

Impacts of no ADC in GMOS

What we can do to minimize the effect on imaging and spectroscopy?

This is to raise awareness among the science staff (including observers, contact scientists, queue coordinators and NGOs) about the implications on blue imaging and (especially) spectral data taken in the absence of an ADC on either GMOS

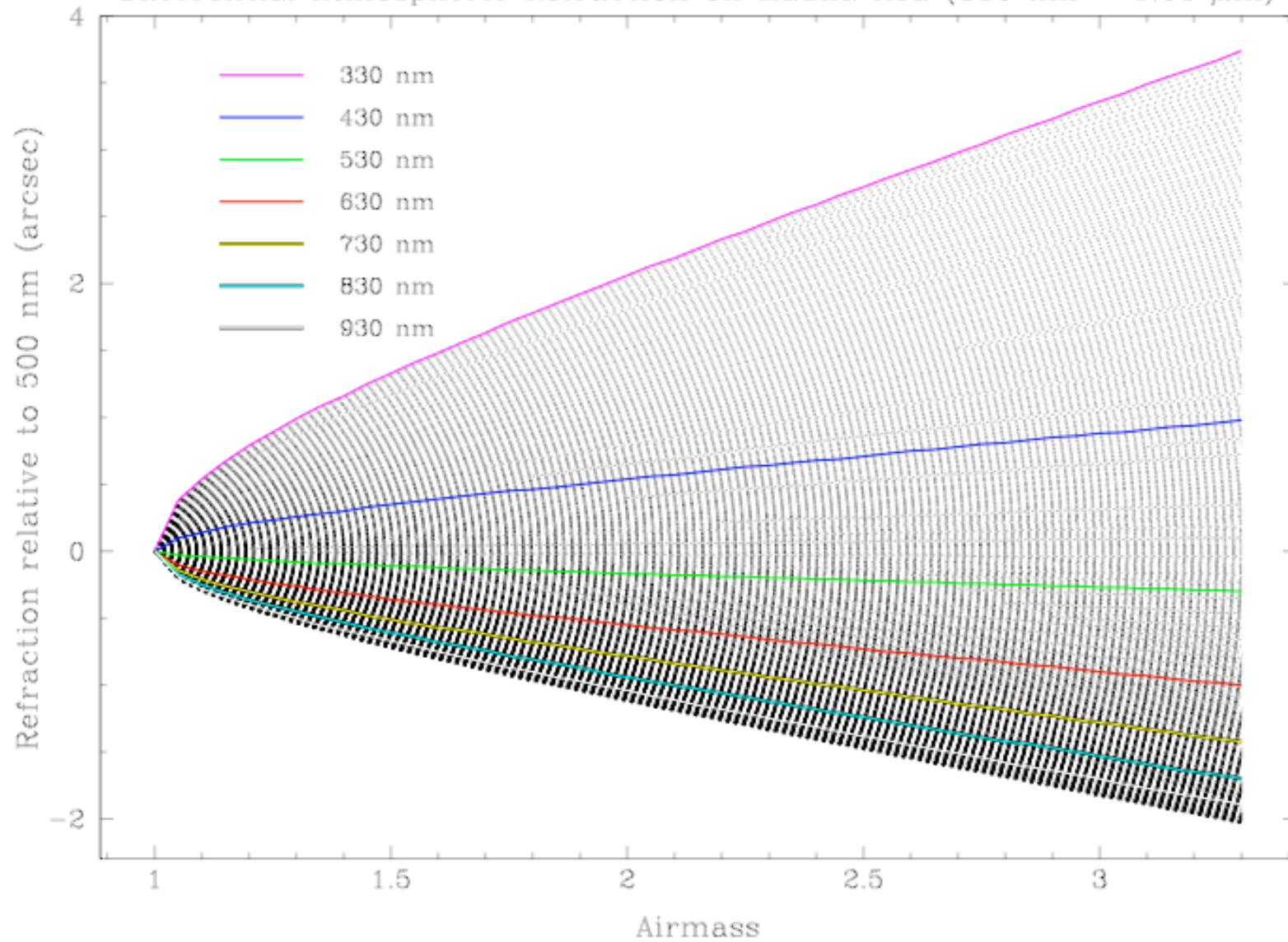
Neither GMOS has ever had an ADC and this is not appreciated enough among the Gemini user community. Staff have not been given adequate guidance to help Pis deal with this and compromised data has been delivered

This is NOT a discussion as to whether or not either GMOS should eventually have an ADC.

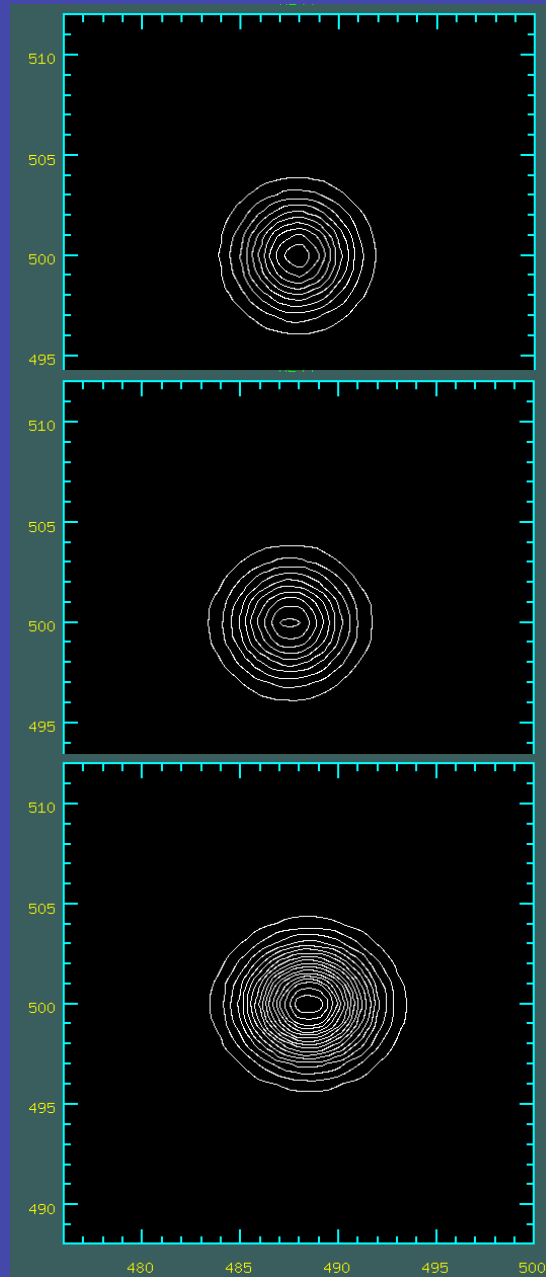
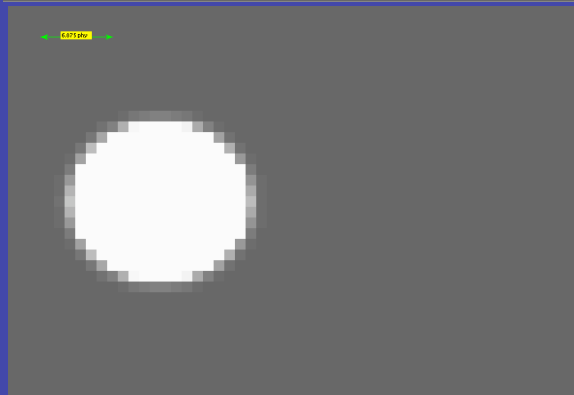
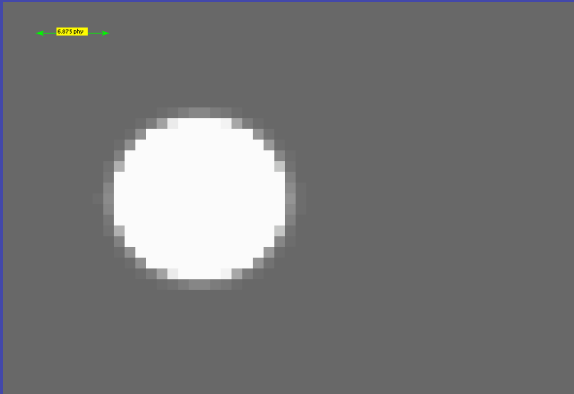
This is a discussion for how we deal with the current configuration (better than we have been)

