNOD=4

.4037 1.3W 0.3S after 4036
NNOD=6

.4038 0 object after .4037

0.6E 0.4S after 4038
NNOD=6
BOJMS =

.4039 3.0E 0.9S after 4039

11:30 PM

.4040 Cosmic ray scan 2
(7th scan order)

.4041 4.3W 0.6S after 4040
cut down NNOD=4

.4042 1.4E 0S after 4041

.4043 1.6E 0.2N after 4042

2.9E 1.1S after 4043

12:00 AM (going to Juno (Asteroid 3)) check focus, non mode, Divis-r

Dip=3.5 Mat good. Cant see it.
TRYING Psyche. No good

TRY:

LB00

pos, 164, 30 : SATURN SWWP
Wait for Vesta, going to do Engineering until Vesta rises.

at

LB00. 4044

at LB00. setting up to do a flat test:

$\tau = 0.25$

obs mode = flat

α Boo. 4045

$\tau = 1$

.4046

$\tau = 0.25$

Speckle in defth order

Apr 14 cont'd

$$\tilde{\nu} = 816 \text{ cm}^{-1}$$

aboo. 4047
4048

$$IT = 0.25 \text{ sec} \\ = 1 \text{ sec}$$

$$\tilde{\nu} = 1163 \text{ cm}^{-1}$$

aboo. 4049
4050
4051

$$0.25 \text{ sec} \quad n_{\text{frame}} = 8$$

$$2 \text{ sec}$$

$$0.5 \text{ sec} \quad n_{\text{frame}} = 4$$

$$\tilde{\nu} = 731 \text{ cm}^{-1}$$

Back to Vesta for divisor for Saturn

feature
wrong

vesta. 4052
. 4053
4054
4055

some trouble keeping in slit.

Change to Spencer

$$\tilde{\nu} = 530 \text{ cm}^{-1}$$

vesta. 4056

$$\underline{\text{focus} = -2.2} \quad (\text{header is wrong}).$$

$$\text{dip} = 3.72$$

Rotate to NS slit. Go to Callisto. Using crosshair A

cal. 4057

Go to Io

io. 4058
. 4059
. 4060
. 4061
. 4062

peaking image wandering. wind shake?

"

"

{ pos, 46, 60 }
{ neg, 64, 10 }

$$z = 1.34$$

Go to Callisto

cal. 4063
. 4064

Go Back To Io

10.4065
 .4066
 .4067
 .4068
 .4069
 .4070
 .4071

pair 5 - 7 water drops rear its head
 lot of variation in cloud motion
~~about~~ pair drift mid exposure
 Lost dave

Go to Callisto

cal. 4072

checked focus. still fine @ -2.2 = 2

Go to Io

10.4073
 10.4074
 10.4075
 10.4076
 .4077
 .4078
 .4079
 .4080
 .4081
 .4082
 4083

found pair 4
 found pair 12
 pair 14 lost

(throughout all runs)

Speckle rather ~~notable~~ apparent
 now with low S/N

peaking through about pair 6
 moved up on slit before 4083

Go to Callisto

cal. 4084

Good one.

Dip = 4.08 @ zenith

Apr 15 UT

DC, AK, JB, SS, MR

Crisp / Venus

Start at 1344.5 cm^{-1} in order 8 for slit length.
Gain = 50 2 sec itime

Go to Sirius for focus, pointing, telluric.

acma. 5001

focus = -1.95

peaking

image wander

drift south

.5002

more guiding

bare sight center of slit at end.

Go to Venus.

Use fscan. start across center of planet

venus.5003

vcen_ ~~apr~~ ^{apr07}.pos nwrite = 2
echelon dispersion shift

venus.5004

vsou_ ~~apr~~ ^{apr07}.pos 4" S

Barley off pole.

check pointing with mirror 2.2" E 1.1" S

.5005

vnor_ ~~apr~~ ^{apr07}.pos 4" N

not sure all the way off the pole.

