

# V&V Reference Report

## L2 ASCDS Version : 10.4.3.1

Observation 17787 - L2 Version 1  
Chandra X-Ray Center

L2 Processing Date : Mar 30 2016

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# 1 Front

|          |                                                                            |                                                |
|----------|----------------------------------------------------------------------------|------------------------------------------------|
| seq_num  | 401719                                                                     | Sequence number                                |
| obs_id   | 17787                                                                      | Observation id                                 |
| title    | FOLLOWING THE ULTRA-FAST WINDS IN STELLAR-MASS BLACK HOLE, IGR J17091-3624 | Proposal title                                 |
| observer | Dr. Ashley King                                                            | Principal investigator                         |
| object   | IGR J17091-3624                                                            | Source name                                    |
| dtcycle  | 0                                                                          | &#160                                          |
| cycle    | P                                                                          | events from which<br>exps?<br>Prim/Second/Both |
| ra_targ  | 257.279167                                                                 | Observer's specified<br>target RA [deg]        |
| dec_targ | -36.406944                                                                 | Observer's specified<br>target Dec [deg]       |
| ra_nom   | 257.27656302751                                                            | Nominal RA [deg]                               |
| dec_nom  | -36.405206968872                                                           | Nominal Dec [deg]                              |
| roll_nom | 68.155084298792                                                            | Nominal Roll [deg]                             |
| revision | 1                                                                          | Processing version of<br>data                  |
| ontime   | 40828.374919057                                                            | Sum of GTIs [s]                                |
| livetime | 39478.219801834                                                            | Livetime [s]                                   |
| ontime5  | 40828.333879113                                                            | Sum of GTIs [s]                                |
| ontime6  | 40828.29283905                                                             | Sum of GTIs [s]                                |
| ontime7  | 40828.374919057                                                            | Sum of GTIs [s]                                |
| ontime8  | 40827.010759115                                                            | Sum of GTIs [s]                                |
| l2events | 1178643                                                                    | Number of level 2<br>events                    |