- What GMOS configurations are potentially impacted
- How are blue imaging and blue spectral data affected (with examples)
- How do contact scientists identify when data will be adversely affected
- What observing strategies can mitigate the effect; what advise should NGOs and CSs be giving to PIs
- What amount of scheduling constraints (how tight) will the QCs allow without reducing the programs chances at being observed and how does this correlate with ranking band
- What OT enhancements can we implement (will we implement) to make the third and fourth items easier
- What can PIs do after the fact to "correct" their data, are there tools available
- Public Webpages will have to be amended to include as much of this information as possible

Differential Atmospheric Refraction on Mauna Kea (330 nm - 1.03 μm)

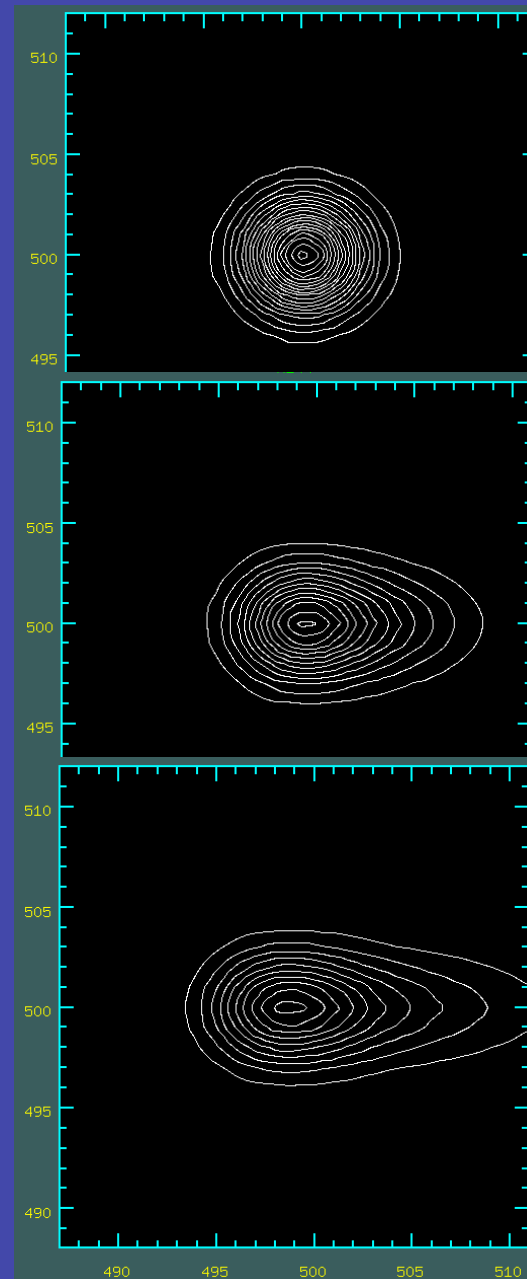
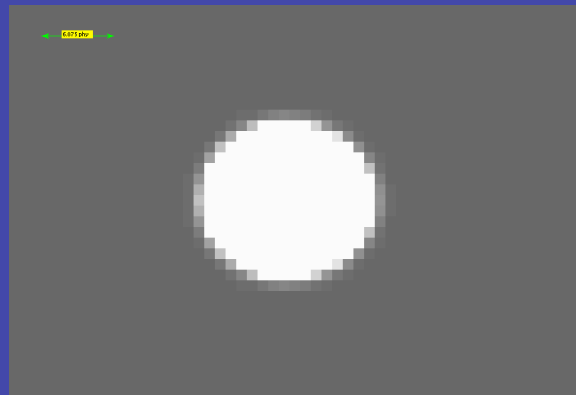


Imaging - Mauna Kea (models)