3.1" W ON

.5006

vsou2_ ~~apr~~ ^{apr07}.pos 7" S
0.6 W 2.1 S

$\bar{\nu} = 791.5$

Gain = 25

itime = 1 s

nframe = 2

nwrite = 1

.5007

vcen_ ~~apr~~ ^{apr07}.pos
moved telescope during flat
~~2.9~~ 3.3 E 2.3 S

.5008

~~vcen~~ vsou_ ~~apr~~ ^{apr07}.pos

Got pole

1.0" 0.4" S

Using
Normal
Flats



5009

vner - apr 07. pos
not getting pole
2.6E ON

Go to BN

focus -2.0

(wrong in header)

Temp = 278

also wrong

5010

nodwait too long

5011

peaking + guiding

Start Greathouse Saturn

Go to LCMA

 1156 cm^{-1}

bracket 1151.3 - 1159.2

LCMA. 5012

focus check -2.0

peaked paraboloid after moving black: a (around 90°)
(180° tot) $\sim 45^\circ$

.5013

Set bore sight: move crosshair to star
after coming back East 1"

Go to SATURN

recenter echelle

Sat. 5014

5.2 W after 5014

0.9 S

Sat. 5015

1.1 W 0 N after 5015

bad shift

~~0.9 W~~

Sat. 5016

0.9 E ON after 5016

Sat. 5017

N non = 4

bad shift for the 1st scan

(choose w/f w/no)

may have to

bad shift

2.6 W 0.2 N offset after 5017

BAD SHIFTING. TRY IN CVF. Peaked CVF "filter"

~~CVF~~

Sat. 5018

N non = 2

filter = 106.9

slit = 59.94

light leak. Cambridge

.5019

BACK TO nominal 1156 cm^{-1}

1.0 W, 1.7 S after 5019

(Apr 15 cont'd)

Sat. 5020

.5021
.5022

0.6W 0.4S after 5020

0 offset after 5021

up NNOD=4

only write buffer 0. Going to try
uping the IT time to 2.5s from 2.0s.

1.1 W 1.3 S after 5022

.5023

Star by mistake

changed IT time = 2.5s. Buffer not alternating 0, 1

.5024

offset 1.4 E 0.8S after 5024

IT time = 3s | gain = 25

NNOD=2

buffer now alternating

0.9 W 0.1 N

after 5025

.5025

NNOD=4

IT=3.

gain=25

offset=

2.4 W 0.2 S

after 5026

.5026

~~3.4 E 0.8 S~~

~~after 5027~~

~~.5027~~ .5027

NNOD=2

3.4 E 0.8 S

after 5027

.5028

NNOD=2

drifting a bit

.5029

"

1.4 E 0.1 N

after 5028

.5030

2.6 E 0.1 N

after 5029

Bounce scan 2

.5031

0.9 E 0.1 N

after 5030

Bounce scan 1

.5032

NNOD=4

~~0.9 E~~ 0.1 W

0.3 S after 5031

.5033

"

2.9 W 0.8 S

after 5032

offset = 0 for after 5033

.5034

"

offset 2.0 E

0.6 S after 5034

.5035

"

offset 2.2 E

0.6 S after 5035

Go to Titan

check focus

couldn't find it.

Back to SACRED

~~0.9 E~~ aim at 1.48

echelle shift
early?

Sat. 5036

NNOD=2

offset = 0

after 5036

.5037

scan 2 bounce

2.9 W 0.6 S

after 5037

.5038

echelle shift

.5039

5.0 W 0.2 N

after 5038

lower shutter in way.

scan 1 glitch

ended early scan 2



α Boo

offset after 5039 S.2W 1.35

nod mode. 2 sec integ time. Gain = 50

aboo. 5040 hi-med. bias = -4.2 V
peakingGo to med mode. 0.22 int time 5 nframe bias = -4.2
55,000 counts in black.
Change to gain = 25
1200 in sky. change to 0.33 int time 3 nframe
35,000 in black, 2,500 in sky. nodwait = 1.2 s

aboo. 5041 peaking

Go to zenith and change bias to -3.8 V
20,000 in black 1500 - 2000 in sky

aboo. 5042 peaking

Change to hi-med. sky = 1500 - 2000 Gain = 50 itime
Black 25,000 = 2 sec

.5043 peaking. nod is really small

Change to $\delta = 780.424$

Gain = 25 Itime = 1 sec sky = 1500 black = 20,000

aboo. 5044 peaking

change to med mode itime = 0.22 nframe = 4
black = 40,000 sky = 4700

.5045 peaking

No time for high bias tonight. Do it tomorrow.

