

# **Cycle 24 COS Calibration Plan**

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# Cycle 24 Statistics

## COS Instrument Usage Based on Approved Programs

- COS orbits comprise ~20.5% of all GO prime orbits in Cycle 24

| Instruments | GO Prime Orbits Usage* | GO SNAP Orbit Usage |
|-------------|------------------------|---------------------|
| ACS         | 13.9%                  | 25.4%               |
| COS         | 20.5%                  | 16.8%               |
| STIS        | 27.6%                  | 0.0%                |
| WFC3        | 37.9%                  | 57.7%               |
| FGS         | 0.0%                   | 0.0%                |

\*Coordinated parallels not included. Extracted from cycle 24 GO instrument Usage:  
<http://www.stsci.edu/hst/metrics/SelectionStats/Data/20160715go.txt/preWrap>

# Cycle 24 Statistics

## COS Instrument Usage Based on Phase II Submissions

- 1.4% of the total COS prime observing time consists of *acquisition* exposures (1.3% NUV + 0.1% FUV)
- 98.6% of the total COS prime observing time consists of *science* exposures

Total SCIENCE exposures: Breakdown by Mode

| Configuration/Mode        | Prime Usage<br>(COS science exposures) | SNAP Usage<br>(COS science exposures) |
|---------------------------|--|---------------------------------------|
| <b>FUV / Spectroscopy</b> | 93.5%                                  | 100%                                  |
| <b>NUV / Imaging</b>      | 0.1%                                   | 0.0%                                  |
| <b>NUV / Spectroscopy</b> | 6.4%                                   | ---                                   |

Extracted from cycle 24 COS Instrument Usage: <http://www.stsci.edu/hst/metrics/SiUsage/COS/>

# Cycle 24 Statistics

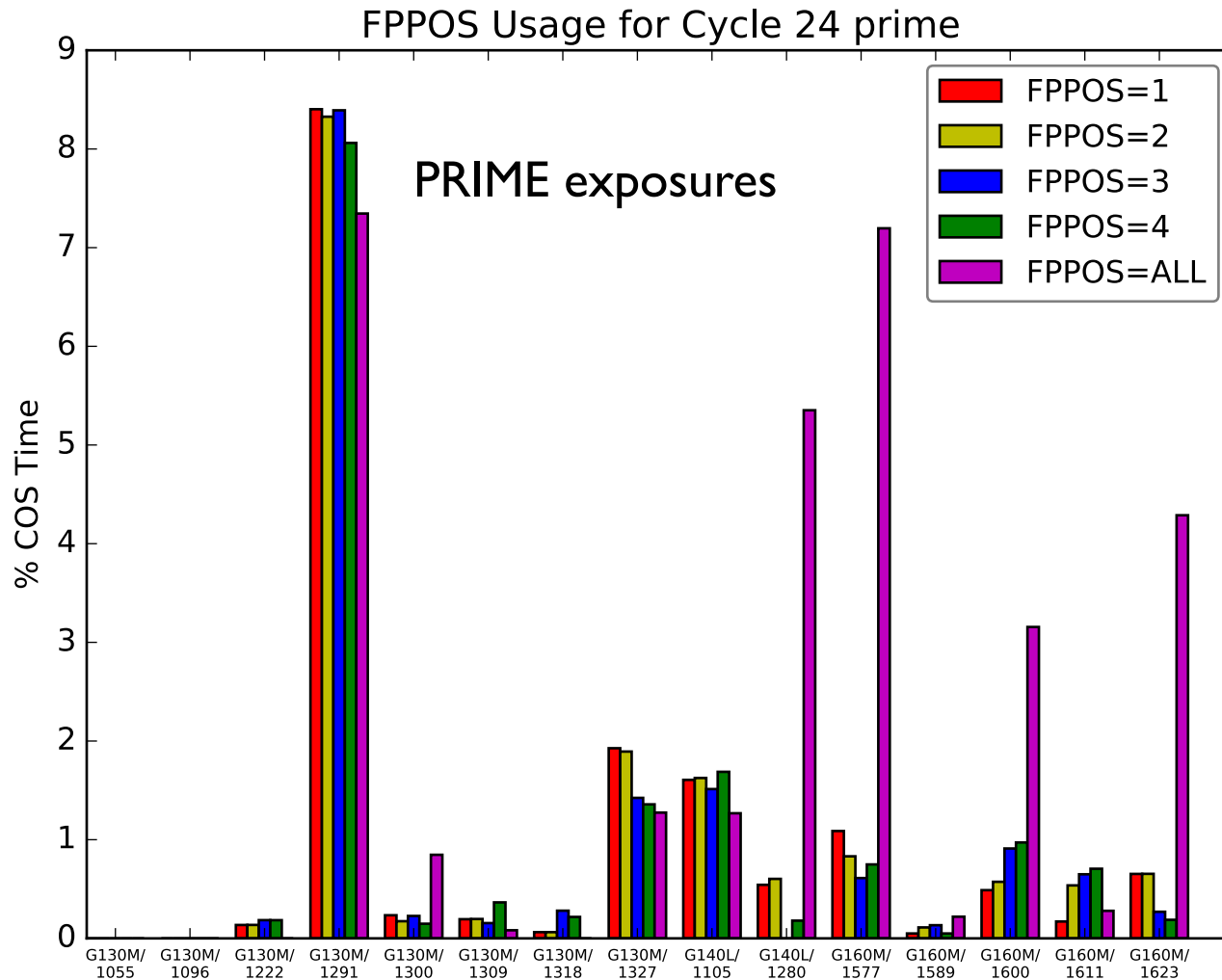
## COS Instrument Usage Based on Phase II Submissions

Total SCIENCE exposures: **Breakdown by Mode & Grating**

| Configuration                 | Grating    | Percentage of COS Prime Science Exposures |         | Percentage of COS SNAP Science Exposures |         |
|-------------------------------|------------|---|---------|--|---------|
|                               |            | C23 (%)                                   | C24 (%) | C23 (%)                                  | C24 (%) |
| COS/FUV<br>(C24: 93.5% prime) | G140L      | 15.4                                      | 14.6    | --                                       | --      |
|                               | G130M      | 45.7                                      | 53.1*   | 100                                      | 100     |
|                               | G160M      | 23.2                                      | 25.9    | --                                       | --      |
| COS/NUV<br>(C24: 6.5% prime)  | G230L      | ---                                       | 4       | --                                       | --      |
|                               | G185M      | 4.4                                       | 2.3     | --                                       | --      |
|                               | G225M      | 11.3                                      | --      | --                                       | --      |
|                               | G285M      | ---                                       | --      | --                                       | --      |
|                               | MIRROR A/B | <0.1                                      | 0.1     | --                                       | --      |

\*<1 % of total G130M observing time goes to exposures in the “Blue Modes” : **decrease of ~10% compared to C23** – C24 Blue Mode distribution: 1222 (100%), 1055 (0%), 1096 (0%).  
For comparison: C23 Blue Mode distribution was 1222 (42.8%), 1055 (6.7%), 1096 (50.5%).