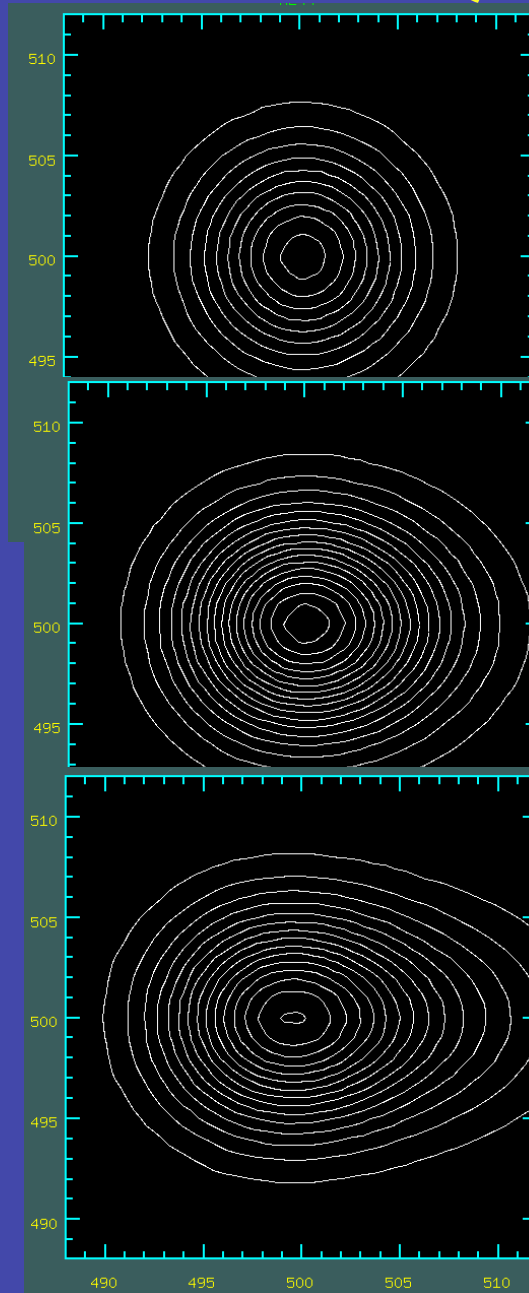
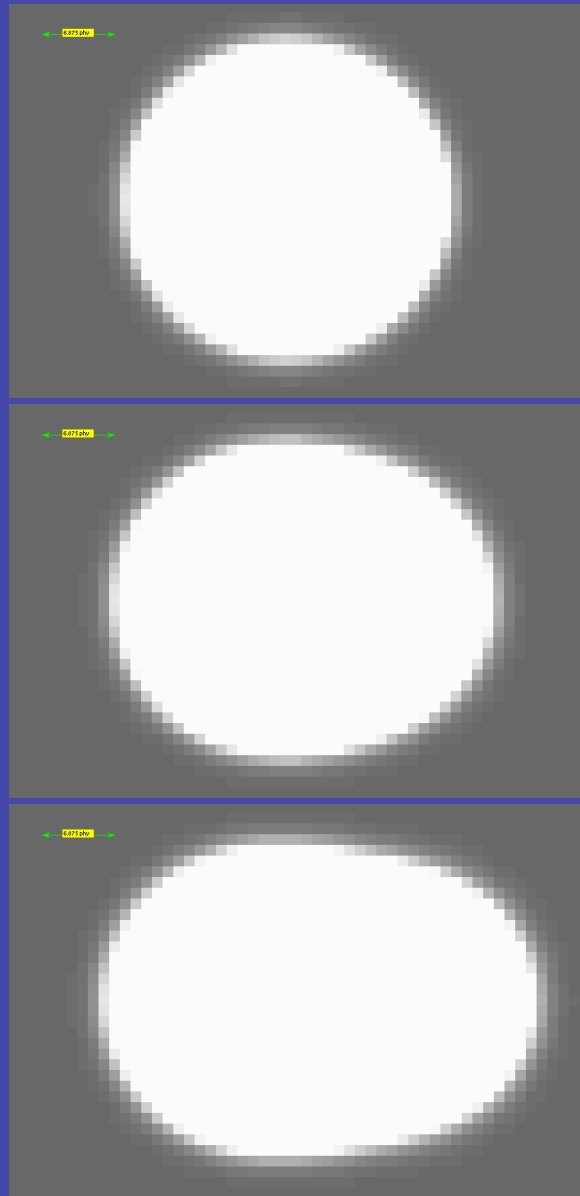
- Models include only differential refraction with airmass
- All refraction is relative to 500 nm
- Assumes seeing disk is 0.3" with no refraction
- No appreciable elongation for i-band at most airmasses, only displacement
- Airmass 1.05, 1.5, 2.0
- i-band filter wavelength range 706-850 nm

Imaging - Mauna Kea (models) - cont.



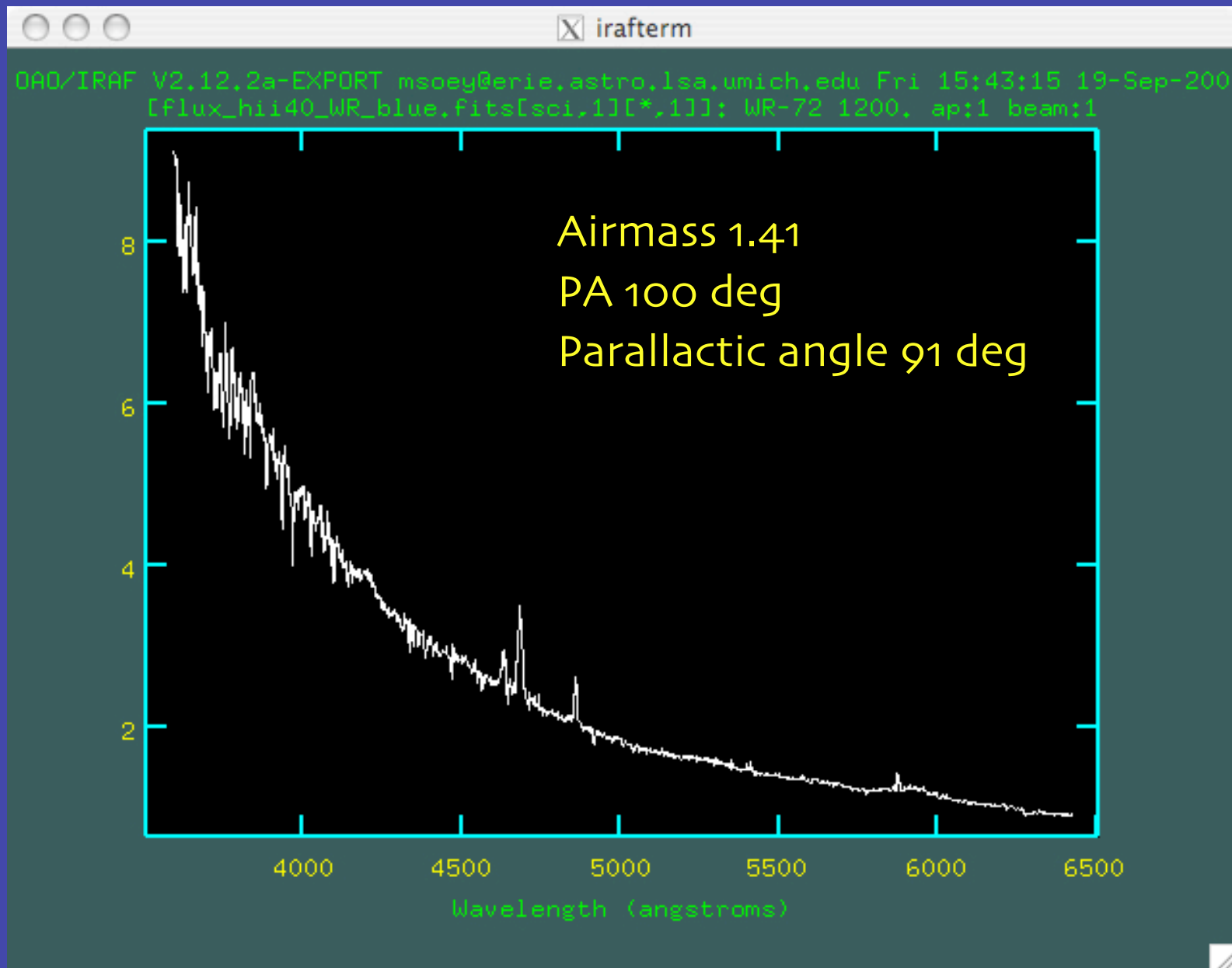
- Models include only differential refraction with airmass
- All refraction is relative to 500 nm
- Assumes intrinsic image quality is 0.3"
- Appreciable elongation at even low airmass in g-band
- u-band not modeled but would be even more severe
- Airmass 1.05, 1.5, 2.0
- g-band filter wavelength range 398-552 nm

Imaging - Mauna Kea (models) - cont.

