



## 17617 - Cycle 32 COS NUV MAMA Fold Distribution

Cycle: 32, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

### INVESTIGATORS

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|---|--|
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### VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i> | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 01           | DARK<br>DEUTERIUM            | COS/NUV<br>S/C                      | 1                  | 13-Dec-2024 15:00:10.0        | yes                           |

1 Total Orbits Used

### ABSTRACT

The performance of the MAMA microchannel plate can be monitored using a MAMA fold analysis procedure. The fold analysis provides a measurement of the distribution of charge cloud sizes incident upon the anode giving some measure of changes in the pulse-height distribution of the MCP and, therefore, MCP gain. This proposal executes the same steps as Cycle 31, Proposal 17318.

## **OBSERVING DESCRIPTION**

While globally illuminating the detector with a flat field the valid event (VE) rate counter is monitored while various combinations of row and column folds are selected. The procedure is implemented using special commanding. The procedure is described below and in COS TIR 2010-01.

The proposal nomenclature for the various anode fold configurations is: C2 = Column 2, R2 = Row 2, C3 = Column 3, R3 = Row 3, C4 = Column 4, R4 = Row 4, C5 = Column 5, R5 = Row 5, C6 = Column 6, and R6 = Row 6. The fold analysis is initiated by selecting the grating/lamp combination appropriate for the test. The following steps are then executed:

Select the count rate monitor and collect 60 seconds of data;

Repeat this for each of the count rate monitors W, X, Y, Z, OR, EV, VE;

Disable all of the selectable folds (C2, C3, C4, C5, C6, R2, R3, R4, R5, R6);

Collect 60 seconds of VE with folds C2, R2 enabled, other folds disabled;

Collect 60 seconds of VE with folds C2, R3 enabled, other folds disabled;

Collect 60 seconds of VE with folds C3, R2 enabled, other folds disabled;

Collect 60 seconds of VE with folds C2, R4 enabled, other folds disabled;

Collect 60 seconds of VE with folds C3, R3 enabled, other folds disabled;

Collect 60 seconds of VE with folds C4, R2 enabled, other folds disabled;

Collect 60 seconds of VE with folds C3, R4 enabled, other folds disabled;

Collect 60 seconds of VE with folds C4, R3 enabled, other folds disabled;

Collect 60 seconds of VE with folds C3, R5 enabled, other folds disabled;

Collect 60 seconds of VE with folds C4, R4 enabled, other folds disabled;

Collect 60 seconds of VE with folds C5, R3 enabled, other folds disabled;

Collect 60 seconds of VE with folds C4, R5 enabled, other folds disabled;

Collect 60 seconds of VE with folds C5, R4 enabled, other folds disabled;

Collect 60 seconds of VE with folds C4, R6 enabled, other folds disabled;

Collect 60 seconds of VE with folds C5, R5 enabled, other folds disabled;

Collect 60 seconds of VE with folds C6, R4 enabled, other folds disabled;

Collect 60 seconds of VE with folds C5, R6 enabled, other folds disabled;

Collect 60 seconds of VE with folds C6, R5 enabled, other folds disabled;

Collect 60 seconds of VE with folds C6, R6 enabled, other folds disabled;

Proposal 17617 (STScI Edit Number: 0, Created: Friday, December 13, 2024, 3:00:11PM Eastern Standard Time) - Overview

Enable all selectable folds (C2, C3, C4, C5, C6, R2, R3, R4, R5, R6);

Collect 60 seconds of EV and 5 samples of VE counts to measure any lamp drift;

Turn off the lamp;

Select the W count rate monitor and collect 60 seconds of data for the dark rate;

Repeat this for each of the other count rate monitors (X, Y, Z, OR, EV, and EV);

Restore the global monitor to its normal value.

Analysis of the data is performed by creating a histogram binned by the sums of the fold numbers for columns and rows:

C2R2 = 4 folds

C2R3 + C3R2 = 5 folds

C2R4 + C3R3 + C4R2 = 6 folds

C3R4 + C4R3 = 7 folds

C3R5 + C4R4 + C5R3 = 8 folds

C4R5 + C5R4 = 9 folds

C4R6 + C5R5 + C6R4 = 10 folds

C5R6 + C6R5 = 11 folds

C6R6 = 12 folds

The sum of the 4 to 12 folds is equal to VE. The total number of events  $\geq 4$  folds is EV. The number of events greater than 12 folds is EV-VE.

Generate a plot of 4 fold/EV, 5 fold/EV through 12 fold/EV, with (EV-VE)/EV on the abscissa and with the ordinate labeled 4 fold, 5 fold... 12 fold.

Results are sent to the COS Science Team and Steve Franka of Ball Aerospace <sfranka@ball.com>.

----- Additional Comments -----

Bright Object Protection Considerations. During the execution of the fold analysis some anode folds are disabled. Consequently, the OR counter does not provide a true representation of the OR count and so the Software Global Monitor (SGM) does not trigger until the enabled folds provide enough counts to the OR counter to trigger the SGM's threshold. To compensate, while the fold analysis is running the SGM threshold is reduced to 100,000 counts in a 1.0 second interval, from its nominal value of 20,000 counts in a 0.1 second interval.

This test should only be run with the COS external shutter closed.

Special Commanding is used in this proposal.