# FP-POS Usage for Cycle 24



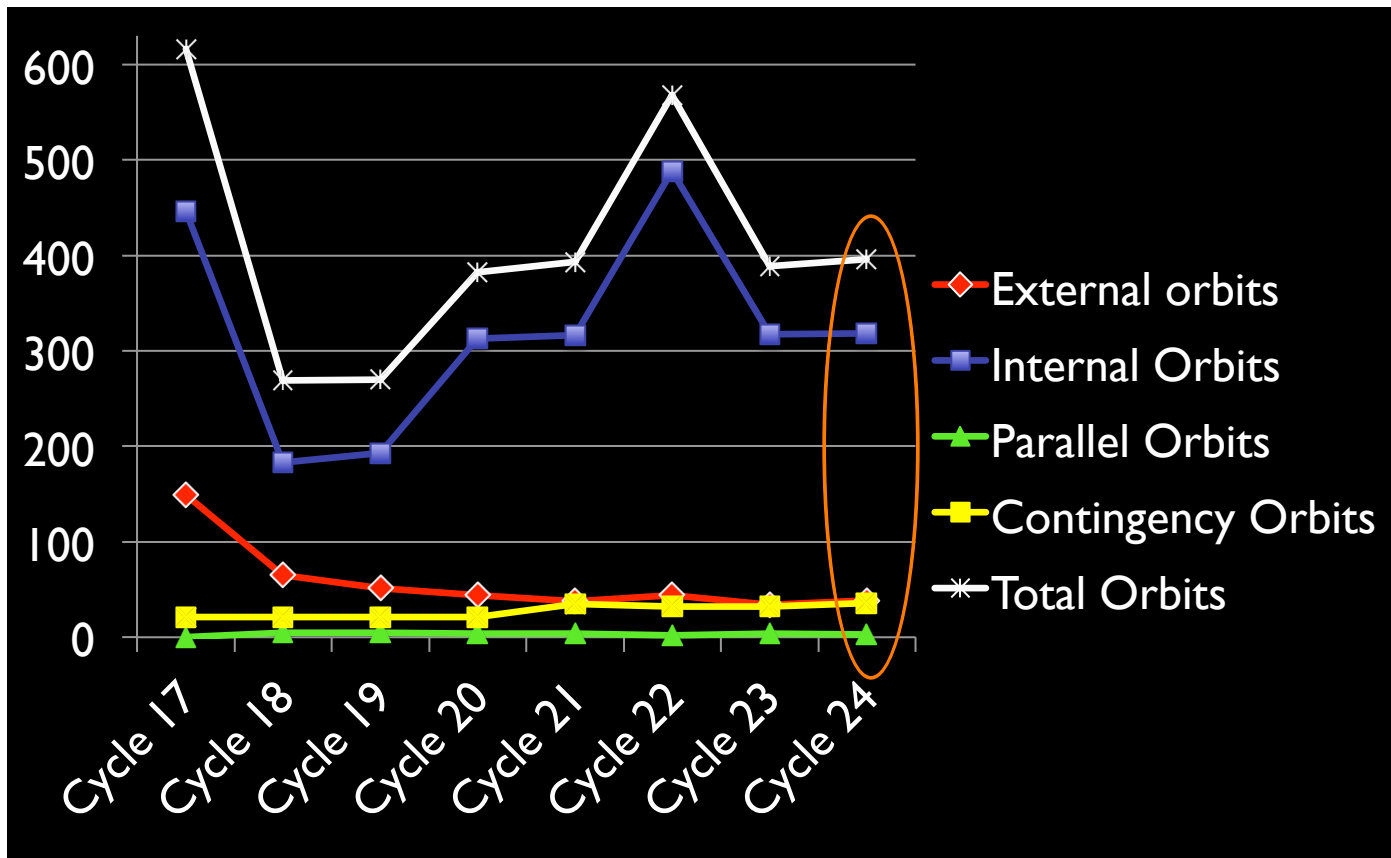
# COS Calibration Programs Approved with Time

|                 | # of Programs | External Orbits | Internal Orbits      | Parallel Orbits      | Total Orbits                       |
|-----------------|---------------|-----------------|----------------------|----------------------|------------------------------------|
| Cycle 17        | 20            | 149             | 446                  | 0                    | 595+(21)                           |
| Cycle 18        | 11            | 65              | 183                  | 5                    | 248+(21)+5                         |
| Cycle 19        | 10            | 51              | 193                  | 5                    | 244+(21)+5                         |
| Cycle 20        | 11            | 44              | 313+(21)             | 4                    | 357+(21)+4                         |
| Cycle 21        | 14            | 38+(14)         | 316+(21)             | 4                    | 354+(35)+4                         |
| Cycle 22        | 13            | 44+(11)         | 488+(21)             | 2                    | 534+(32)+2                         |
| Cycle 23        | 12            | 34+(10)         | 317+(21)+(2*)        | 4                    | 351+(31)+(2*)+4                    |
| <b>Cycle 24</b> | <b>12</b>     | <b>39+(12)</b>  | <b>318+(21)+(3*)</b> | <b>3<sup>†</sup></b> | <b>357+(33)+(3*)+3<sup>†</sup></b> |

\*related to HV change – () mark contingency orbits - † mark COS data taken with STIS as prime in Cy24 program 14833.

External Orbit Requests are < 40 in an continuous effort to *streamline* the calibration programs and to preserve the lifetime of the COS FUV detectors while providing high quality science data. The Cycle 22 external orbit increase was related to move of operations to LP3 and to a special program. The 5 orbit increase for C24 is associated with the move of operations to LP4 and to additional calibrations needs for NUV TDS monitoring.

# COS Calibration Programs with Time



Internal Orbits Requests are  $< 320$  and have *decreased primarily* due to a decreased cadence for the FUV dark monitor in Cycle 23. This decreased cadence is maintained in C24. In Cycle 22, an additional 170 internal orbits were requested to monitor the darks at the 2 operational HV after move to LP3. Based on the Cycle 24 usage, these additional orbits are not required this cycle either.

# Summary of Fall COS Orbit Request for Cycle 24

| Title<br>(PI)   | External<br>(3-Gyro) | C24 Frequency<br>(orbits x repeats) | Cycle 23 Allocation |
|---|----------------------|-------------------------------------|---------------------|
| <b>FUV Monitors</b>   |                      |                                     |                     |
| FUV Spectroscopic Sensitivity Monitor<br>(De Rosa)                | <b>26+(11)</b>       | 3x5 + 1x5 +2x3                      | 23 (10)             |
| FUV Internal/External Wavelength Scale Monitor<br>(Sonnentrucker) | 3                    | 3x1                                 | 3                   |
| <b>NUV Monitors</b>   |                      |                                     |                     |
| COS Target Acquisition Monitor<br>(Penton)                        | 2+(1)                | 2x1                                 | 2+(1)               |
| NUV Spectroscopic Sensitivity Monitor<br>(Taylor)                 | <b>6</b>             | 3x2                                 | 4                   |
| NUV Internal/External Wavelength Scale Monitor<br>(Sonnentrucker) | 2                    | 1x2                                 | 2                   |
| <b>COS Side 2 Carry Over Programs</b>                             |                      |                                     |                     |
| COS Side 2 Initial NUV Checkout<br>(Sahnow)                       | 1                    | 1x1                                 | 1                   |
| COS Side 2 Initial FUV Checkout<br>(Fox)                          | 2                    | 2x1                                 | 2                   |
| <b>Total Cycle 24 Request</b>                                     | <b>39+(12)</b>       |                                     | <b>Ext: 34+(11)</b> |

( ) Contingency orbits not included in Cycle 24 request



# COS Side 2 Switch Programs

- Programs are carried along each cycle's calibration plan (keeping the same ID) so that the impact of any changes to operating conditions (e.g., gyros) can be evaluated and modifications to the programs implemented as needed.
  
- **Science programs** (2 Internal + 3 External orbits)
  - 13192 - COS Side 2 Initial NUV Checkout (1 Internal + 1 External orbit):  
-> No changes required in Cycle 24
  
  - 13193 - COS Side 2 Initial FUV Checkout (1 Internal + 2 External orbits)  
-> Minor changes required in Cycle 24 to accommodate (i) a change in definition of LIFETIME\_POS keyword associated with FSW Build LV58 and (ii) change in PEAKXD algorithm required for operation at LP4 move