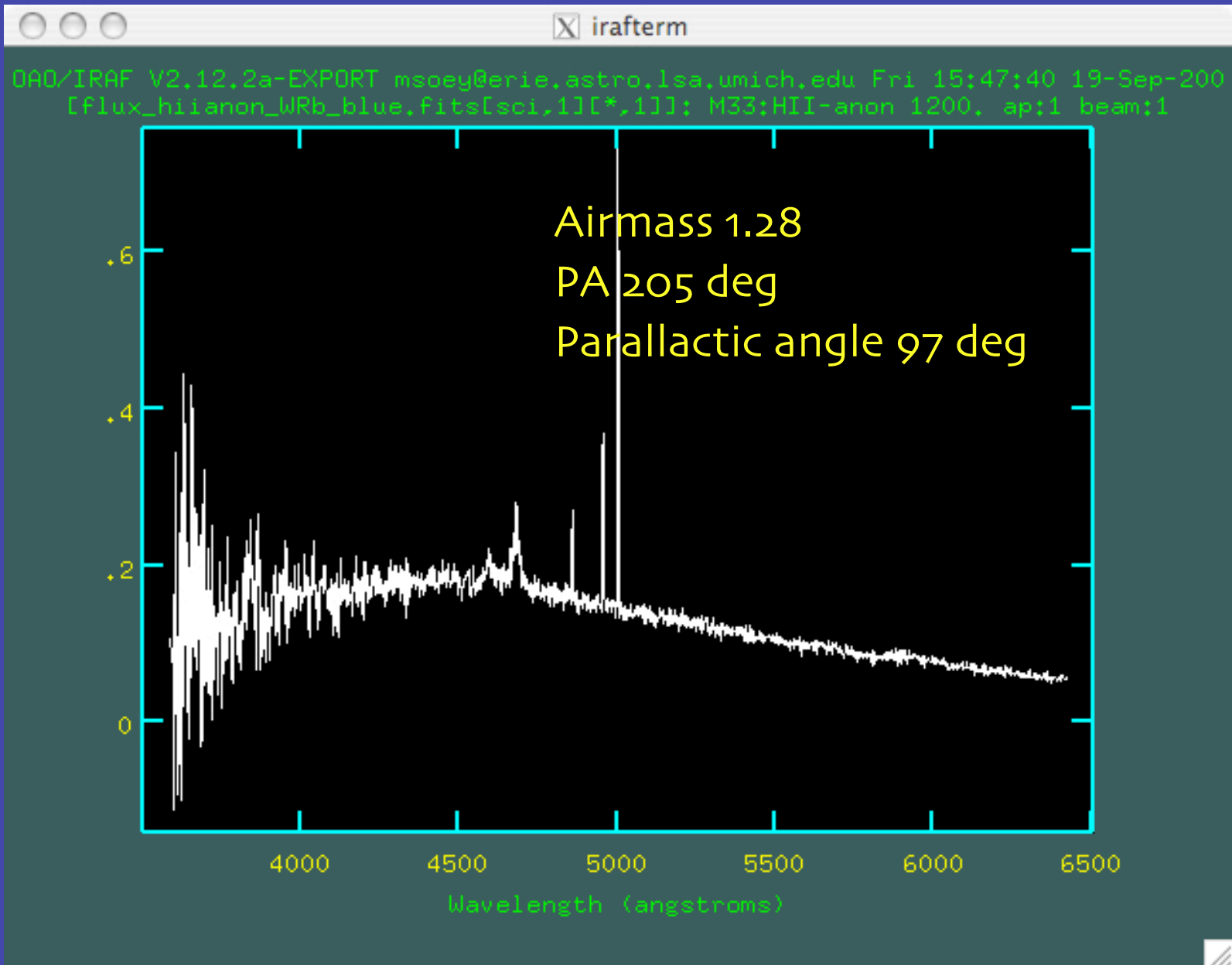


- Models include only differential refraction with airmass
- All refraction is relative to 500 nm
- Assumes intrinsic image quality is $0.6''$
- Elongation only becomes a problem at fairly high airmass
- u-band not modeled but would be even more severe
- Airmass 1.05, 1.5, 2.0
- g-band filter wavelength range 398-552 nm

Spectroscopy - Mauna Kea (data)