Apr. 15 (cont'd)

Rotate to NS * set bias to -4.2

Back to hi-med

Go to Callisto. Black = 30,000

529.41 end of 1st order

Have a long slit, ~~but~~ long enough to see clip.

change focus to -2.4

Change paraboloid so 530.4089 is near right edge.

cal. 5046 peaking
set boresight for Callisto

Go to Io

io. 5047 peaking
5048 change nsum = 8. adjusting rates
5049

5050

5051

5052

5053

up nsum to 10. computer hung for
a while after pair 4.
maybe seeing Jupiter: DC trending upwards
cosmic ray in pair 13

Go to Callisto

cal. 5054 skip 1-5 due to guiding

Change to Greathouse Jupiter.

H₂ S(1) Line
adjust paraboloid to
see bluer

$\bar{v} = 586$. slight clips

jup. 5055

13:43 UT

nframe = 3

May scan across Io or its shadow - No. They are
Going for BA Worth.

jup. 5055 shows waterspot in scan 1. ^{or 2} Right near H_2 line.
 scan 3 started way too far East
 scan 4 is only a little too far East

jup. 5056 up npoints to 59 ~ 3 1/2 W 2S before 5056
 up offset to 27.2 E
 3 scans
 1.9 W 0.8 S

Go to Callisto for nod mode

cal. 5057 guiding
 5058 change focus pair 14

$\tilde{\nu} = 945.5 \text{ cm}^{-1}$ 2 sec integ gave black = 25,000
 focus = -2.2

cal. 5059 pair 9 good

Go to Jupiter

jup. 5060 - upped offset & npoints from what Tommy suggested
 - 2 sec itime & 2 nframes
 6" S 2.9" E afterward

5061 - reduced offset & npoints
 1.5" S 0.1" W afterwards

5062 4.3" E 2.5" S afterwards

6:00 AM DLP 1.53

April 16 2007

MR, SS, AK, JB

(Rotated TEXES E/W USE ~~Crosshair B~~)

Go To J Ori
dori .6001

focus $Z = 2.0$
NNOD = 8, NSUM = 3
Adjusted Crosshair

934 cm^{-1}

Go To BN (offset from)
0.1c

Set up for N: [II] John
Gain 50

7:10 pm

bn .6002
.6003

Seeing is not great tonight
→ Big grating shift set wno. Don't sum
6002 + 6003

748 cm^{-1}

bn .6004

→ set up for 748 cm^{-1} getting 7 orders
Tommy's SATURN C₃H₂
pos 126, 32

NSUM = 6, NNOD = 16, gain = 25, IT = 1.5

(can offset guide for BN!)

a lot of image variability

bn .6005

bounce pair 10
bounce pair 15, 16

.6006

Go to SATURN setup E/W scan w/ Tommy's Parameters

IT = 1.5 NFrame = 3 NN = 2

Sat. 6007
.6008
.6009
.6010
.6011
.6012
.6013
.6014
.6015
.6016
.6017
.6018
.6019
.6020
.6021

2.3 W ~~0.1 N~~ after 6007

offset 0 after 6008

used NNOD = 4 from 2 → 0 offset

rodwalk = 6.3

0.6 W 0.7 S after 6010

0.9 W 1.3 S after 6011

1 E 0.4 S after 6012

0 E 0.2 N after 6013

3.9 E 0.4 N after 6014

0.2 N after 6015

1.0 W 0.2 N after 6016

3.7 E 0.7 S after 6017

3.9 E 0.8 N after 6018

offset 6019 → 0

2.3 W 0.4 N after 6020

sat. 6022

0.4 W

0.2 N

after
6021

changed focus from to -2.1 (Bill
said focus change about -0.1 per
degree)

focus = -2.1

offset after 6022, 0

sat. 6023

3.2 E 0.4 N after 6023

sat. 6024

⊙ offset after 6024

.6025

"random"

couldn't check offset. Terminal down going
again. maybe bad

.6026

"chicken dance"

2.3 W ON offset after 6026

.6027

"Macarena"

do swap = 2 last time. High run mass

12:30 Dip 4-69

.6028

"unknown"