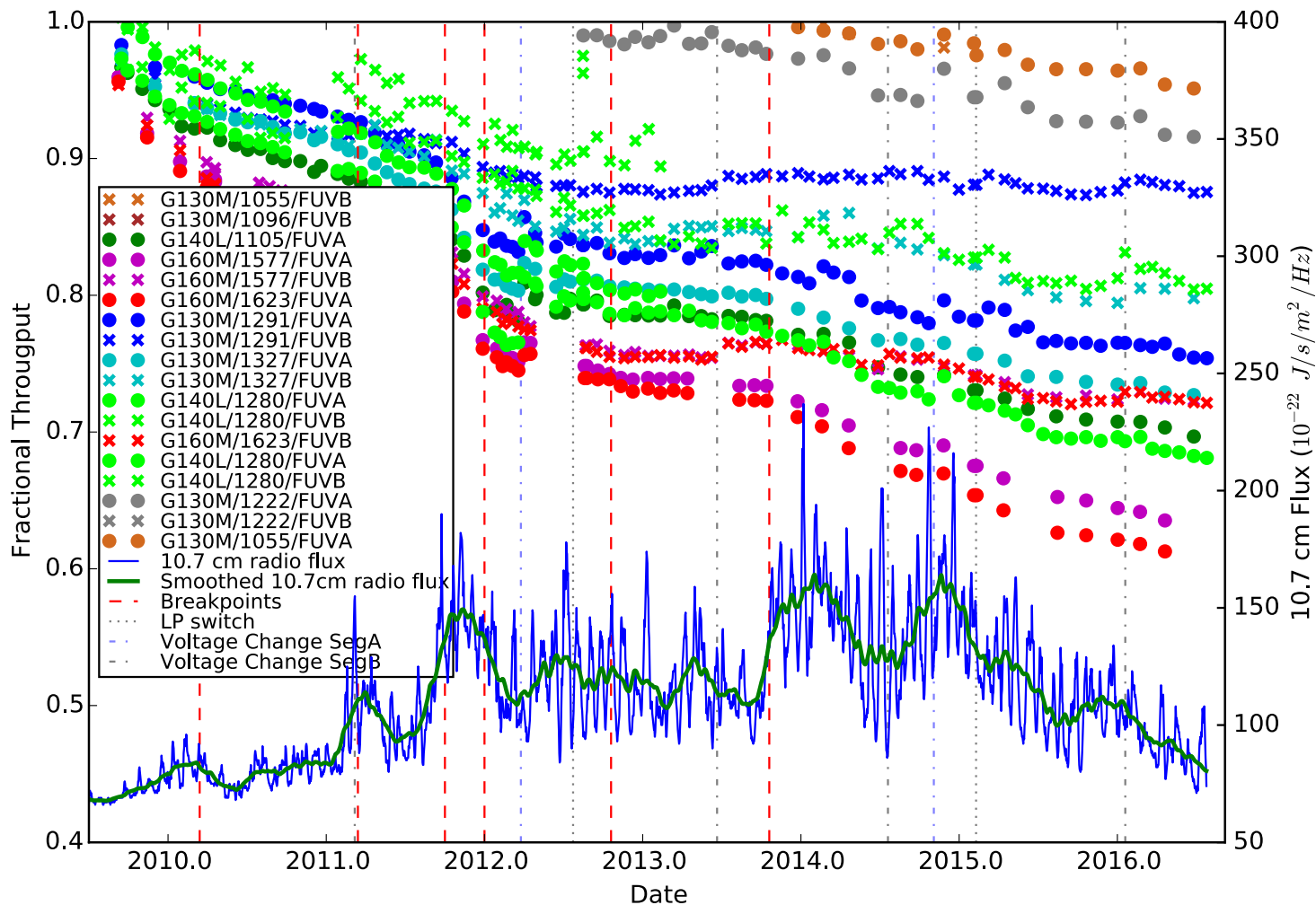
# **FUV Monitors**

# COS FUV Spectroscopic Sensitivity Monitor

## PI: Gisella De Rosa

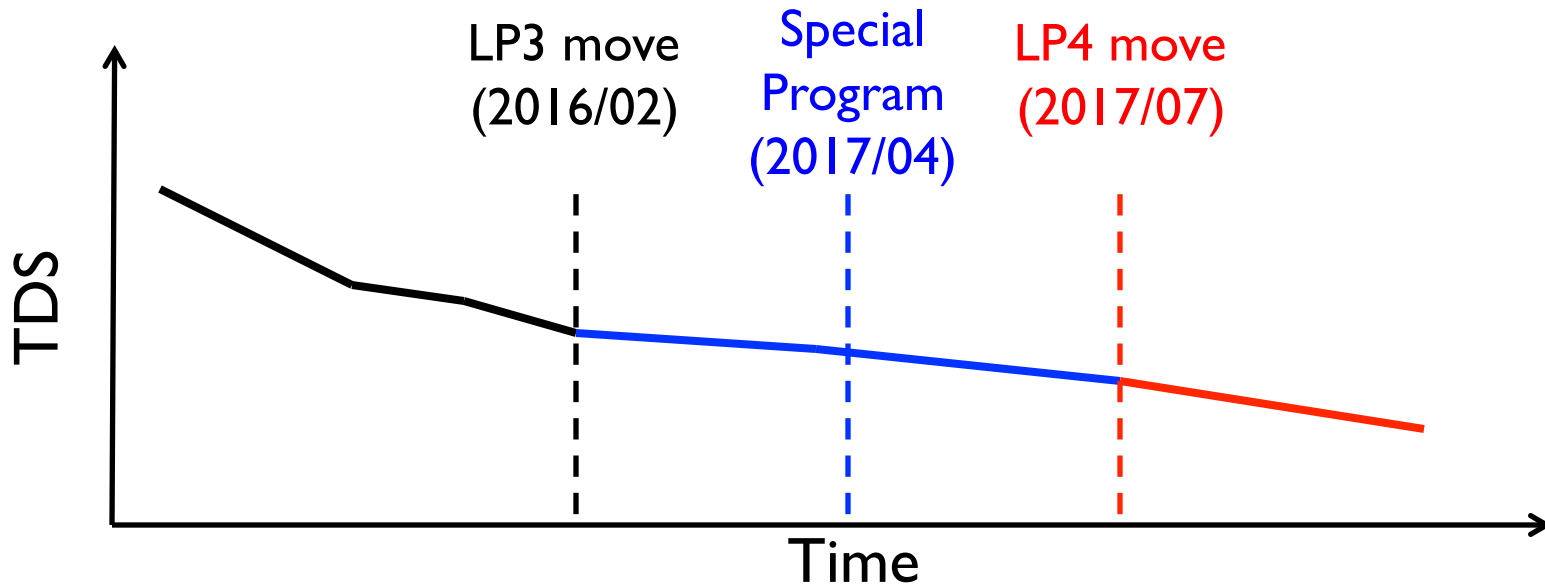
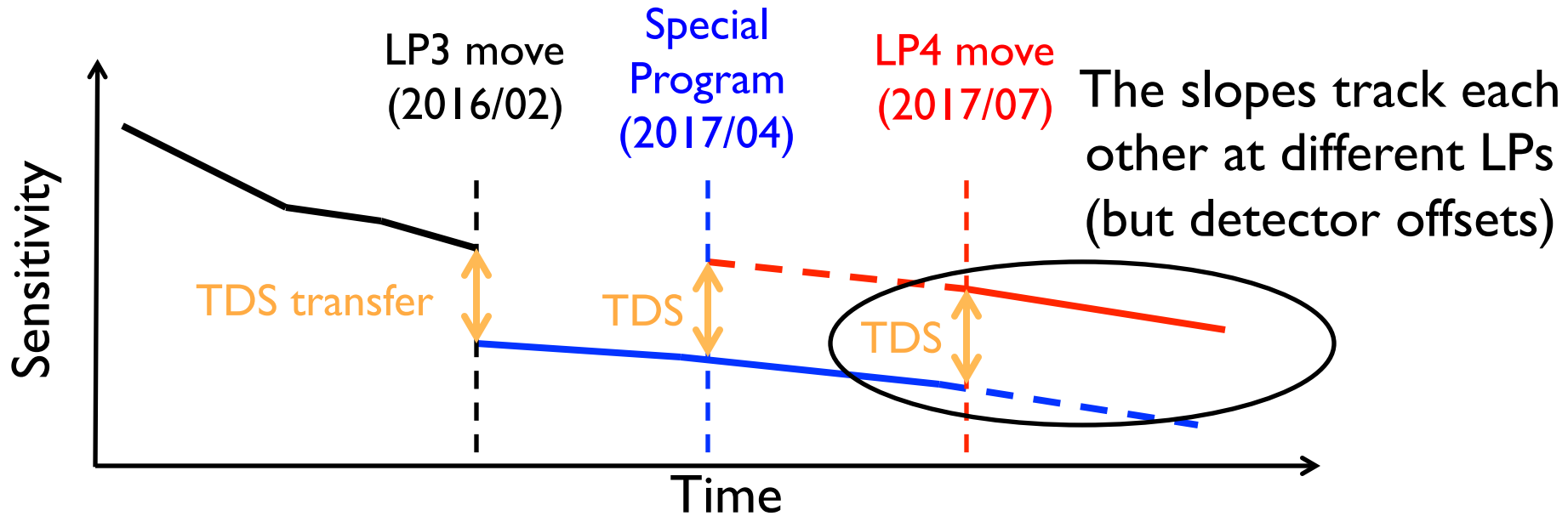
|  |   |
|--|---|
| <b>Purpose</b>                               | Monitor the sensitivity of each FUV grating to detect any change due to contamination or other causes. The FUV gratings are the most heavily used modes on COS and have also experienced several changes in the time-dependent spectroscopic sensitivity since launch. These trends are grating, segment, and wavelength dependent.   |
| <b>Description</b>                           | To track the TDS as a function of wavelength we obtain exposures with all FUV gratings every month. There are 2 types of monitoring sequences which occur on alternating months. (i) Full monitoring sequence every other month (except May – July when GD71 is unavailable): 3 orbits in 2 visits. The 1-orbit visit (GD71) covers the G130M/1096/FUVB, G160M/1577/FUVA, and G160M/1623/FUVA modes. The 2-orbit visit (WD0308) covers G130M/1222, G130M/1291, G130M/1327, G130M/1055/FUVA, G160M/1577/FUVB, G160M/1623/FUVB, G140L/1105, G140L/1280 modes. These comprise the reddest and bluest central wavelengths of each grating with additional coverage of the G130M blue modes. (ii) Reduced monitoring sequence in alternating months: 1 orbit visit. WD0308 used to monitor the complete wavelength range of the standard modes with G130M/1291, G160M/1623, and G140L/1280. To transition from LP3 to LP4 we request: (i) to execute complete April TDS visit at LP3 within 2 weeks of special LP4 calibration program and (ii) to change the July TDS visit from a reduced 1-orbit visit to a full 2-orbit visit at LP3 and to add a full 2 orbit visit at LP4 (WD3008 only since GD71 is not visible). One contingency orbit is also requested to observe GD71 at LP4 and will only be activated if the April and July data are in disagreement. |
| <b>Fraction GO/GTO Programs Supported</b>    | 93.5% of COS exposure time  |
| <b>Resources Required: Observations</b>      | 26 external orbits + (11 contingency external orbits needed if changes in trends are seen during cycle)   |
| <b>Resources Required: Analysis</b>          | 10 FTE weeks  |
| <b>Products</b>                              | Time-Dependent Sensitivity reference file as necessary, update to ETC throughputs, the COS monitoring webpages, and a summary ISR   |
| <b>Accuracy Goals</b>                        | - SNR of 15 per resel at wavelength of least sensitivity for the standard modes, SNR of 25 per resel at wavelength of most sensitivity for the blue modes. For the blue modes, this will ensure $S/N > 15$ for $\lambda > 1030 \text{ \AA}$ for 1096/FUVB, $\lambda > 1130 \text{ \AA}$ for 1055/FUVA and 1222/FUVB<br>- TDS calibration better than 2% for standard modes and 10% for blue modes   |
| <b>Scheduling &amp; Special Requirements</b> | <ul style="list-style-type: none"> <li>• Reduced monitoring sequence should occur every 2 months starting in November 2016</li> <li>• Complete monitoring sequence should occur every 2 months starting in December 2016</li> <li>• The FUVA turn-off of the GD71 visit should be hidden in the GS-ACQ</li> <li>• GD71 is unschedulable May – July 2016</li> <li>• LP3-LP4 reconnection: April complete visit to be executed @LP3 within 2 weeks from LP4 special calibration program</li> </ul>  |
| <b>Changes from Cycle 23</b>                 | Increase by 3 external orbits and 1 contingency orbit for LP3-LP4 reconnection.   |

