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EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

COS Status Update

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Overall COS Update

- COS is performing nominally
- FUV and NUV Time Dependent Sensitivity trends remain constant
- LP4 line spread functions have been made available to the community
  - http://www.stsci.edu/hst/cos/performance/spectral_resolution/ (regular modes)
  - Will add LSF for new cenwaves by end of November 2018

- New versions of COS IHB and DHB released on May 10, 2018

- COS Cycle 26 calibration program approved
  - Identical to that for Cycle 25
  - 35 external orbits (+16 contingency for FUV TDS monitor)
  - 321 internal orbits (+23 contingency for gain maps and recovery)
  - Delta-Cycle 26 program will be considered together with TAC results (& will include new modes being commissioned)

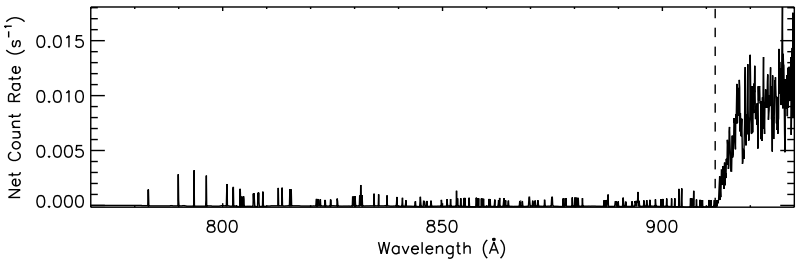
New COS/FUV Modes – Overall Status and Forward Plan

- Commissioning of two new modes (G140L/800, G160M/1533) is ongoing
  - **COS/FUV/G160M/1533**
  - Similar to G160M/1577; covers the gap between end of G130M/1222 and G160M; full wavelength coverage can be obtained with 2 settings, and no need to use G130M/1327
    - Important e.g. for users looking at different species at different *z* in a single spectrum
  - **COS/FUV/G140L/800**
  - Proposed initially by S. McCandliss in Cycle 19 (outsourced calibration program – 12501)
    - Places full wavelength range in a single segment, FUVA: ~800 – 1800 Å
    - Decreases astigmatic height in the region 900 – 1100 Å – important for background limited observations, e.g. studies of the Ly escape fraction etc.
    - Has resolution comparable to that of other G140L modes