0.6 W 0.2 N after 6027

systematic grating shift noticeable
in these last few

.6029

"disco"

2.6 W 0.1 N offset after 6028

slight grating shift in echelle

4.3 W 0.1 N 6029

.6030

.6031

3.3 W

0.4 N after 6030

EngineeringGo to α Boo to try 780.424 at high bias.

$$\tilde{\nu} = 780.424 \text{ cm}^{-1}$$

aboo. 6031

hi-med at -4.2 V bias (compare
with yesterday)
peaking

change to med mode

itime = 0.11 gave 40,000 counts on black
this may be too fast. Try optirdrst after 6032.

aboo. 6032

6033

peaking

optirdrst |

peaking

April 16 UT (cont'd)

change to 945 cm¹ in med mode.

Don't bother with optirdrst
optistare 1 0.22 sec gave black 20,000

a600.6034 peaking

change to hi-med. 1sec. Gain = 50

change ~~wave no~~ a bit to get Tommy's setting
grating

.6035 peaking

2:00 AM dip = 4.0
@ Zenith

Greathouse Jupiter

GRS isn't visible yet, so get Callisto. Callisto is too
NS slit. near limb. Try Ganymed

~~GO TO~~ gany. 6036
JUPITER

focus = -2.2

Jup .6037
.6038

1.5W

1.2N offset after 6037
offset from center:

25.1E -4.5N

stepsize -0.7E 0N

npoints 36 NFRAMES = 3

nmods (scans) 2 IT = 1 sec

gain ~~2~~ 50

"jupplans ver 2.tex"

.6039

didn't check offset. Went again
(Bill out of room)

0.1E 0.2S after .6039

.6040

1.2E 1.6S after .6040

.6041

0.8W 0.6S after 6041

.6042

1.1E 1.3S after 6042

.6043

0E 1.7S after 6043

.6044

0.3W 2.1S after 6044

.6045

Jup, 6046

Npts = 41 → spot getting close to edge.
no offset after 6045

.6047

0.4E 1.15 after 6047

Npts = 45

.6048

1.7E 2.45 after 6048

Npoint = 48

.6049

1.4E 0.35 after 6048

Npts = 50

0.8E 1.35 after 6049

.6050

We might not have been trained on the
cells - see it coming in later, lead
by another eddy?

maybe for next one, shift by 5 → 7 pix

South (telescope) so, $S_{pix} \times 0.3 \frac{1}{\text{arc}} = 1.5''$ or $2.1''$

Shipped 1.5" S

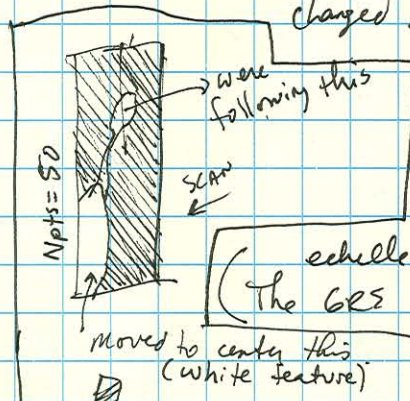
Jup. 6051

Npts = 40

0.1W 0.5S offset after 6050

changed offset to

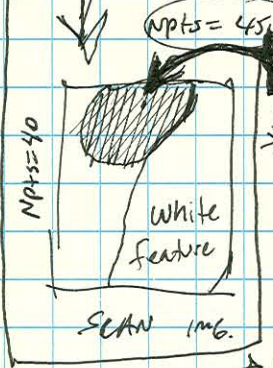
25.1E + -6.0N to try to
get what may really be the
GRS in the center of the slit
(+1.5" S)



echelle shifted towards higher wno
(The GRS is $\frac{25}{143}$ the diameter of Jupiter ≈ 0.2
So this Bic feature may very well be the GRS)

.6052

4.0E 1.35 after 6051



* -ok looks like
Found this * Tweak out, probably the dark
* * spot is the GRS. only one
file now for this guy.

~~Shifted offset~~
added Npts to hopefully get off of
it.