# COS TDS FUV Trends



Unchanged FUVB ( $< 3\%$ ) and FUVA flattened trends ( $< 5\%$ ) since 2015.2

# Reconnecting life time positions



# Reconnecting life time positions

## Standard Program:

- **Reduced visit: 1 orbit, WD0308, starting November to be repeated every 2 months.**
- **Complete visit: 3 orbits, WD0308 & GD71, starting December to be repeated every 2 months (GD71 not visible in June).**

## LP3-LP4 Reconnection:

- **2017 April:** complete visit at LP3 (standard program) + special calibration program at LP4 (WD0308, GD71, no blue modes) to be executed within 2 weeks –no additional orbits.
- **2017 July:** complete visit at LP4 (WD0308 only, instead of reduced) + complete visit at LP3 (WD0308, no blue modes) –3 additional orbits.
- **2017 August:** GD71 contingency visit at LP3 (no blue modes) to be activated only if zero points from April and July are in disagreement –(1) additional orbit.

# COS FUV Internal to External Wavelength Scale Monitor

## PI: Paule Sonnentrucker

|  |  |
|--|--|
| <b>Purpose</b>                               | This program monitors the offsets between the wavelength scale set by the internal wavecal versus that defined by absorption lines in external target AV75 obtained through the PSA.   |
| <b>Description</b>                           | This program monitors the offset between the internal and external wavelength scales: this offset is referred to as "DELTA" in the wavelength dispersion reference file and corrects for the shift between the WCA and PSA in TV03 versus the shift between the WCA and PSA in orbit : $(WCA-PSA)_{TV03} - (WCA-PSA)_{orbit}$ . Analysis of TV data indicates that this DELTA (offset) is cenwave and FP-POS independent for a particular grating, but it is grating dependent. To verify and monitor this dependency, this program observes the G130M/1096-1222-1291-1327, G160M/1577-1623 at different FP-POS and G140L/1105-1280 cenwaves |
| <b>Fraction GO/GTO Programs Supported</b>    | 93.5% of COS total exposure time based on Cycle 23 usage   |
| <b>Resources Required: Observations</b>      | 3 external orbits. Schedulability set to 30% to fit all observations within requested orbits.  |
| <b>Resources Required: Analysis</b>          | 4 FTE weeks  |
| <b>Products</b>                              | Update of wavelength dispersion reference file if necessary, ISR, and a summary ISR.   |
| <b>Accuracy Goals</b>                        | G140L 150km/s, 7.5-12.5 pixels<br>G130M 15km/s, 5.7-7.5 pixels<br>G160M 15km/s, 5.8-7.2 pixels   |
| <b>Scheduling &amp; Special Requirements</b> | Executes once per cycle. ORIENT is set to avoid bright field targets-> restricted visibility: March (10days); June-July (5-6 weeks)- Sept (10 days)<br>External target used is AV75 (target used since Cy 20).   |
| <b>Changes from Cycle 23</b>                 | No changes   |