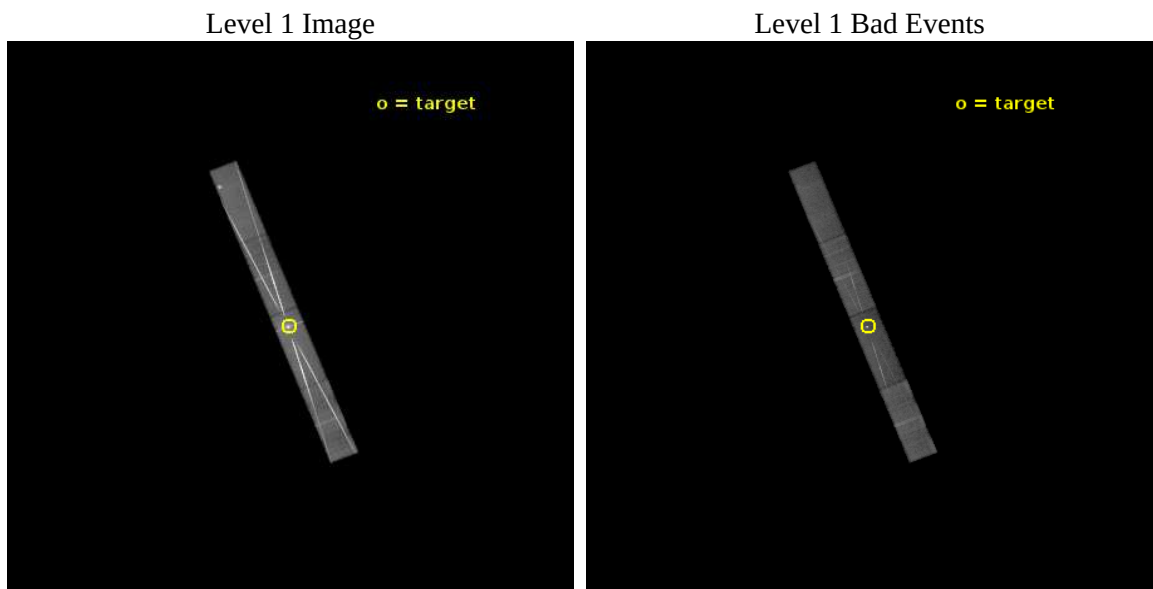




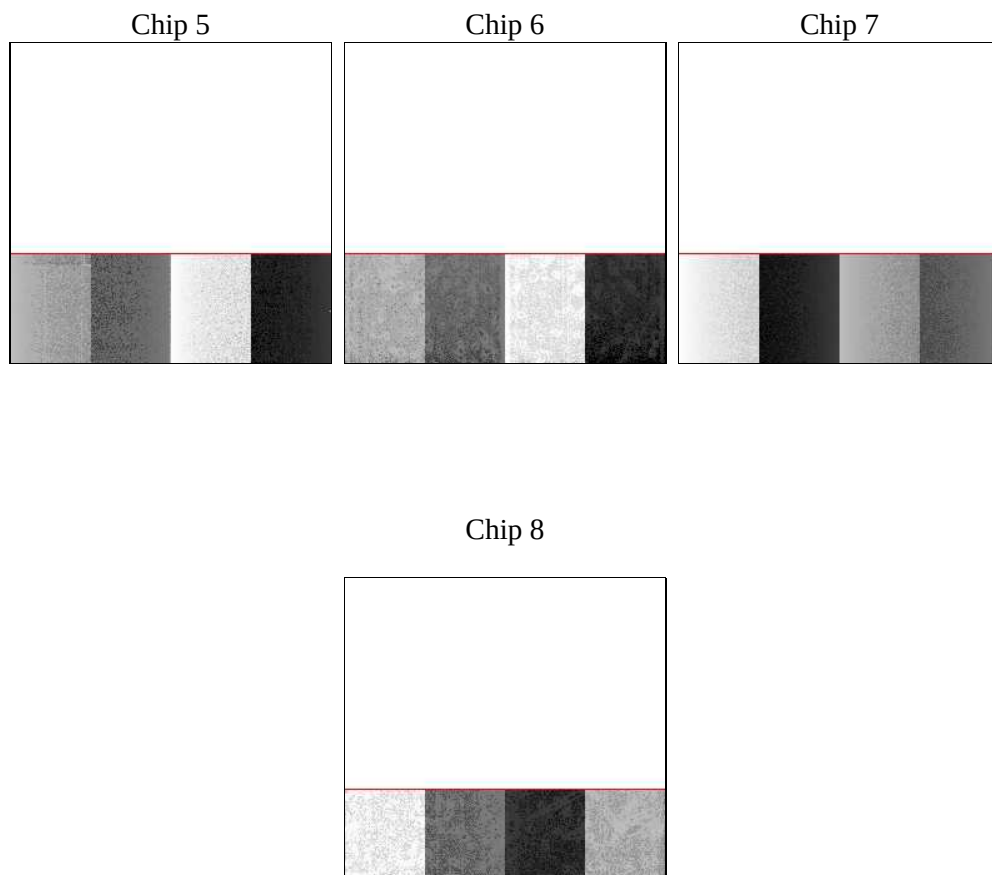
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |                    |                                                  |
|----------|---------------------|--------------------------------|----------------|--------------------|--------------------------------------------------|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 40749.433000       | [s] Scheduled observation exposure time          |
| ascdsver | 10.4.3.1            | Processing system revision     | ontime         | 40828.374919057    | Sum of GTIs [s]                                  |
| caldsver | 4.7.1               | &#160                          | ontime5        | 40828.333879113    | Sum of GTIs [s]                                  |
| date     | 2016-03-31T02:08:04 | Date and time of file creation | ontime6        | 40828.29283905     | Sum of GTIs [s]                                  |
| revision | 1                   | Processing version of data     | ontime7        | 40828.374919057    | Sum of GTIs [s]                                  |
|          |                     |                                | ontime8        | 40827.010759115    | Sum of GTIs [s]                                  |
|          |                     |                                | l1events       | 1588293            | Number of level 1 events                         |
|          |                     |                                | tgmethod       | FINDZO             | Method used to create src1a file                 |
|          |                     |                                | zo_pos         | (4067.03, 4084.36) | src1a sky pixel position                         |
|          |                     |                                | zo_pos_tgd     | (4067.02, 4085.12) | src1a sky pixel position via <del>radetect</del> |