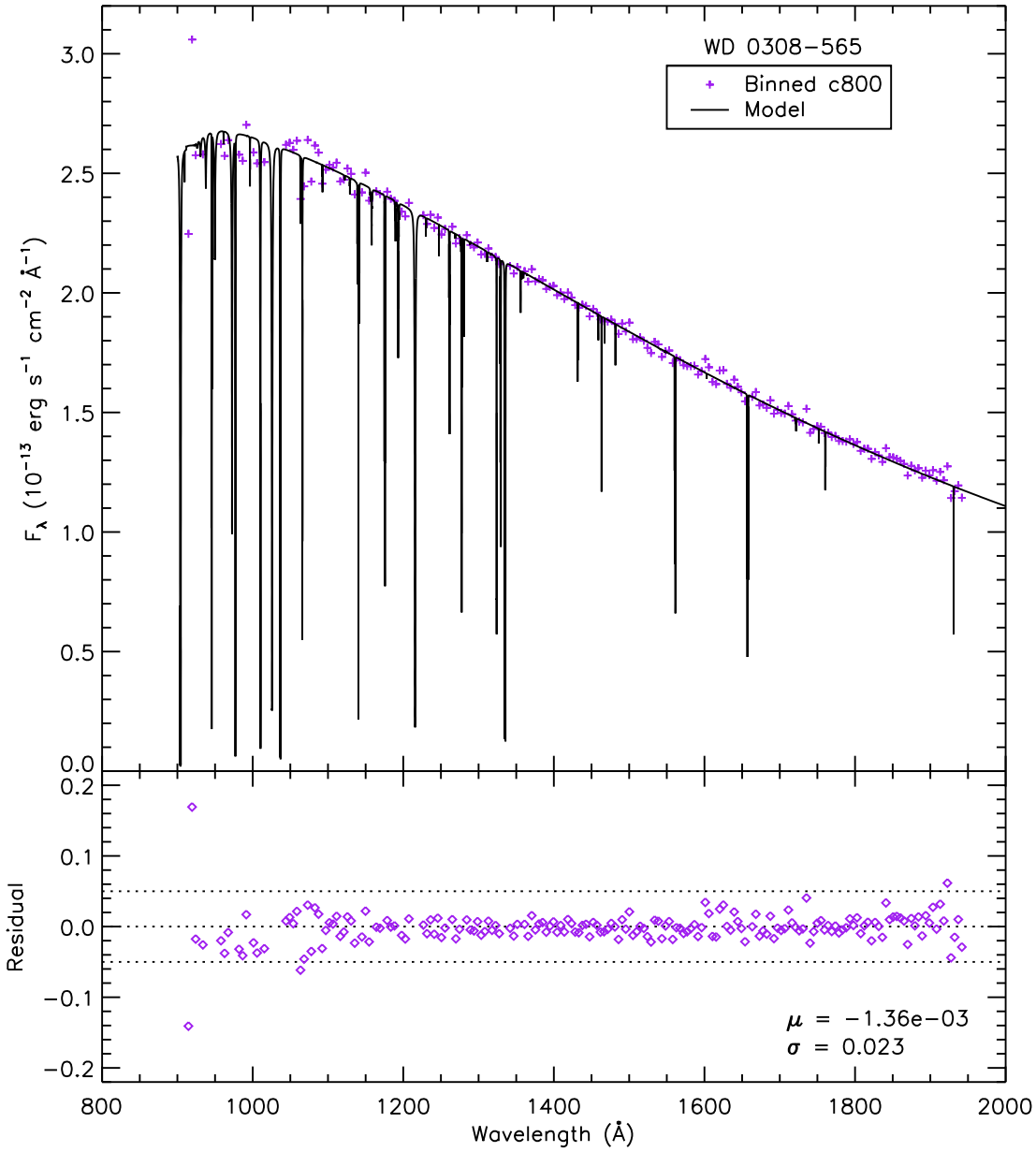
- Multiple calibration programs executed over last few months
  - Wavelength calibration accuracy is +/- 3 pix for both modes
  - Flux calibration accuracy is within 5% for G160M/1533 and 10% for G140L/800
- We are in the final stages of testing all the new calibration reference files
- Plan to deliver all reference files by end on November 2018 and release a STAN giving more specifics on the accuracy of the calibrations (more detailed ISRs to be published later)