# NUV Monitors



# COS Target Acquisition Monitor

## PI: Steven Penton

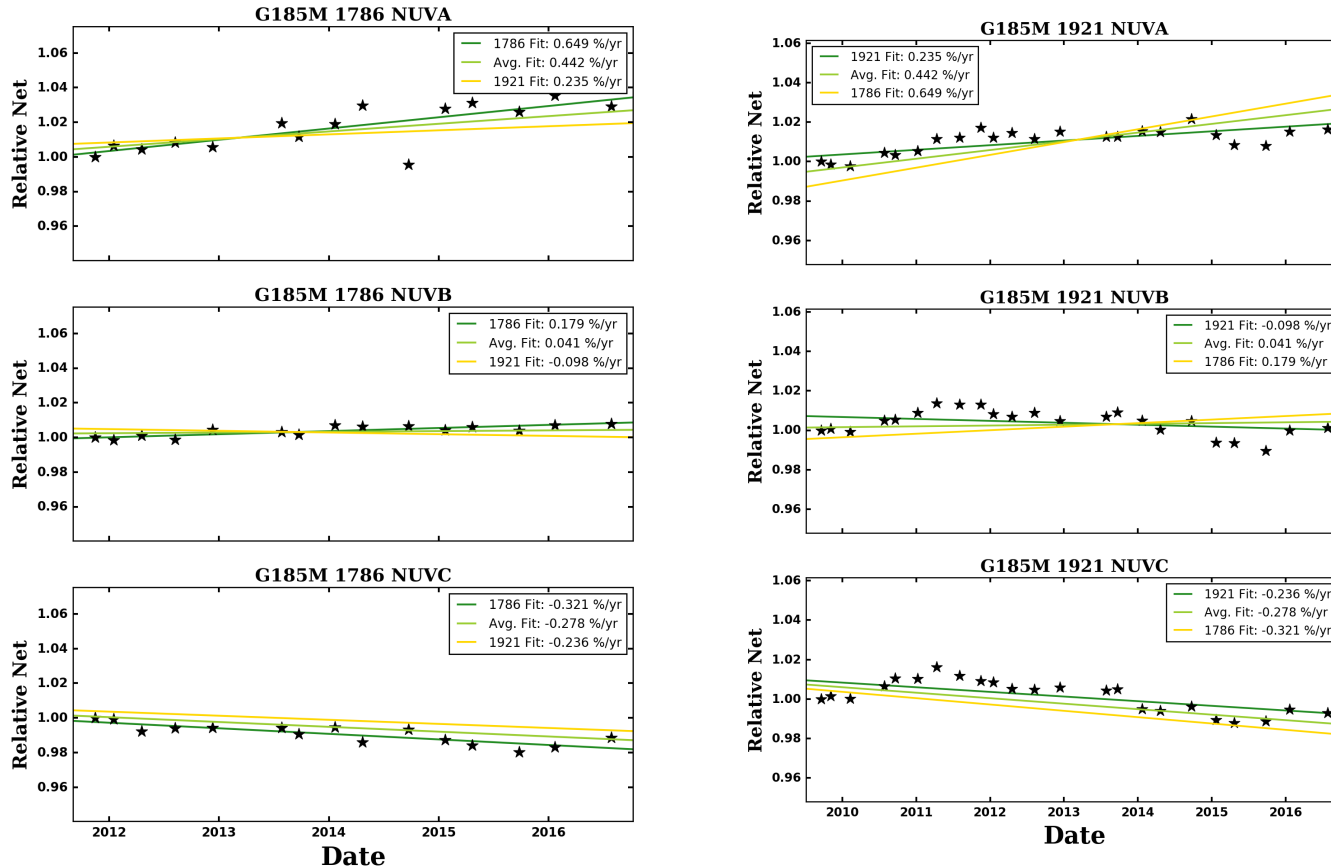
|  |   |
|--|---|
| <b>Purpose</b>                               | Measure/monitor the WCA-to-PSA/BOA offsets used for imaging target acquisition (TA), and WCA-to-PSA for spectroscopic TAs   |
| <b>Description</b>                           | There are 4 NUV ACQ/IMAGE mechanism combinations: 2 science apertures (SAs: PSA & BOA) x 2 mirror modes (MIRRORA & MIRRORB). During SMOV, the WCA-to-PSA+MIRRORA offset was determined by an aperture scan; the other WCA-to-SA offsets were bootstrapped from this offset. Changes in the PSA+MIRRORA-to-PSA+MIRRORB offset are monitored in the Focal Plane Calibration program (SI-FGS Alignment). All other spectroscopic WCA-PSA offsets, all WCA-SA imaging offsets, and co-alignment for all ACQ/IMAGE modes are monitored by the present program. It obtains PSA spectra of the targets with all gratings to track any changes in the spectroscopic WCA-to-PSA offsets. The improved PEAXD algorithm required to perform Spectroscopic TA at LP4 is also tested for all gratings. |
| <b>Fraction GO/GTO Programs Supported</b>    | 100% of COS total exposure time (all COS exposures depend on WCA-SA offsets)  |
| <b>Resources Required: Observations</b>      | 2 external one-orbit visits + 1 external orbit contingency visit. The PSA+MIRRORA and PSA+MIRRORB co-alignment is periodically tested in the SIAF file verifications of HST program I4035. If this program has not been run with the current SIAF file, a contingency visit would be needed to measure the PSA+MIRRORA-to-PSA+MIRRORB offset  |
| <b>Resources Required: Analysis</b>          | 2 FTE weeks for analysis, and verifying WCA-to-SA offsets. Should changes be warranted to existing offsets, additional effort will be needed, as this requires changes to the COS flight software (FSW).  |
| <b>Products</b>                              | Updated NUV imaging WCA-to-SA offsets, NUV & FUV Spectroscopic WCA-to-PSA offsets and summary ISR.  |
| <b>Accuracy Goals</b>                        | Imaging WCA-to-SA offsets need to be known to better than 0.5 NUV pixels in both dispersion and cross-dispersion (XD). Spectroscopic WCA-to-PSA offsets to 0.5 XD pixel.  |
| <b>Scheduling &amp; Special Requirements</b> | Executes annually and 45 days after each COS SIAF adjustment.   |
| <b>Changes from Cycle 23</b>                 | <b>Minor change:</b> tests of the improved PEAKXD algorithm are included for all gratings using G130M/I318, G160M/I623 and G140L/I280 at no additional orbit cost.  |

# COS NUV Spectroscopic Sensitivity Monitor

## PI: Jo Taylor

|  |  |
|--|--|
| <b>Purpose</b>                               | Monitor sensitivity of all NUV gratings to detect any change due to contamination or other causes. Track time dependence of the sensitivity with wavelength. The NUV gratings on COS degrade at an overall steady rate since the start of on-orbit operations, with the bare-Aluminum gratings (G225M and G285M) degrading at a faster rate (~3 and 11%/yr) than the MgF <sub>2</sub> coated gratings (G185M and G230L, ~0%/yr).   |
| <b>Description</b>                           | This program obtains exposures with all NUV gratings using external targets WD1057+719 (G230L) and G191B2B (G185M, G225M, G285M). The following modes are monitored: G230L/2635-2950, G185M/1786-1921, G225M/2186, and G285M/2617-3094 since C19. These cenwaves constitute the reddest and bluest central wavelengths containing only first order light with the exception of the G225M. Current data indicate a wavelength dependence of the TDS. To better characterize this effect, observations of the G185M/2010, G225M/2306-2410 and G285M/2850 are added to the monitoring program in Cycle 24 to provide data at both the extreme cenwaves and the middle cenwave for the M gratings. The G230L monitoring coverage is adequate and left unchanged. |
| <b>Fraction GO/GTO Programs Supported</b>    | 6.5% of COS exposure time  |
| <b>Resources Required: Observations</b>      | 6 external orbits - 2 visits of 3 orbits each.   |
| <b>Resources Required: Analysis</b>          | 5 FTE weeks  |
| <b>Products</b>                              | Time-Dependent Sensitivity Reference File and a summary ISR. As permitted by resources and data quality: add wavelength dependence to TDS reference files  |
| <b>Accuracy Goals</b>                        | Characterize evolution of TDS within 2% .  |
| <b>Scheduling &amp; Special Requirements</b> | Observe at 6 month intervals.  |
| <b>Changes from Cycle 23</b>                 | <b>Orbit request increased by 2 external orbits.</b> Monitoring of additional cenwaves is required to characterize TDS cenwave dependency.   |