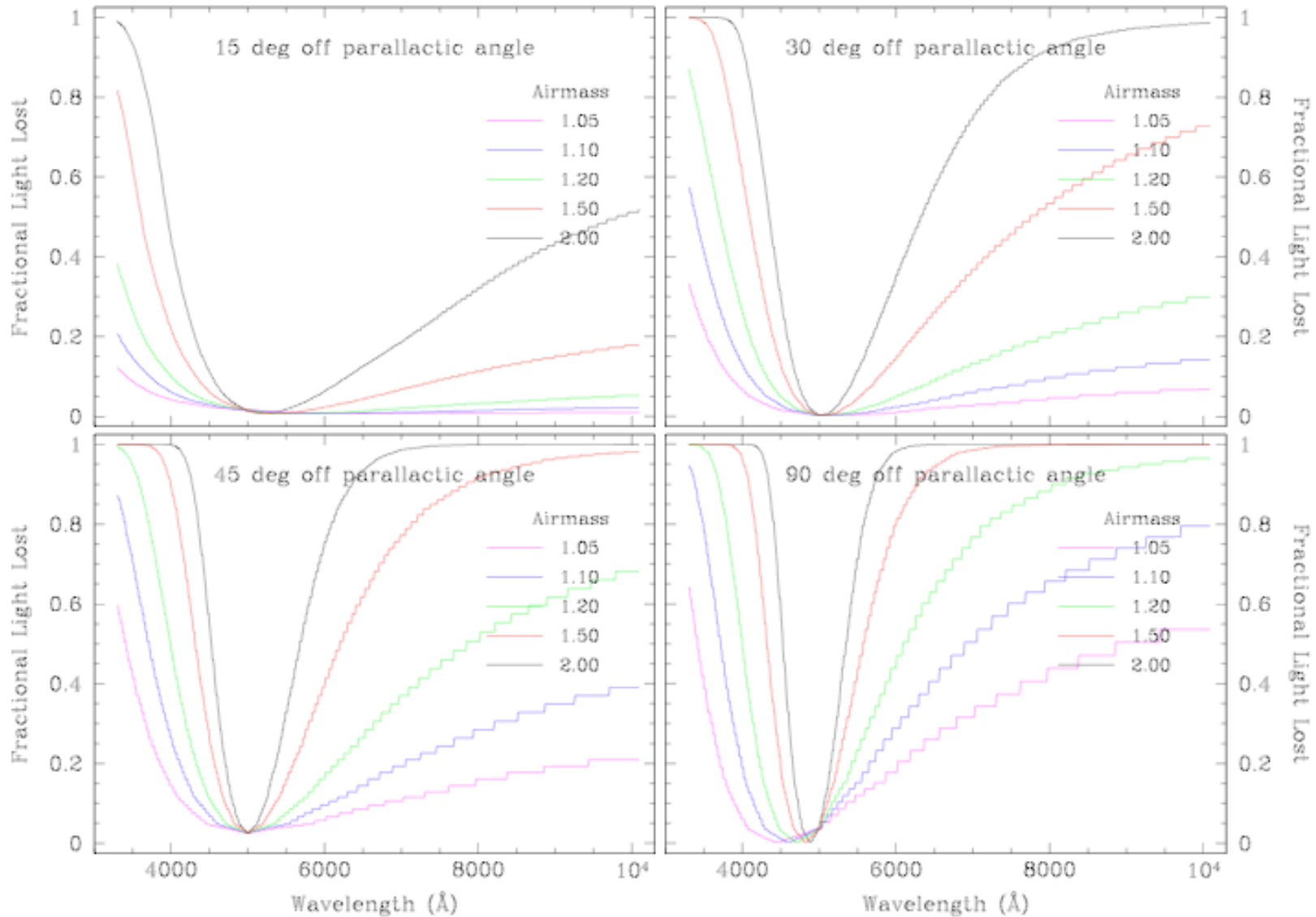


Spectroscopy - Mauna Kea (data)



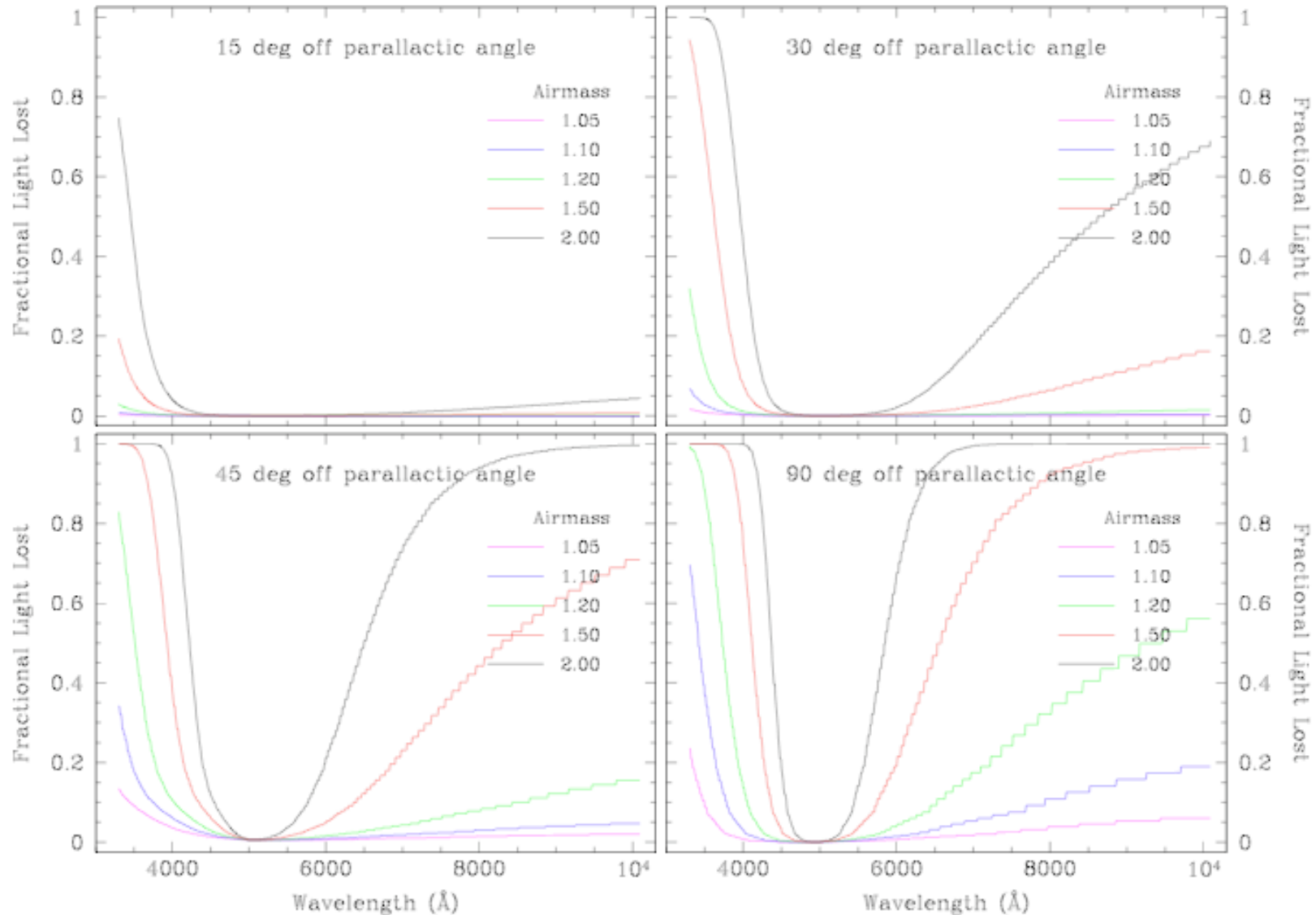
Spectroscopy - Mauna Kea (models)

Light Loss due to Refraction on Mauna Kea (0.51" longslit, 0.3" seeing)