G140L/800 – Flux Calibration

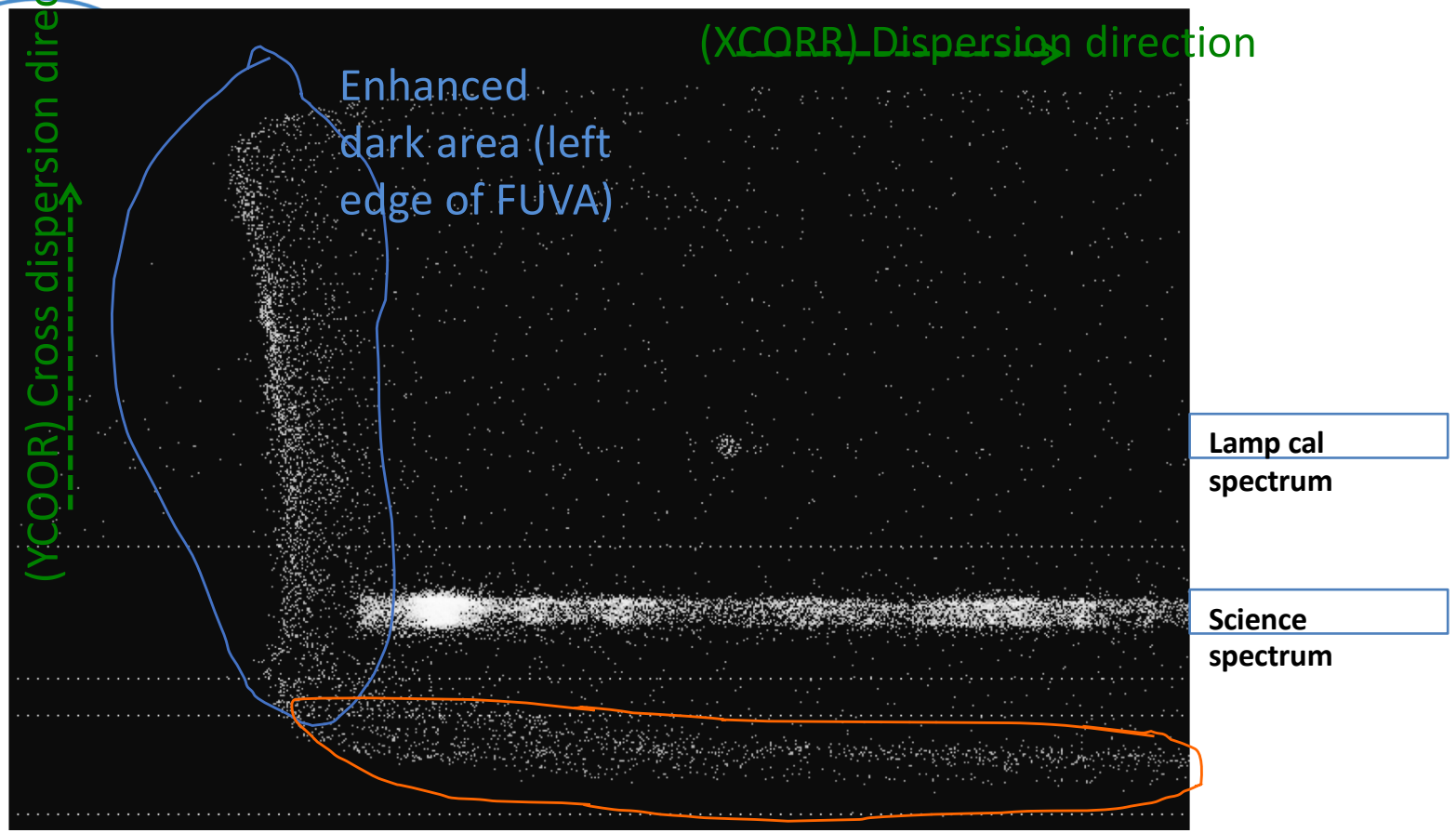
- Observed standard star WD0308-565 (15483)
- Use L flat derived for other G140L cenwaves using LP4 data
- Goal was to achieve absolute flux accuracy ~10% below 1100 Å
- Flux calibration below 900 Å tricky as target has no flux there
- For now λ < 900 Å will have flux ~0 but there will be information in the counts array



- Further improvements to flux calibration will depend on mode usage/demand/needs