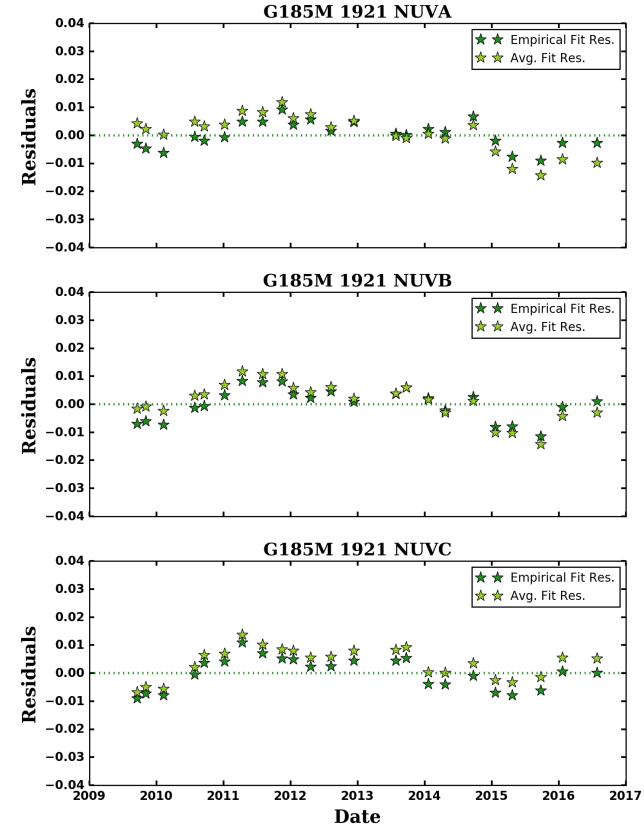
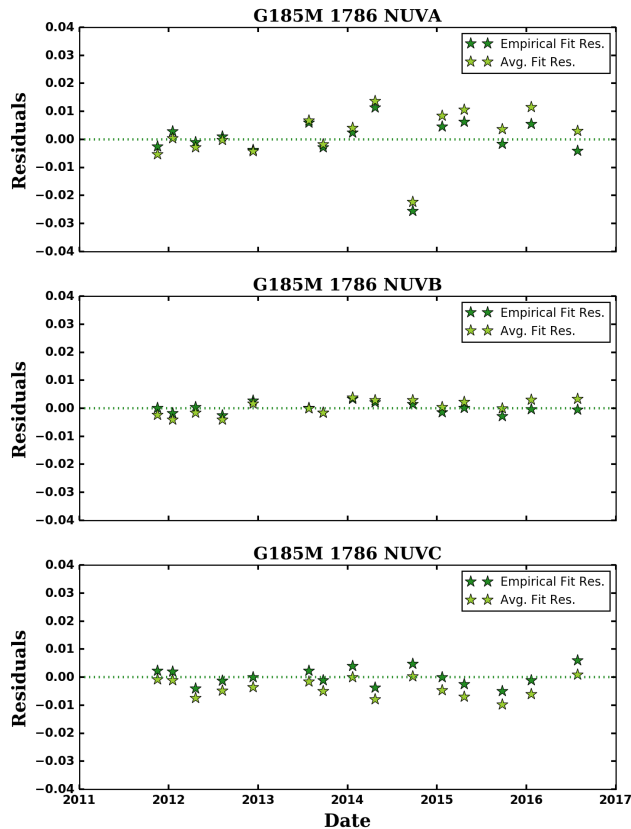
# COS NUV TDS Trends In Monitoring Data



## NUV TDS monitoring:

- Wavelength dependency suggested for all gratings
- Monitor both extreme and middle cenwaves for all gratings to characterize trend.

# COS NUV TDS Trends in Residuals



## NUV TDS monitoring:

- Wavelength dependency suggested for all gratings
  - > Monitor both extreme and middle cenwaves for all gratings to characterize trend.

# COS NUV Internal to External Wavelength Scale Monitor

## PI: Paule Sonnentrucker

|  |   |
|--|---|
| <b>Purpose</b>                               | This program monitors the offsets between the absolute wavelength scale (zero-point) set by the internal wavecal versus the absolute wavelength scale defined by absorption lines in external target HD6655 obtained with the PSA.  |
| <b>Description</b>                           | This program monitors the zero-point offset between the internal and external wavelength scales: this offset is referred to as "DELTA" in the wavelength dispersion reference file and corrects for the shift between the WCA and PSA in TV03 versus the shift between the WCA and PSA in orbit: (WCA-PSA)_TV03 - (WCA-PSA)_orbit. Analysis of TV data indicates that this DELTA is cenwave and FP-POS independent for a particular grating, but it is grating and stripe dependent. To verify and monitor this dependency, this program takes spectra of HD6655 with G185M/2010, G225M/2217, G295M/2675 and G230L/2635, 2950 & 3000. Monitoring suggests small, long-term temporal variations that require maintaining frequency of this monitoring in Cycle 24: 2 visits separated by 6 months. |
| <b>Fraction GO/GTO Programs Supported</b>    | 6.5 % of COS total exposure time.   |
| <b>Resources Required: Observations</b>      | 2 external orbits - 2 visits of 1 orbit each.   |
| <b>Resources Required: Analysis</b>          | 3 FTE weeks   |
| <b>Products</b>                              | Update to wavelength dispersion reference file as needed and a summary ISR.   |
| <b>Accuracy Goals</b>                        | G230L 175km/s, 2.0-3.7 pixels<br>G185M 15km/s, 1.7-2.4 pixels<br>G225M 15km/s, 2.3-3.2 pixels<br>G285M 15km/s, 2.3-3.5 pixels   |
| <b>Scheduling &amp; Special Requirements</b> | 2 visits of 1 external orbit each separated by 6 months. BETWEEN are added to take data within 2 visibility periods with known, good GS.  |
| <b>Changes from Cycle 23</b>                 | No changes.   |

# Summary of Fall COS Orbit Request for Cycle 24

| Title (PI)   | External (3-Gyro) | C24 Frequency (orbits x repeats) | Cycle 23 Allocation |
|--|-------------------|----------------------------------|---------------------|
| <b>FUV Monitors</b>  |                   |                                  |                     |
| FUV Spectroscopic Sensitivity Monitor (De Rosa)                | 26+(11)           | 3x5 + 1x5 +2x3                   | 23 (10)             |
| FUV Internal/External Wavelength Scale Monitor (Sonnentrucker) | 3                 | 3x1                              | 3                   |
| <b>NUV Monitors</b>  |                   |                                  |                     |
| COS Target Acquisition Monitor (Penton)                        | 2+(1)             | 2x1                              | 2+(1)               |
| NUV Spectroscopic Sensitivity Monitor (Taylor)                 | 6                 | 3x2                              | 4                   |
| NUV Internal/External Wavelength Scale Monitor (Sonnentrucker) | 2                 | 1x2                              | 2                   |
| <b>COS Side 2 Carry Over Programs</b>                          |                   |                                  |                     |
| COS Side 2 Initial NUV Checkout (Sahnow)                       | 1                 | 1x1                              | 1                   |
| COS Side 2 Initial FUV Checkout (Fox)                          | 2                 | 2x1                              | 2                   |
| <b>Total Cycle 24 Request</b>                                  | <b>39+(12)</b>    |                                  | <b>Ext: 34+(11)</b> |

( ) Contingency orbits not included in Cycle 24 request

# **Back-up Slides**

# COS FUV Spectroscopic Sensitivity Monitor: Program Snapshot

PI: Gisella de Rosa

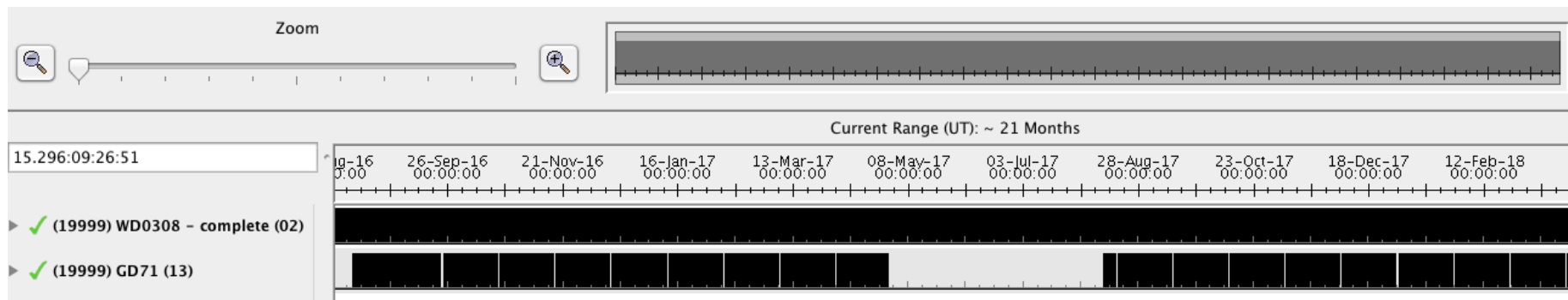
- Monthly Monitor in Cy23
- 2 types of visits:
  - > Complete monitor: **3 orbits** in 2 visits
  - > reduced monitor: **1 orbit** visit
- Targets: WD0308 & GD71
- GD71 **not visible** APR 28 – AUG 11
  - > Only reduced monitor

**LP4 Move sensitive!**

| Configuration | Complete Visit | Reduced Visit |
|---------------|----------------|---------------|
| G139M/1055 A  | ✓              |               |
| G130M/1096 B  | ✓              |               |
| G130M/1222    | ✓              |               |
| G130M/1291    | ✓              | ✓             |
| G130M/1327    | ✓              |               |
| G160M/1577 A  | ✓              |               |
| G160M/1623 A  | ✓              |               |
| G160M/1577    | ✓              |               |
| G160M/1623    | ✓              | ✓             |
| G140L/1105    | ✓              |               |
| G140L/1230    | ✓              | ✓             |