→ didn't get off of it enough. Should
have made Npts even larger. (Npts = 45)

offset after 6052 0.1W ON

Set up for 587 nm^{-1}

$z = -2.3$

More like offset
-65

587 cm⁻¹ Jupiter (cont.)

jup. 6053 drifting west. drive further east
before scan 4

7.2E 1.7S

Go to Ganymede → to close.

Go to Callisto 39.2 -28.8 from Spencer

cal. 6054 skip = 13

Greathouse Neptune:

~~rep~~ Go to 820 cm⁻¹ recenter on blaze

Can't see Neptune in guide camera. Found w/TEXES
Nod off slit

nep. 6055 Lots of centering, good at pair 9

6056 skip = 1, 2, 7

6057 skip = 1, 2,

6058 skip = 11, 12, 13 (not on meridian?)

6059 skip = 1, 2,

6060 skip = 11

6061 skip =

6062 moving along the slit. skip = 13, 14, 15

6063 Think we're seeing "seeing". Try to guide less.
skip = 11

6064 skip = 11, 12

6065 skip = 12, 13, 14

6066 skip = 13, 14, 15

skips
are mostly
when I think
I'm not along
meridian.

switch to scan mode after talking to Tommy.

6067 adjusted EW after 2.
NS after 3.

change to 0.3 steps

6068

6069

6070

nep. 6071 move 0.6" E before 2
 move 0.6" S before 4

6072 move 0.6" S before 2

6073 move 0.7" S before 2

cloud(?) in scan 2 near end
there are clouds around
big clouds in 5
stopped after 5

Call it quits!

dip = 4.6 at zenith at 9 AM

April 17 2007

SS, AK, MR, JB

Setup for Tommy's 1248 cm⁻¹ setting
Go to Alpha CMA

Ech - Foregor & rotate slit E/W
- Rotated Slit E/W

$Z = -2.0$

1248 cm⁻¹

acma . 7001
. 7002
. 7003

NW=2, IT=1, gain too low = 25 (sky obs ~ 270, atm obs = 187)
" upped IT=2, gain = 50 obs diff btm sky + in btm order = 2
NW=3, trying IT=3, gain = 50 obs diff btm sky + in btm order = 4

Go to SATURN

set boresight (move 1.5 E on ACMA)
4pix slit (4x.3 = 1.5")

Sat. 7004

NF=1, NW=2, IT=3.0

offset after 7004 1.1W 1.6N (good pointing)

. 7005

0.4W 0.1N after 7005

. 7006

NW=4 0.6W 0.2S after 7006

. 7007

" 1.6W 0.1S after 7007

. 7008

" 0.6W 0.2S after 7008

. 7009

" 1.7E 0.2N after 7009

wander . 7010

A lot of echelle + CVF shifting
Shortened slit to 80. Mirror in, stare mode. Higher filter value, slightly better (99.7) vs lower filter value (99.3)
Lots of blurring & partial CVF shifting across an order (not huge shift - just slight shift in maximum phase. Near transit. θ curves = 1.205

better filter pos'n = 99.3 rather than 99.6 (default)

0.6 W 1.2 S after wander . 7010

Sat . 7011

0.7W 0.6S after 7011

. 7012

1.3 E 1.4 S after 7012

. 7013

offset = 0 after 7013

. 7014

0 offset after 7014

. 7015

5.0 E 0.2 S after 7015

. 7016

0.9 W 0.2 S after 7016

. 7017

3.4 E 0.2 S after 7017

. 7018

7.2 E 0.2 N after 7018

NOT WORKING WELL
POSSIBLE WANDER

back to SAT
really horrible *
wander! Bad
Scans but we are seeing CH4. *

try NF=2, IT=2, nodwait=4.5

" " " , nodwait=6.5

Go to 587cm⁻¹

. 7019

NF=1, NW=2, IT=3

(0.9E 0.2N before 7019)

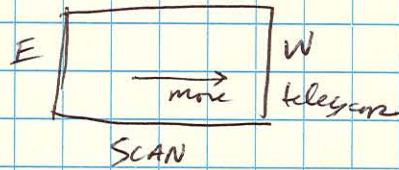
. 7020

Nodwait=4.5 (sort of our nominal setting)

MISTAKE! Gain = 25, NF=3, IT=1, nodwait=6.5
drifting off to S. pole peaks.