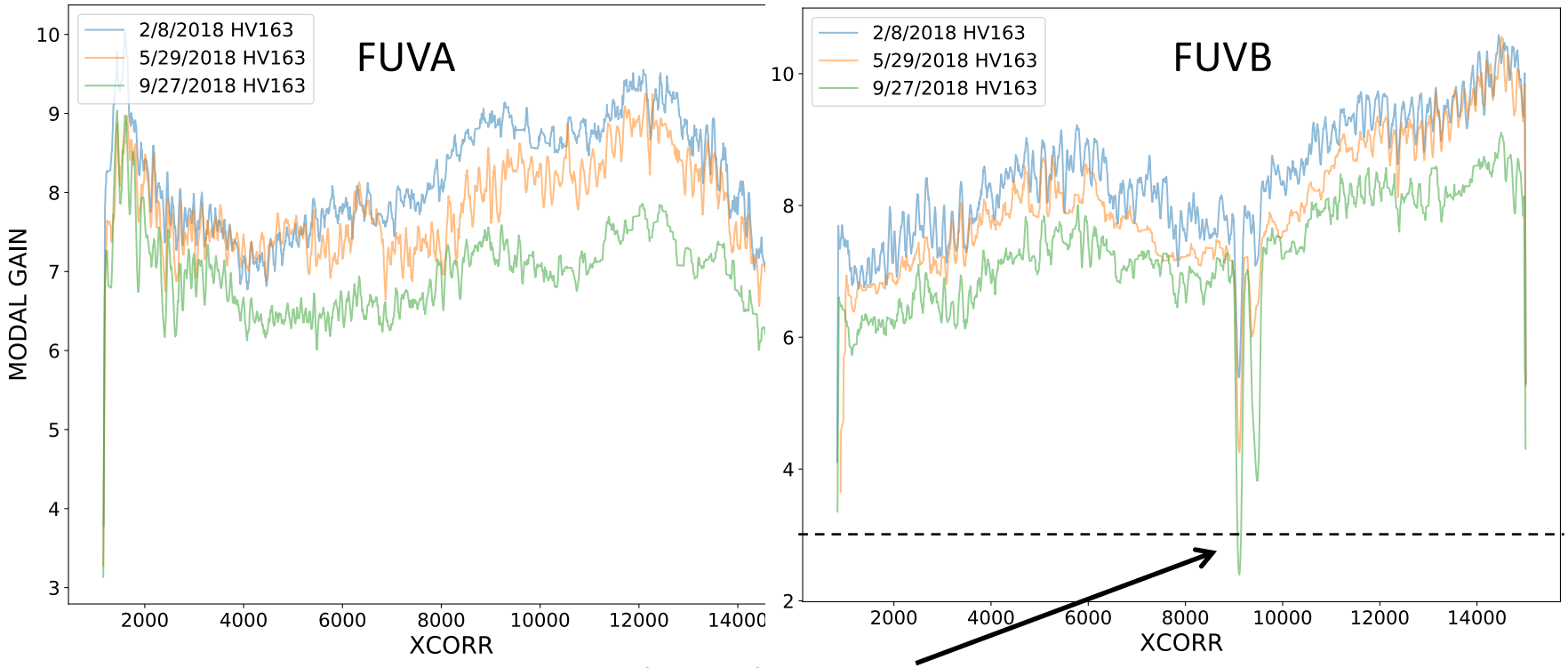
COS FUVA Dark Rate – Edge Enhancement



Enhanced dark area (bottom edge of FUVA) – affects background extraction boxes for LP4 data

- Enhanced count rate at the edges is not related to solar activity or HV changes
- Has been present since 2012, varying in time, disappearing, and returning. Started increasing in early summer, it is now decreasing.
- We are in the process of updating LP4 background extraction regions in reference files, expect updates to be available before end of November.

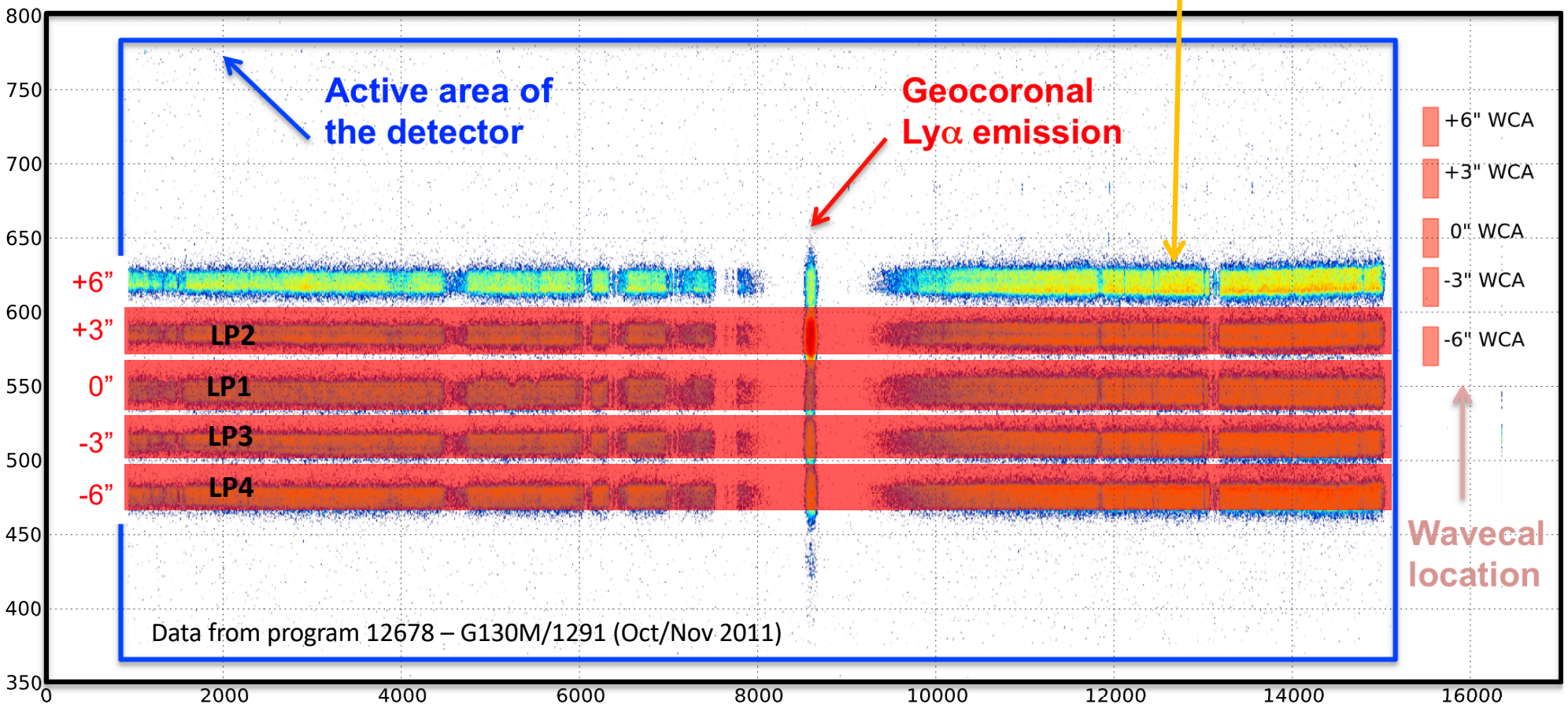
Gain Sag Monitoring and Predictions – LP4