Proposal 17617 - NUV Fold Test (01) - Cycle 32 COS NUV MAMA Fold Distribution

Fri Dec 13 20:00:11 GMT 2024

|   |  |                 |                        |                             |                                     |  |  |   |  |              |
|---|--|-----------------|------------------------|-----------------------------|-------------------------------------|--|--|---|--|--------------|
| <b>Visit</b>  | <b>Proposal 17617, NUV Fold Test (01), implementation</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: S/C, COS/NUV<br>Special Requirements: BETWEEN 01-MAY-2025:00:00:00 AND 01-JUN-2025:00:00:00; PARALLEL<br><i>Comments: Schedule one NUV MAMA fold analysis visit per year</i> |                 |                        |                             |                                     |  |  |   |  |              |
|   | <b>Diagnosics</b><br>(NUV Fold Test (01)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB VISIT   |                 |                        |                             |                                     |  |  |   |  |              |
| <b>Exposures</b>  | <b>#</b>   | <b>Label</b>    | <b>Target</b>          | <b>Config,Mode,Aperture</b> | <b>Spectral Els.</b>                | <b>Opt. Params.</b>  | <b>Special Reqs.</b>                           | <b>Groups</b>                           | <b>Exp. Time (Total)/[Actual Dur.]</b> | <b>Orbit</b> |
|   | 1  | Fold Test Setup | DARK                   | S/C, DATA, NONE             |                                     |  | SAA CONTOUR 32;<br>SPEC COM INSTR<br>ELFOLDSET | Same Alignment in<br>NUV Fold Test (01) | 20.0 Secs (20 Secs)<br>[==>]           | [1]          |
|   | <i>Comments: Special setup for NUV Fold Analysis Test. Set the Software Global Monitor to 15,000 ORCOUNTS per sec (sufficient to allow for spike at lamp turn-on).</i>   |                 |                        |                             |                                     |  |  |   |  |              |
| 2   | Fold Test  | DEUTERIUM       | COS/NUV, TIME-TAG, FCA | G185M<br>1850 A             | CURRENT=MEDIUM;<br>BUFFER-TIME=2700 | SPEC COM INSTR<br>ELFOLDTST;<br>QESIPARM TARG<br>TYPE FOLD | Same Alignment in<br>NUV Fold Test (01)        | 2315.0 Secs (2315 Secs)<br>[==>]        | [1]                                    |              |
| <i>Comments: The NUV Fold Analysis will be conducted during a deuterium lamp time-tag exposure. The exposure specification will ensure that the FCA aperture will be used, that the OSMs will be positioned at NCM1 FLAT and G185M/1850, and that the lamp current is set to MEDIUM. Qesiparm TARGTYPE must be specified as FOLD so that the instructions will command the proper lamp. Note that the commanding will turn the lamp off during the exposure, and the exposure commanding will issue a redundant lamp off command after the exposure.</i><br><br>Set Software Global monitor (SGM Threshold = 10,000, SGM Integration period = 1 sec.)<br>(1) Collect event data during flat field illumination. Collect 60 sec. of data for the following event types: W, X, Y, Z, OR, EV, and VE.<br>(2) Disable MAMA Folds: C2, C3, C4, C5, C6, R2, R3, R4, R5, R6<br>(3) Conduct fold analysis. Collect one minute of VE data for following 19 combinations of MAMA folds:<br>(a) Enabled: C2, R2; Disabled: C3, C4, C5, C6, R3, R4, R5, R6<br>(b) Enabled: C2, R3; Disabled: C3, C4, C5, C6, R2, R4, R5, R6<br>(c) Enabled: C3, R2; Disabled: C2, C4, C5, C6, R3, R4, R5, R6<br>(d) Enabled: C2, R4; Disabled: C3, C4, C5, C6, R2, R3, R5, R6<br>(e) Enabled: C3, R3; Disabled: C2, C4, C5, C6, R2, R4, R5, R6<br>(f) Enabled: C4, R2; Disabled: C2, C3, C5, C6, R3, R4, R5, R6<br>(g) Enabled: C3, R4; Disabled: C2, C4, C5, C6, R2, R3, R5, R6<br>(h) Enabled: C4, R3; Disabled: C2, C3, C5, C6, R2, R4, R5, R6<br>(i) Enabled: C3, R5; Disabled: C2, C4, C5, C6, R2, R3, R4, R6<br>(j) Enabled: C4, R4; Disabled: C2, C3, C5, C6, R2, R3, R5, R6<br>(k) Enabled: C5, R3; Disabled: C2, C3, C4, C6, R2, R4, R5, R6<br>(l) Enabled: C4, R5; Disabled: C2, C3, C5, C6, R2, R3, R4, R6<br>(m) Enabled: C5, R4; Disabled: C2, C3, C4, C6, R2, R3, R5, R6<br>(n) Enabled: C4, R6; Disabled: C2, C3, C5, C6, R2, R3, R4, R5<br>(o) Enabled: C5, R5; Disabled: C2, C3, C4, C6, R2, R3, R4, R6<br>(p) Enabled: C6, R4; Disabled: C2, C3, C4, C5, R2, R3, R5, R6<br>(q) Enabled: C5, R6; Disabled: C2, C3, C4, C6, R2, R3, R4, R5<br>(r) Enabled: C6, R5; Disabled: C2, C3, C4, C5, R2, R3, R4, R6<br>(s) Enabled: C6, R6; Disabled: C2, C3, C4, C5, R2, R3, R4, R5<br>(4) Enable MAMA folds C2, C3, C4, C5, C6, R2, R3, R4, R5, R6<br>(5) Check lamp stability by checking EV and VE: Collect 60 sec. of data for EV and VE event types.<br>(6) Turn off the deuterium lamp.<br>(7) Collect event data for detector dark count rate. Collect 60 sec. of data for the following event types: W, X, Y, Z, OR, EV, and VE.<br>(8) At completion of the test, reset SGM to nominal operating level. |  |                 |                        |                             |                                     |  |  |   |  |              |