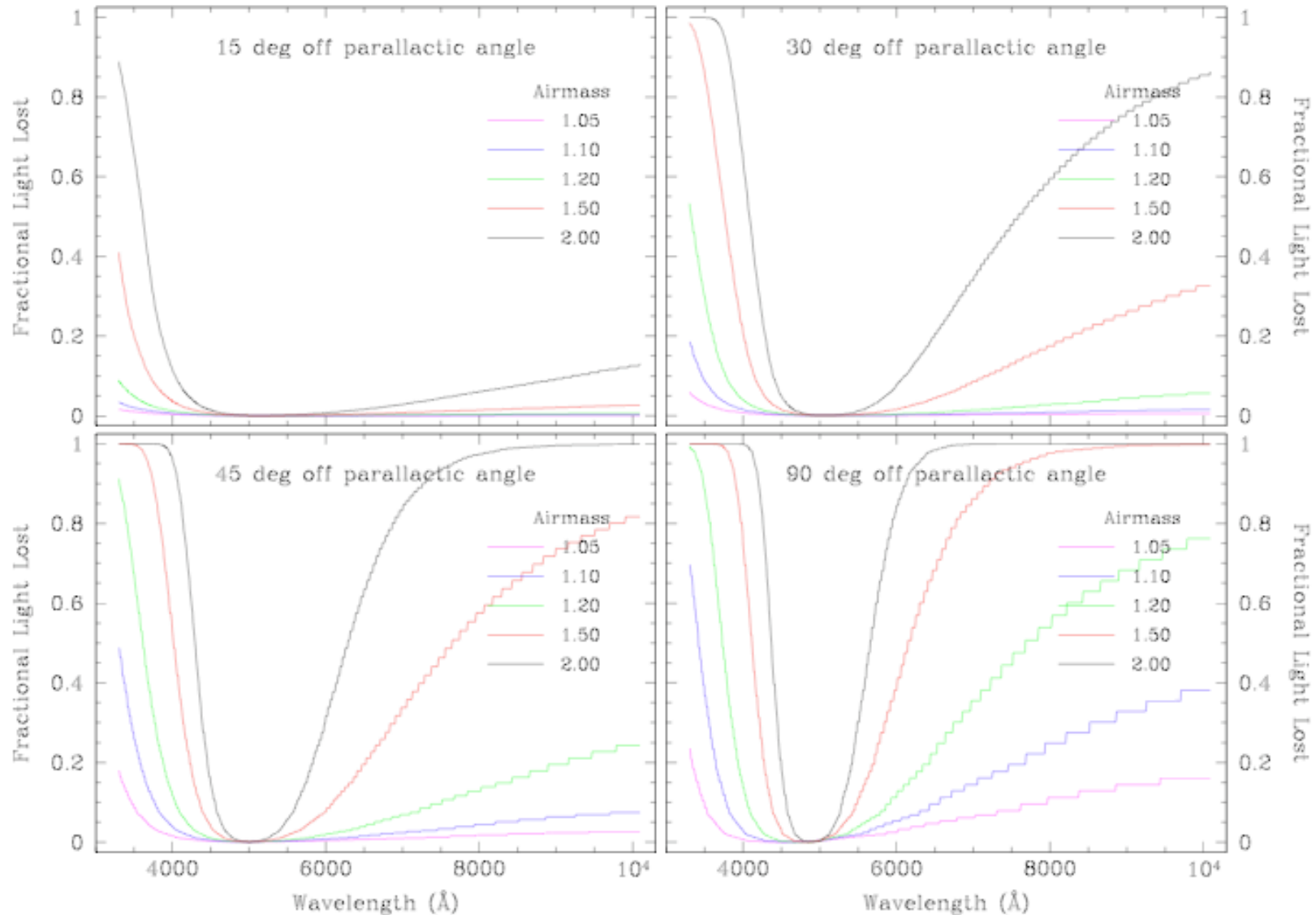
Spectroscopy - Mauna Kea (models)

Light Loss due to Refraction on Mauna Kea (0.95'' longslit, 0.3'' seeing)



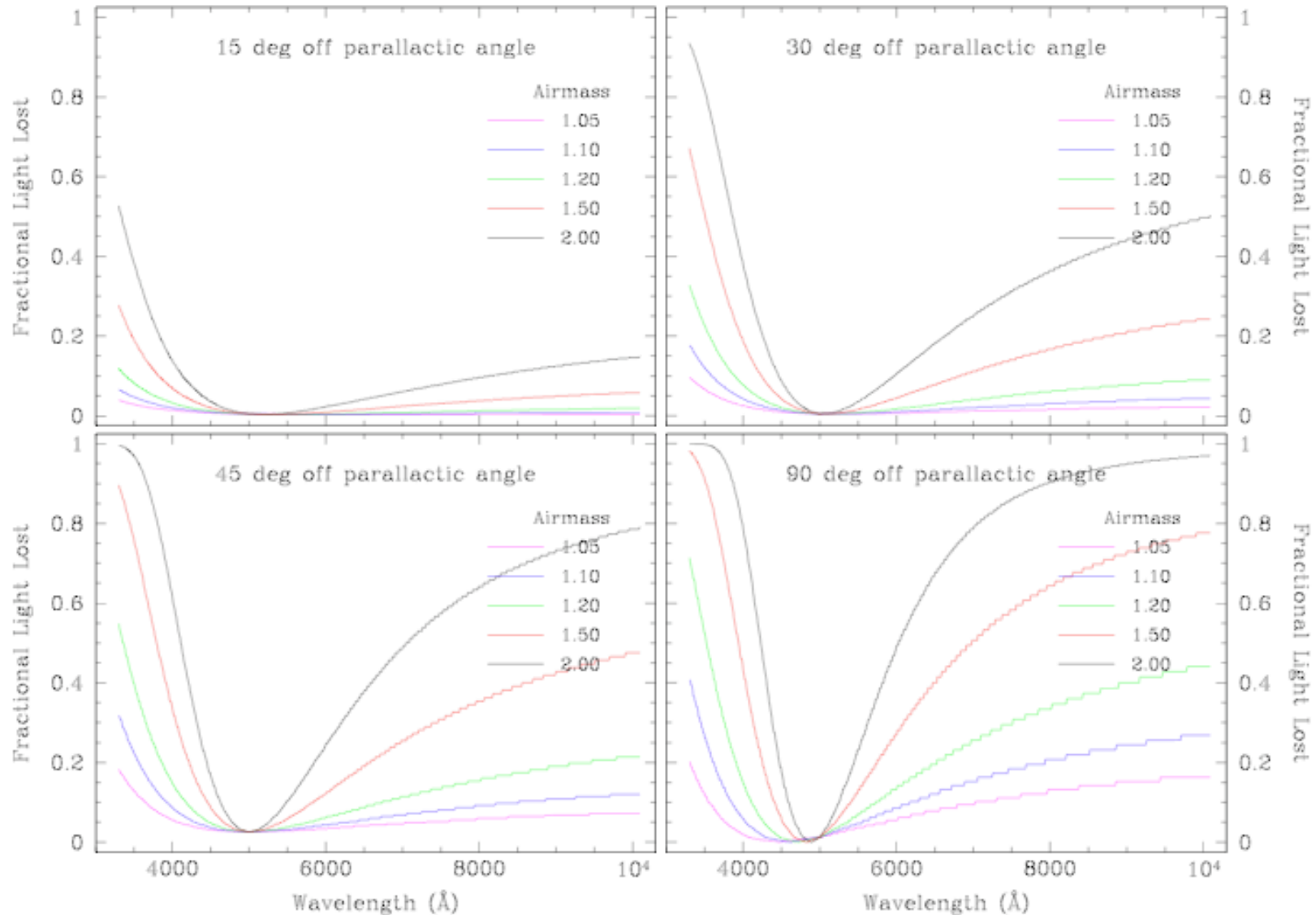
Spectroscopy - Mauna Kea (models)