Sat 7021

7.2 W 0.25 aft 7020



- . 7022
- . 7023 quicklook died during scan 1
- . 7024
- . 7025
- . 7026

0 offset after 7021
 found scan 3
 0 offset after 7022
 1.1 E 1.25 after 7023
 5.2 W 0.2 N after 7024
 0.3 E 0.2 N after 7025

. 7027

Source
 2.9 W 0.2 N after 7026
 Bruce. Blue DC Jump on cloud monitor
 5.9 W 0.2 N after 7027

WNO = 587
 s1 order 3, 2628 =
 Scan = 0.7 offset
 0, -14.
 file = 298.68 scale = 54.413
 slit = 259.9
 para = -92.52
 k = 0.247

Engineering time.

Go to α Boo at 587 cm^{-1} (will get Vesta later)

aboo. 7028 hi-med, 1s int time, 6 num B = -2.3
 peaking

. 7029 med mode, opti/rd/rst, 0.086 s itime.
 black ~ 40,000
 peaking

7030 sub 128
 peaking

io. 7046

.7047 peaking + focusing. It may be seeing

Go to Callisto

cal. 7048 skip = 1-2: guiding along slit
image wander

.7049 guiding along slit

Change to 539 cm^{-1} . paraboloid shifted to see blue.
537.9836 near middle of order

cal. 7050

Go to Io

io. 7051 | waterspot in pair 4, bounce + waterspot in 5.

pair 6 is good
peaking + guiding

.7052

pair 6: cloud.

7053

clouds during flat and file. 25% variation

+ 7054

clouds bad. not bad at end.

7055

cloud at start. good: 5-10

7056

nsum = 4. waterspot in pair 5, skip = 16

7057

clouds. skip = 1-2, 10-15

7058

nods = 24. good: 13-21, 22-24

7059

skip = 5-8, 11-13, 15-17, 19-23

7060

skip = 10-15, 17-24

April 19, 2007

SS, MR, AK, JB

$Z = -1.9$

VB = -4.2
(VOLT)

1248 cm^{-1}

Tommy & SATURN

CH4

{ Chappy cirrus all night }
says forecast
" Seeing Poor/Bad

Go to X-CMA

Slit E/W

X-CMA. 8001

IT=2, NN=6, NS=4, gain=50

filter = tweaked 99.3, CWF blazed up

rod = 16

(0.4W, 5.9E)
(1.1 0.9)

.8002
.8003

checked Bright

Go to SATURN

settle shift from 1st scan
(small - towards shuttle axis)

will keep the setting for all SPTS. (Just
will be a little shifted from X-CMA)

Sat. 8004

0 offset aft 8004

order 7 - scan crossing
shuttle slightly too far south

.8005
.8006
.8007
.8008
.8009
.8010

NN=4

2.4N 1.1E aft 8005

NN=2

0 offset 8006

0 E 0.3N aft 8007

0 aft 8008

1.6E 0.7N aft 8009

0.6E 0.2N aft 8010

hand h bell if on center of pole

0.9W 0.2N aft 8011

0.6W 0.35 aft 8012

1.4W 0.2N aft 8013

0E 1.05 aft 8014

1.3E 2.55 aft 8015

(shifted off center again) 1.6E 0.2N aft 8016

0.2N aft 8017

3.2E 0.4N aft 8018

3.9E 0.2N aft 8019

2.7E 0.2E aft 8020

0 offset 8021

1.1W 0.4N 8022

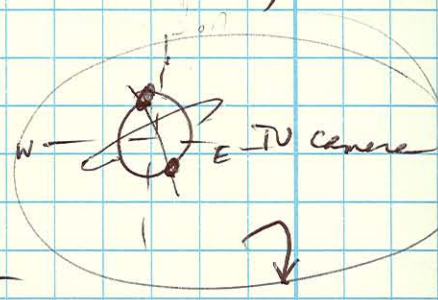
1.1W 0.2N 8023

.8024

(We want saturn to look slightly offset towards left on scan order)

sat. 8025

0.6 E 0.2W
after 8024
glide scan 8



,8026

2.9E 0.2N 8025

,8027

2.2W 0.2N 8026

,8028

1.0W 0.2N 8027

,8029

2.6W 0.2N 8028

(might be a little high on slit)?
hard to tell

- No, looks ok on screen and thought

,8030

0.9W 0.2N after 8029

10.6W 0.8S after 8030

Refering slit N/S
ENGINEERING

BIAS VOLTAGE = -3.8

dip = 3.56 @ zenith at midnight

feature
wider

change to 945 cm⁻¹,

Gain = 50, Int time = 1s
black = 14,000



aboo. 8031 peaking

adjust boresight for center of slit.