### 2.1.4 Events

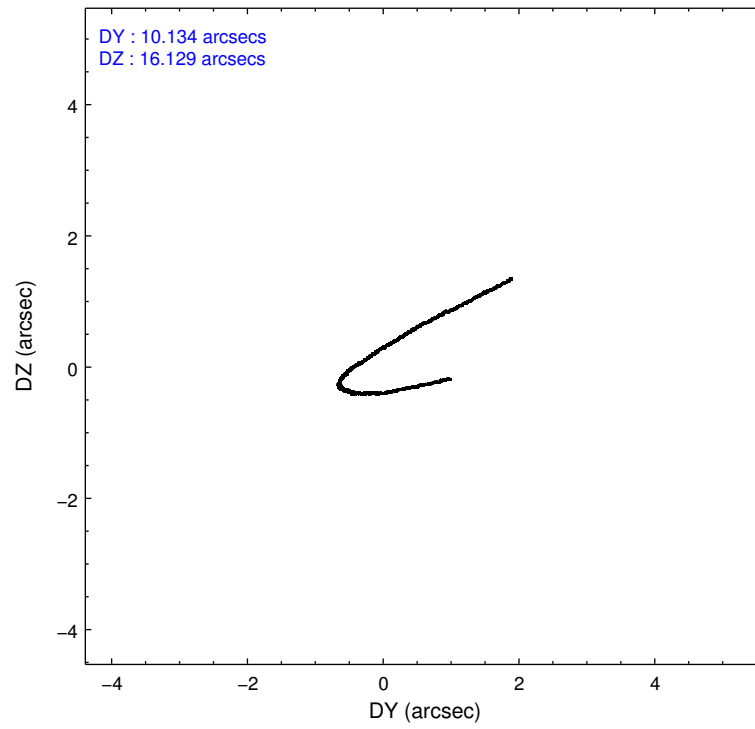
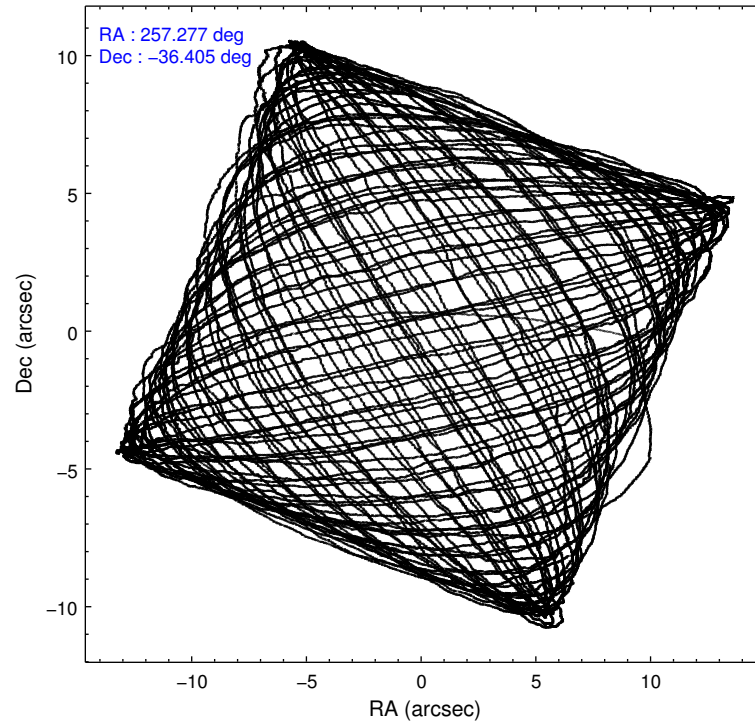
|                 | ccd 5  | ccd 6  | ccd 7  | ccd 8  |
|-----------------|--------|--------|--------|--------|
| level 1 events  | 210742 | 511239 | 607044 | 259268 |
| rejected events | 70872  | 90724  | 78383  | 93509  |
| rejected %      | 33%    | 17%    | 12%    | 36%    |