Light Loss due to Refraction on Mauna Kea (0.80" longslit, 0.3" seeing)



Spectroscopy - Mauna Kea (models)

Light Loss due to Refraction on Mauna Kea (0.80" longslit, 0.9" seeing)



What observing strategies can mitigate the effect; what advise should NGOs and CSs be giving to PIs

- For imaging only airmass constraints can help; g-band and u-band IQ20 obs especially affected
- For spectroscopy, wavelengths $< \sim 450$ nm affected; narrow slits especially affected. Use the widest slit the science will tolerate.
- Longslit obs may be able to observe at parallactic angle but not always possible due to lack of guide stars
- Custom tilted longslits combined with airmass constraints (?)
- MOS position angle fixed once the mask is designed; consider parallactic angle and guide star when choosing position angle and possible airmass constraints
- For spectroscopy airmass restrictions depend on shortest wavelength covered by spectral setup and total wavelength coverage, as well as slit width (and position angle for MOS)
- VLT VIMOS does not allow PI to choose position angle (fixed at 90deg), Gemini does not want to impose this restriction.
- Keck Deimos not really used below 500 nm; PIs choose position angle appropriate for time of night mask is observed

Parallactic Angle Example in GMOS OT Library

Science Program Editor - [GN-GMOS-library] GMOS-N OT library - version 2008-05-30

File Edit View Go Help

Open Back Forward Cut Copy Paste Plot Image Data Proc Libraries Queue Edit

Observation

- GMOS-N OT library - version 2008-05-30
 - Library description
 - History
 - New GCAL Configurations and exp. time T...
 - [52] Example: griz offset imaging sequenc...
 - [81] Example: Mean Parallactic Angle Long...
 - OBSERVE AT MEAN PARALLACTIC ANGL...
 - Observing Conditions
 - Targets (ExampleTarget)**
 - GMOS-N
 - Description
 - Sequence
 - [76] Template: Blind Offset Target
 - [78] Template: Two Targets on Longslit
 - Templates: Imaging
 - Templates: Spectroscopy Science Observat...
 - Templates: Spectroscopy Acquisition Obse...
 - Example: Non-Sidereal Target Using PWFS
 - Examples: Nod & Shuffle Darks
 - Examples: Longslit Baseline Calibrations
 - Examples: IFU Baseline Calibrations
 - Examples: MOS Baseline Calibrations

Group

Note

Component

Iterator

Observe

Data Proc

Target Environment

Use this component to enter the base position and wave front sensor targets for this observation.

Type Tag	Name	RA	Dec	Dist	Mag
Base	ExampleTarget	03:35:20.721	11:20:24.10	0	R=21
OIWS-1	3.5692064E7	03:35:06.663	11:19:50.72	3.49	13.26U, 11.99...
OIWS-2	3.5692073E7	03:35:24.971	11:19:37.08	1.3	16.58U, 14.36...
OIWS-3	3.5692075E7	03:35:32.259	11:23:42.97	4.36	15.32U, 13.73...

Selected Target

Base Resolve SIMBAD Names via CADC

J2000 RA Dec Mag

Proper Motion \ Tracking Details \ Nonsidereal Details \

RA milli-arcsecs/year

Dec milli-arcsecs/year

Image... Find Guide Stars... Set Base From Image

Show

Save Close

Parallactic Angle Example in GMOS OT Library - cont.

The screenshot displays the Science Program Editor interface for the GMOS-N OT library. The window title is "Science Program Editor - [GN-GMOS-library] GMOS-N OT library - version 2008-05-30". The menu bar includes "File", "Edit", "View", "Go", and "Help". The toolbar contains icons for "Open", "Back", "Forward", "Cut", "Copy", "Paste", "Plot", "Image", "Data Proc", "Libraries", and "Queue".

The left sidebar shows a tree view of the library structure:

- Observation
 - Group
 - Note
 - Component
 - Iterator
 - Observe
 - Data Proc

The main content area shows the "Program Note" for the selected program "OBSERVE AT MEAN PARALLACTIC ANGLE". The note text is:

Enter notes for the operator/astronomer here.

Title:

Note

Observe at mean parallactic angle.

Set the PA appropriately depending on when the observation is scheduled and use the corresponding OIWFs guide star.
OIWFS-2 is faint, guide at 100Hz if necessary.

OIWFs1: PA=330-260 can be used for parallactic angle range (80,150) and (-100,-30)
OIWFs2: PA=235-210 can be used for parallactic angle range (30,55) and (-150,-125)
OIWFs3: PA=79-88 can be used for parallactic angle range (79,88) and (-101,-92)

Buttons for "Save" and "Close" are located at the bottom right of the note area.

Position Editor - jsky51936.fits

File View Go Graphics Catalog

Open Back Forward Cut Levels Catalogs Guide Stars Images

Mode:
Browse
Drag
Erase

Add:
PWFS1
PWFS2
OIWFS
AOWFS
Target
Offset

View:
Base
WFS
Target
Catalog
Offset
PWFS FOV
OIWFS FOV
AOWFS FOV
Sci FOV
Acq Cam