med mode. 0.22 s int time => 30,000 on black



aboo. 8032 peaking clouds(?)

set bias to -4.2V

Greathouse Jupiter

Go to Vesta

vesta. 8033

clouds ~ pair 8

mark boresight in center of slit.
Jupiter > 1.7 armass, so go again

Vesta. 8034 clouds during flat
pair 12 is good

Go to Jupiter Oval BA

jup. 8035 scan 2 is better than scan 1 0"E, 0"N after
.8036 good scans. 1.1"E 0"N
think I see BA. Move a little more south. 8.7" \Rightarrow 9.3"
.8037 I think I like this position.
First scan sees chopper DC. Increase wait time,
After 8037 1.2"E 0.5"S
8038 increased wait seems to have helped.
After 8038: 0"E 0"N
8039 after 8039: move telescope 2.5 W ON

Change back to -8.7N for offset.

8040 some good scans in this set. Notice focus is wrong in
header.
0.6"W 0"N
8041 Notice we're not quite on blaze. Live with it.
what I think is BA is about at CM.
add more npoints for 8042 (50 \Rightarrow 55)
after 8041: 0.8 W ON
8042 no motion needed after 8042
increase npoints (55 \Rightarrow 60) for 8043
8043 only do 2 scans since almost Io fine
looks like a grating shift in scan 1.
maybe some clouds in scan 2. 1% variation in sky
no motion needed after 8043

Spencer: Io

Change to 530 cm^{-1} moved paraboloid to see blue.
Go to Callisto

cal. 8044

Go to Io

io. 8045 peaking. skip pair 8; waterspot
 8046 nsum=8 2nd deriv bounce starting in pair 5
 offset guiding
 8047
 8048
 8049
 8050
 8051

Go to Callisto

cal. 8052 skip = 1-3
 8053 focus looks soft: adjust during file. -2.35
 end after 14 pairs

Back to Io

io. 8054
 . 8055
 . 8056
 . 8057
 8058
 8059

Back to Callisto

cal. 8060

Switch to Greathouse Neptune

$\tilde{\nu} = 819$ cm (more like 821 cm⁻¹)
 centered on blaze

cal. 8061 like pair 5. This file isn't piping

Rotate slit 180 degrees

April 18 (cont'd)

Try to get α Cyr on way to Neptune.

Can't find it w/ spectroscopic. Go to camera.

Found it in image. Mark boresight, Go to spectroscopic.

alyr. 8062 bounce in pair 3
missing it pair 4-7
pair 14 good

Go to Neptune

nep. 8063	skip = 1, 2, 15
8064	skip = all look pretty good
8065	skip = 1, 2, 3, 9,
8066	
8067	skip = 1, 2, 12, 14, 15, 16
8068	skip = 1, 2, 3, 7, 10, 14
8069	skip = 3, 5, 6, 9, 10, 11, 14
8070	skip = 1, 2, 3, 4, 8, 13
8071	skip = 1, 2, 3, 4, 5, 6, 15, 16
8072	cloud during flat close for fog,

couldn't find it after re open.

April 19

(whoa whoa!!!)