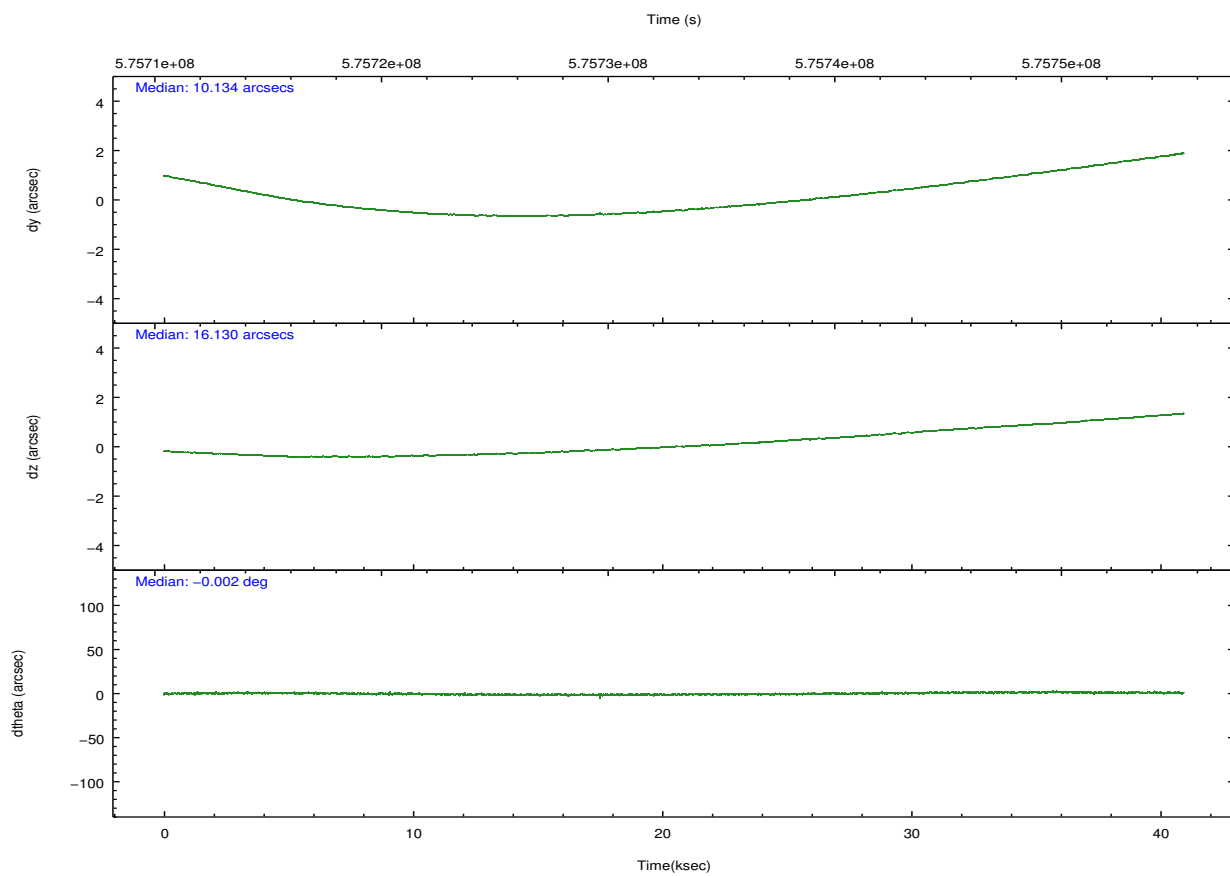
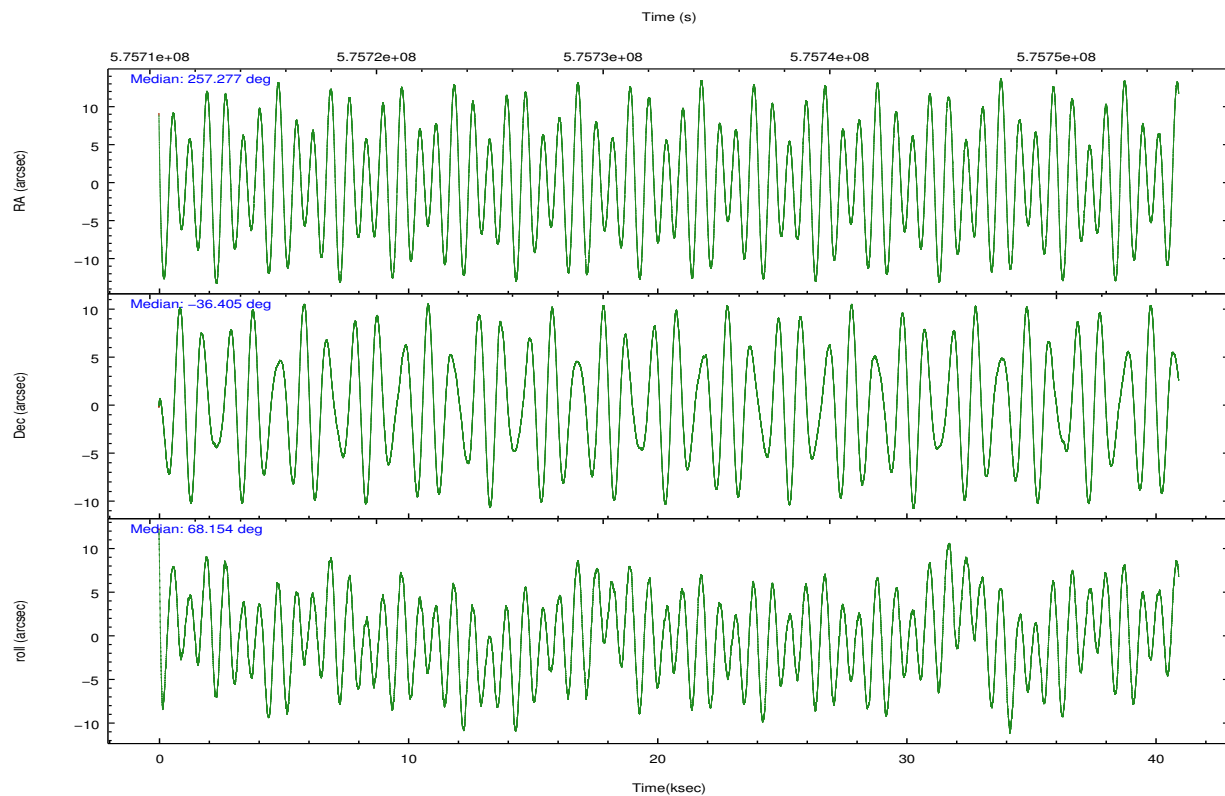
|                | ccd 5 | ccd 6  | ccd 7  | ccd 8  |
|----------------|-------|--------|--------|--------|
| grade 0 events | 34621 | 314905 | 105569 | 116236 |
|                | 16%   | 61%    | 17%    | 44%    |
| grade 1 events | 429   | 2106   | 1675   | 411    |
|                | 0%    | 0%     | 0%     | 0%     |
| grade 2 events | 40542 | 52424  | 131371 | 21379  |
|                | 19%   | 10%    | 21%    | 8%     |
| grade 3 events | 9562  | 17749  | 57443  | 8316   |
|                | 4%    | 3%     | 9%     | 3%     |
| grade 4 events | 9321  | 17420  | 57882  | 8063   |
|                | 4%    | 3%     | 9%     | 3%     |
| grade 5 events | 11437 | 5549   | 18936  | 6109   |
|                | 5%    | 1%     | 3%     | 2%     |
| grade 6 events | 45833 | 18045  | 176418 | 11777  |
|                | 21%   | 3%     | 29%    | 4%     |
| grade 7 events | 58997 | 83041  | 57750  | 86977  |
|                | 27%   | 16%    | 9%     | 33%    |