- Gain sag < 3 in FUVB due to G130M/1291/FP-POS=3
- No change to HV until "continuum" starts sagging per COS2025 policies
  - Expect to stay at LP4 until early 2020's
  - Implementation of COS2025 strategy was very smooth, some PIs requested and were awarded additional orbits to accomplish their science under COS2025 guidelines
- We are in the process of updating the gain sag reference file which will remove these regions from the calibrated products
- We are also working on a model to predict gain sag evolution by setting, based on usage

LP5 Feasibility Study

Light leaks through FCA when wavecal lamp is flashed @+6”.
Leads to shutdown, lands on top of LP4 (gain sag)



- Will start soon a study to evaluate feasibility of LP5 at +6” (perhaps flashing wavecal elsewhere)
- Will consider other options as well, such as operating different settings at different locations, or increasing High Voltage
- Timing for LP5 implementation or change to current operations will depend on additional orbits with COS beyond the typical yearly average and/or brightness and S/N of targets observed

Documentation

ISR 2018-20: Flat Fields and Flux Calibrations for the COS FUV Channel at Lifetime Position 4	W. Fischer et al.
ISR 2018-19: On-orbit comparison of the emission line intensities of the COS Pt-Ne Calibration Lamps	N. Indriolo et al.
ISR 2018-18: Verification of COS/FUV Bright Object Aperture (BOA) Operations at Lifetime Position 4	J. White et al.
ISR 2018-17: COS FUV Aperture and Spectrum Placement at LP4	D. Sahnow et al.
ISR 2018-16: COS2025: A New Strategy to Prolong the Lifetime of the COS/FUV Detector to 2025	C. Oliveira et al.
ISR 2018-14: Exploratory Phase for Optimizing Lifetime Position 4 of the COS/FUV Detector	J. Roman-Duval et al.
ISR 2018-12: Cycle 24 HST+COS Target Acquisition Monitor Summary	S. Penton et al.
ISR 2018-11: Cycle 24 COS/NUV Spectroscopic Sensitivity Monitor	J. Taylor et al.
ISR 2018-10: Testing the Linearity of the Cosmic Origins Spectrograph FUV Channel Thermal Correction	M. Fix et al.
ISR 2018-09: Cycle 24 COS/FUV Spectroscopic Sensitivity Monitor	G. de Rosa et al.
TIR 2018-03: Using the FENA1 Data for Measuring Walk on the COS FUV Detector	D. Sahnow et al.
TIR 2018-02: Requirements for COS Cumulative Images	D. Sahnow et al.
TIR 2018-01: Impact of One-Gyro Mode on the HST/COS Calibration Program	B. James et al.