-> WD0308 & GD71

## Cycle 24 Visibility Windows (3 gyros):



**Added reconnection points around LP4 move in Cy24**

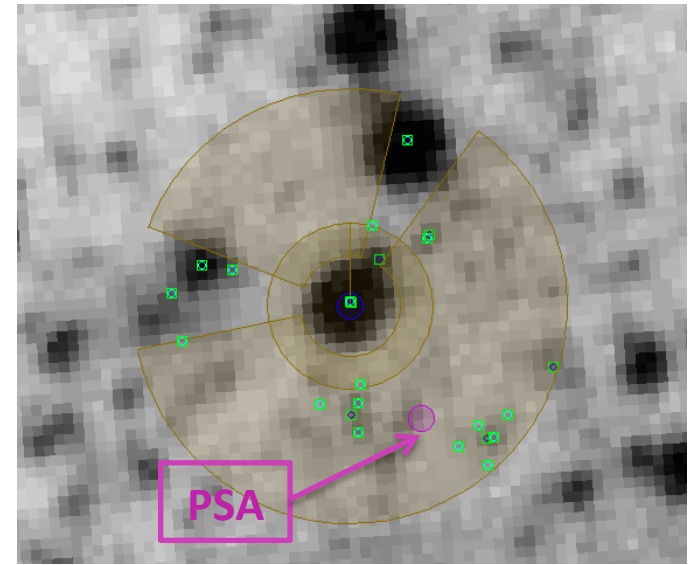


# FUV Internal/External Wavelength Scale Monitoring: Snapshot

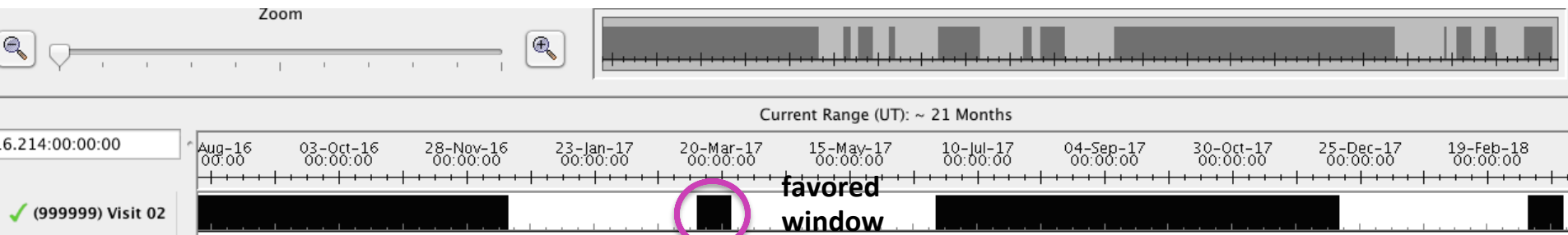
## PI: Sonnentrucker

- Yearly Monitor: 3 orbits in Cy23
- 1 visit of 3 external orbits
- External Target: AV75 (SMC)
- Structure:
  - > G130M/1096- 1222 -1291- 1327
  - > G160M/1577 – 1623
  - >M gratings alternate 2FP-POS per cenwave
  - > G140L/1280 -1105
  - > L grating: FP-POS=3

- TA: ACQ/SEARCH + IMAGE/BOA
  - > 2 unsafe field stars in PSA field
  - > 2 ORIENT constraints



### Cycle 24 Visibility Windows (3 gyros):



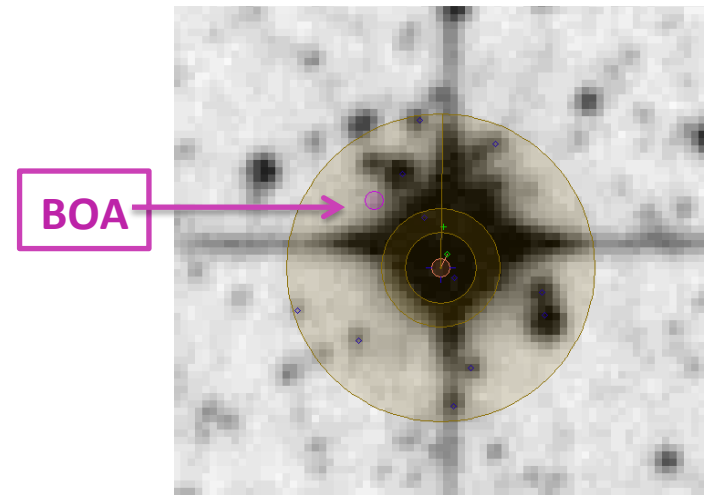
**No Change Recommended in Cy24**

# NUV Internal/External Wavelength Scale Monitoring: Snapshot

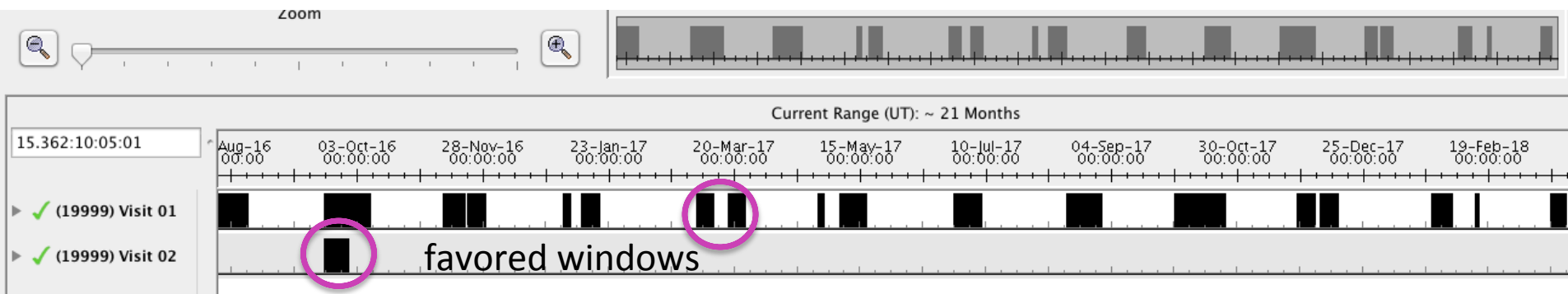
## PI: Sonnentrucker

- Yearly Monitor: **2 orbits in Cy23**
- 2 visits, **1 orbit each** separated by 6 months
- External Target: HD6655; PM star
- Structure:
  - > G230L/2635- 2950- 3000[B]
  - > G185M/2010[COS only]
  - > G225M/2217[C]
  - > G285M/2676[A,B,C]

- TA: ACQ/SEARCH + PEAKXD+PEAKD
  - > using G230L/2635
  - > crowded field => GS pair issues
  - > 2 BETWEEN to get best GS pair