## 2.2 Compared Parameters

| Parameter                         | Planned             | Actual               | Parameter                             | Planned   | Actual  |
|-----------------------------------|---------------------|----------------------|---------------------------------------|-----------|---------|
| Instrument                        | ACIS                | ACIS                 | Obspar format version number          | 7         | 7       |
| Detector                          | ACIS-5678           | ACIS-5678            | Obspar file type                      | PREDICTED | ACTUAL  |
| Grating                           | HETG                | HETG                 | Obspar update status                  | NONE      | UPDATED |
| Data mode                         | FAINT               | FAINT                | Number of optional ACIS chips dropped | 0         | 0       |
| Observation mode                  | POINTING            | POINTING             | On-chip summing requested             | N         | N       |
| [deg] Pointing RA                 | 257.281857          | 257.2765630275062    | Subarray requested                    | CUSTOM    | CUSTOM  |
| [deg] Pointing Dec                | -36.432316          | -36.40520696887191   | Subarray start row                    | 1         | 1       |
| [deg] Pointing Roll               | 68.001602           | 68.15508429879165    | Subarray row count                    | 350       | 350     |
| [mm] SIM focus pos                | -0.684267           | -0.6828225247311905  | Alternating exposures requested       | N         | N       |
| [mm] SIM defocus                  | 0                   | 0.001444936568705701 | [s] Primary exposure time             | 0.000000  | 1.2     |
| [mm] SIM translation stage pos    | -182.132523         | -182.1370004450064   |                                       |           |         |
| [mm] SIM translation stage offset | -8                  | -7.995522138001405   |                                       |           |         |
| [s] Observation start time (MET)  | 575712608.184000    | 575711413.26464      |                                       |           |         |
| Observation start date            | 2016-03-30T08:09:00 | 2016-03-30T07:50:13  |                                       |           |         |
| [s] Observation end time (MET)    | 575753357.184000    | 575753580.22955      |                                       |           |         |
| Observation end date              | 2016-03-30T19:28:09 | 2016-03-30T19:33:00  |                                       |           |         |
| Read mode                         | TIMED               | TIMED                |                                       |           |         |