SS, MR, AK, JB

α CMA

z = -2.0

0.50 cm⁻¹

C₂H₄

SlitLen 1 → 240.0 = slit, filter = 233.520

α CMA . 9001

NN = 16, NS = 4, UT = 2, gain = 50

CF = 138

α CMA . 9002

Setting up for Tommy

α CMA . 9003

. 9004

(pos, 140, 24)

4.2, 7.1

Go To SATURN

Sat. 9005

(pos 137, 24)

NS = 1, NN = 2, UT = 3, gain = 50, nodwait = 6.3

1.9 W 1.1 N after 9005

. 9006

NN = 2 0 after 9006

. 9007

NN = 4

. 9008

1.0 E 0.9 N 9007

. 9009

0 after 9008

. 9010

1.1 W 0.4 N after 9009

trying an off-axis guide star

. 9011

0.1 E 0.5 N 9010

0.1 E 0.85 (star) 9011

. 9012

0.6 W 0.8 N (saturn)

0.5 W 0.55 (diff) 1110111111

. 9013

0.4 W 0.15 after 9012 10111111

. 9014

0 1.0 S after 9013

. 9015

0.75 after 9014

. 9016

0.3 E 0.2 N after 9015

. 9017

1.7 E 0.2 N after 9016

. 9018

3.3 E 0.2 N after 9017

Slight echelle shift

. 9019

0.6 W 0.4 S after 9018

moved echelle back

. 9020

1.9 E 0.2 N 9019

3.6 E 0.2 N 9020

. 9021

0 offset (0.2 N) 9021 11011

. 9022

0 offset 9022

. 9023

0.6 W 0.2 N after 9023

. 9024

0.6 W 0.2 N (star) after 9024

1.6 W 0.55 (star) after 9025
3.2 W 0.35 after 9024

Sat. 9025

still using guide star but periodically checking Saturn too.

.9026

0 offset after 9025

.9027

0.4N offset after 9026

.9028

1.4W 0.2N after 9027

0.6W 0.2N after 9028

try focus - 2.1

.9029

echelle shift towards star

0.2E 0.2N after 9029

shifted echelle 0.03 down before 9030

.9030

" " 0.04 down before 9031

.9031

~~.9032~~

Moved to far limit sum

9025-9029, 9030, 9031

0.9W 0.4N

after 9032

2:00 AM DIP = 0.82

DONE WITH SATURN... ONTO ENGINEERING

Rotate slit NS. Go to α Boo for dwell time tests using nwrite. Offset guiding. 2s int time 4 nsum

occurs as been -2.1

aboo. 9032

nwrite = 1, nmod = 16

peaking good at pair 7

aboo. 9033

nwrite = 2, nmod = 8

peaking in frames 17 & 18

.9034

nwrite = 4 nmod = 4

.9035

8 2

9036

16 1

blinks happen after each positive beam and DC comes every frame.

change 816 cm⁻¹. feature wrong.

gain = 25

itime = 1 sec.

aboo. 9037

nwrite = 1 nmod = 16

end early to change filter to get rid of dust speck.

	abao. 9038	nwrite = 1	nmod = 16	image wander is worse
ortime = 298 s	9039	2	8	wander seems to have calmed down
328 s	9040	4	4	
me is noisy. 416.2 s	9041	8	2	
	9042	16	1	

change to 531 cm^{-1} for $M_1 I$ 8h-7g

aboo. 9043	offset guiding. no peaking	nwrite = 1	nmod = 16
9044		4	4
9045		16	1

Spencer I_o

Go to Callisto
Change to 530 cm^{-1} . Adjust parab to see blue.

cal. 9046

Go to I_o

io. 9047	
.9048	
9049	nsum = 8
io. 9050	
io. 9051	
io. 9052	
io. 9053	
io. 9054	
io. 9055	
io. 9056	— trashed because of a full disk
Flat io. 9057	— was in obsmode = flat after recovering
io. 9058	— also bad, wrong nwrite and nmod
io. 9059	— all appears okay now here

On to Callisto for a divisor at same settings

cal. 9060

Changed settings : $wad = 1350 \text{ cm}^{-1}$

vxsg. 9061 Didn't find I_o at this setting, but getting atmosphere here.

UT 2007 Apr 19

Back to Callisto, nominal $wno = 530 \text{ cm}^{-1}$

cal.9062

And on to Io again at the same setting.

io.9063 — nsum was set to 1 in this file and was set on continuous — 68 frames

io.9064 — Guider no longer works because of twilight...

io.9065

io.9066

io.9067 — Lost Io early due to increasing eastward guiding errors — do not use this file

io.9068

dip @ zenith 6:30 AM = 2.04

LN₂ can pressure is 5 Torr 21 hrs after fill.