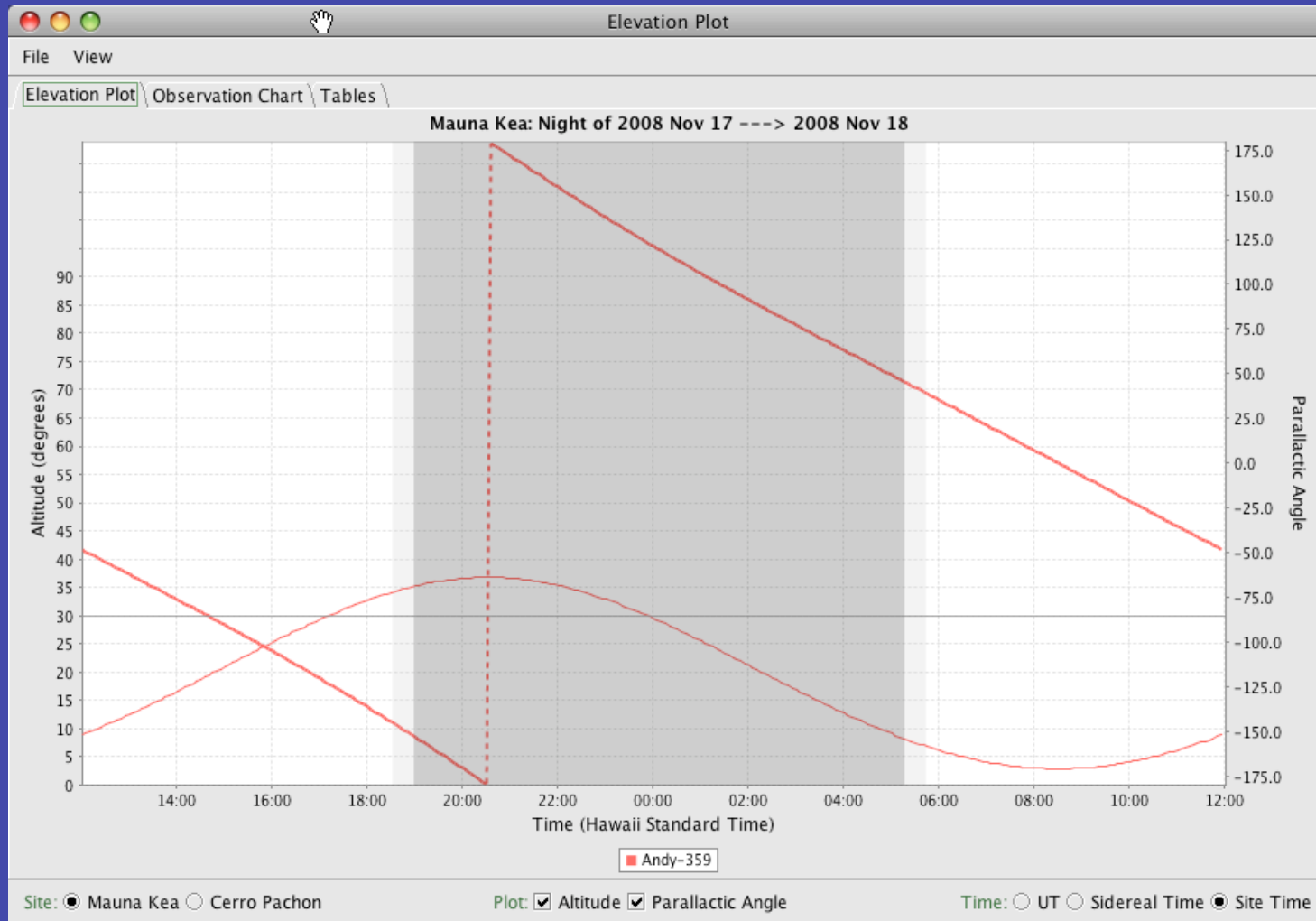
OIWFS-3

OIWFS-2

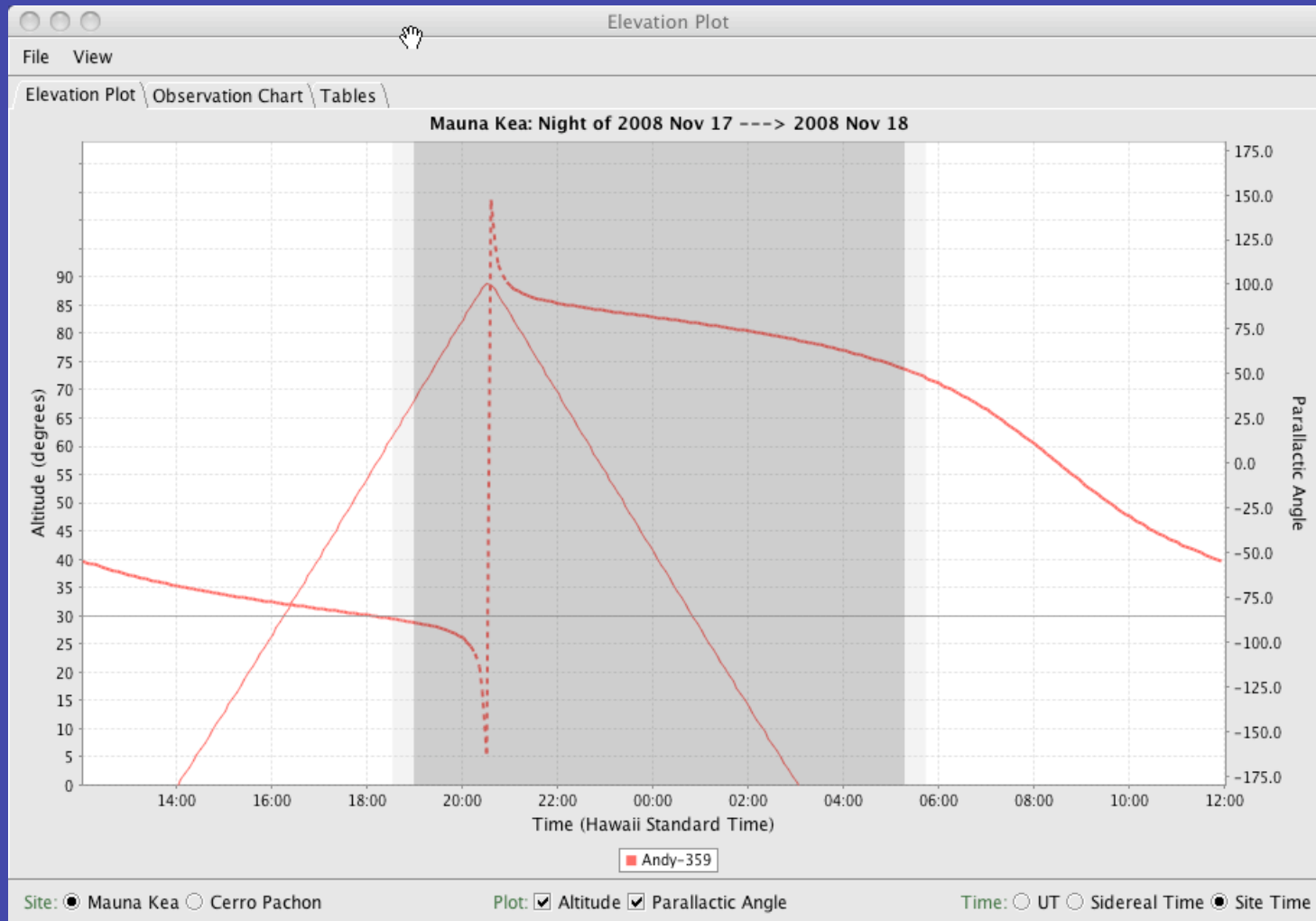
OIWFS-1

1x 763, 610 4928.0 03:34:58.925, +11:23:06.8 J2000

Elevation & parallactic angle OT plot Mauna Kea, Dec = 73deg



Elevation & parallactic angle OT plot Mauna Kea, Dec = 21deg



Discussion

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