## 2.3 Aspect



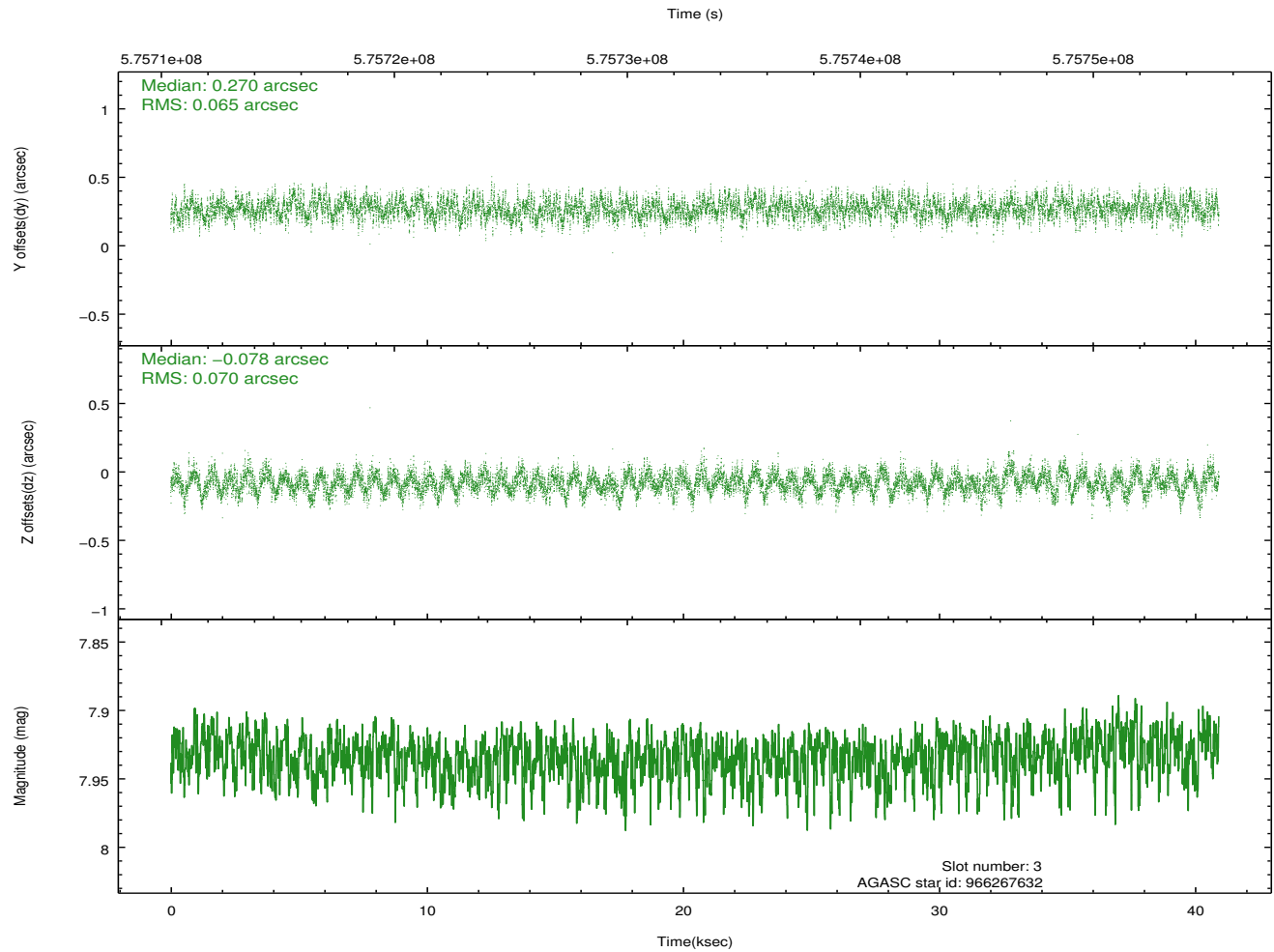
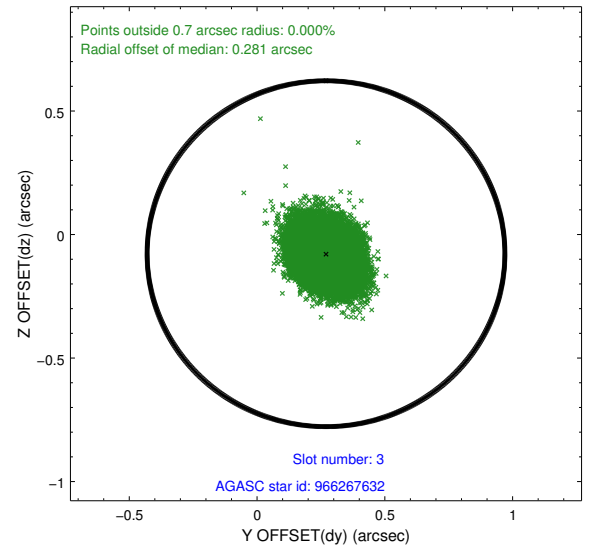
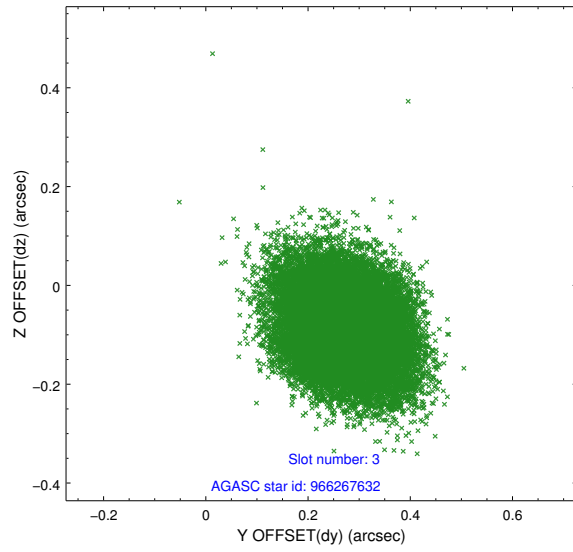