### Cycle 24 Visibility Windows (3 gyros):



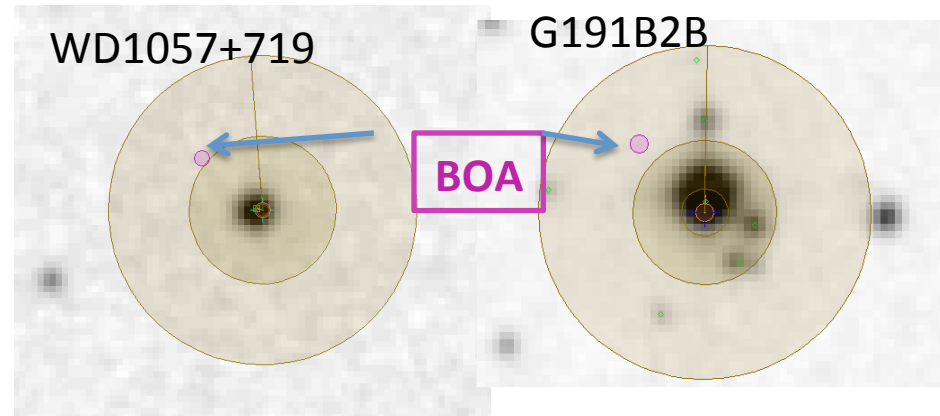
**No Change Recommended in Cy24**

# COS NUV Spectroscopic Sensitivity Monitor: Snapshot

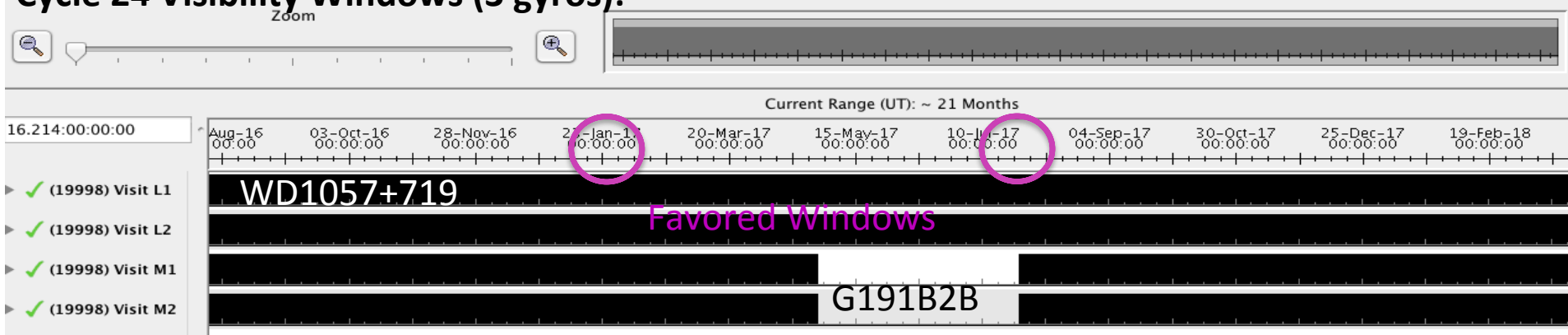
## PI: Jo Taylor

- Yearly Monitor: **4 orbits in Cy23**
- 2 visits, **2 orbit each** every 6 months
- External Targets: WD1057+719 & G191B2B
- Structure:
  - > G230L/2635- 2950
  - > G185M/1786-1921
  - > G225M/2186
  - > G285M/2617-3094
- Between for each visit to fix visibility windows each cycle.

TA: ACQ/SEARCH + PEAKXD +PEAKD  
with G185M/1921 & PSA



### Cycle 24 Visibility Windows (3 gyros):



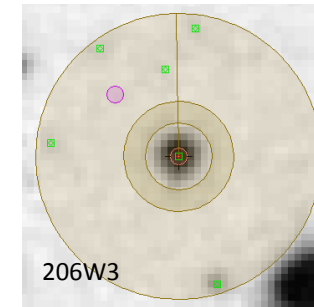
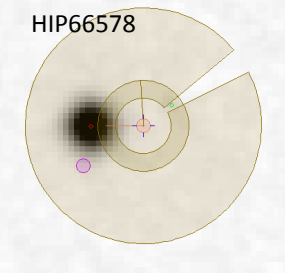
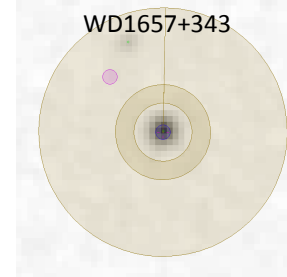
**2 external Orbits Requested in Cy24**

# COS Target Acquisition Monitor: Snapshot

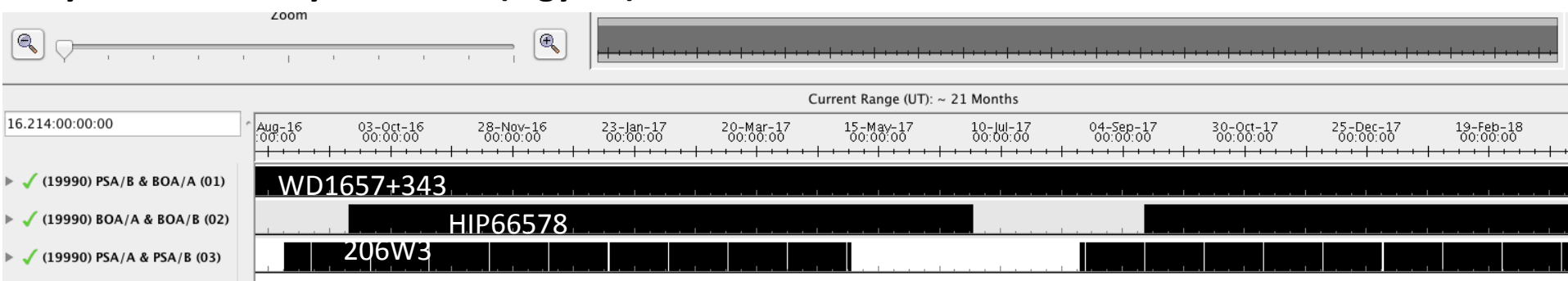
PI: Steven Penton

- Yearly Monitor: **3 orbits in Cy 23**
- 3 visits, **1 orbit each** to check:
  - > All ACQ/IMAGE combinations
  - > WCA-PSA/BOA offset values
  - > Spectro TA accuracy for all gratings.
- Executes 45 days after SIAF program
- Targets: WD1657+343, HIP66578 & 206W3
- Visibility restrictions for HIP and 206W3
- **Will execute @ LP4**
  - > Need to check improved PEAKXD algorithm (NUM-POS>1) for all gratings

TA: ACQ/IMAGE with combinations:  
PSA/MIRRORA-MIRROB  
BOA/MIRRORA-MIRROB



## Cycle 24 Visibility Windows (3 gyros):



**Minor tweaks to program at no orbit cost in Cy24**

# Summary of Approved COS Orbits for Programs Remaining Unchanged since Cycle 23

| <b>PID- Title<br/>(PI)</b>   | <b>External</b>      | <b>Internal</b>      | <b>Frequency<br/>(orbits x repeats)</b> |
|--|----------------------|----------------------|---|
| <b>FUV Monitors</b>  |                      |                      |   |
| <b>I4520- FUV Detector Dark Monitor<br/>(Fix)</b>                                      |                      | <b>260</b>           | 5x52                                    |
| <b>NA- Pure Parallel Observations of Geocoronal Ly <math>\alpha</math><br/>(White)</b> | <b>3<sup>†</sup></b> |                      | See STIS                                |
| <b>I4519- FUV Gain Maps after HV changes<br/>(Sahnow)</b>                              |                      | <b>5+(3*)</b>        | Before and After HV change              |
| <b>NUV Monitors</b>  |                      |                      |   |
| <b>I4521- NUV Detector Dark Monitor<br/>(Fix)</b>                                      |                      | <b>52</b>            | 2 x26                                   |
| <b>I4526- NUV MAMA Fold Distribution<br/>(Wheeler)</b>                                 |                      | <b>1</b>             | 1x1                                     |
| <b>Contingency Programs</b>  |                      |                      |   |
| <b>I4522- FUV Detector Recovery After Anomalous Shutdown<br/>(Wheeler)</b>             |                      | <b>(17)</b>          |   |
| <b>I4523- NUV Detector Recovery After Anomalous<br/>Shutdown (Wheeler)</b>             |                      | <b>(4)</b>           |   |
| <b>Approved Cycle 24 Spring Request</b>  | <b>3<sup>†</sup></b> | <b>318+(21)+(3*)</b> | 29                                      |

# COS Side 2 Programs Carried Over to Cycle 24

- Programs are carried along each cycle's calibration plan (keeping the same ID) so that the impact of any changes to operating conditions can be evaluated and modifications to the programs implemented as needed. Two engineering programs using external orbits will be discussed in September 2016 (impacted by 1-gyro mode operations).
  
- No changes are needed to the internal programs listed below at this time.
  
- **Engineering programs** (22 Internal orbits)
  - 13187 - COS Side 2 Dump Test and Verification of COS Memory Loads
  - 13188 - COS Side 2 Science Data Buffer Check/Self-Tests for CS Buffer RAM and DIB RAM
  - 13189 - COS Side 2 NUV Detector Recovery After MEB Side Switch
  - 13190 - COS Side 2 FUV Detector Recovery After MEB Side Switch
  - 13191 - COS Side 2 NUV MAMA Fold Test
  
- **Science programs** (5 Internal)
  - 13194 - COS Side 2 Internal NUV Wavelength Verification
  - 13195 - COS Side 2 Internal FUV Wavelength Verification

**Total Cycle 24 Carry Over: 27 internal Orbits**