# Slot Statistics

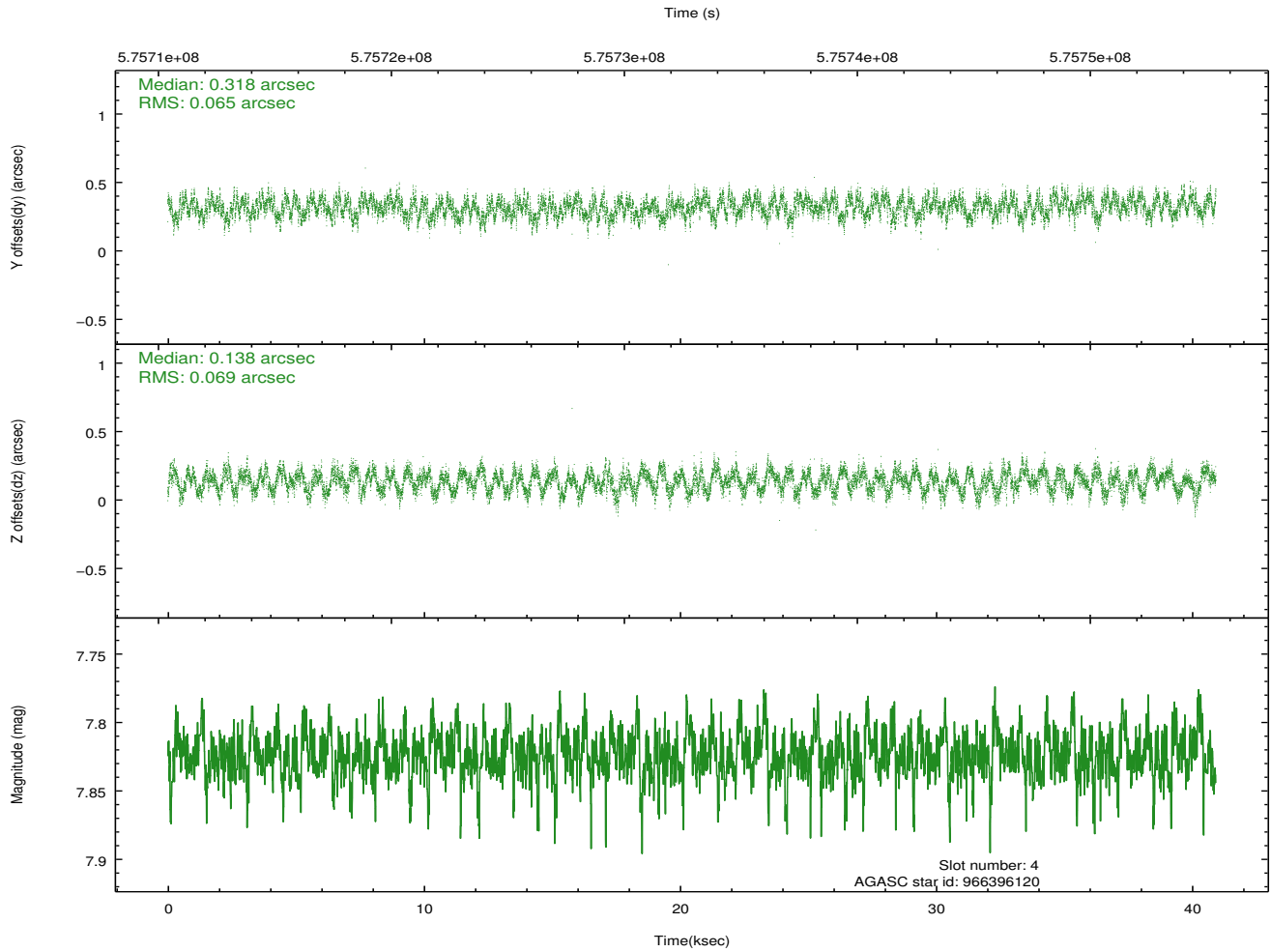
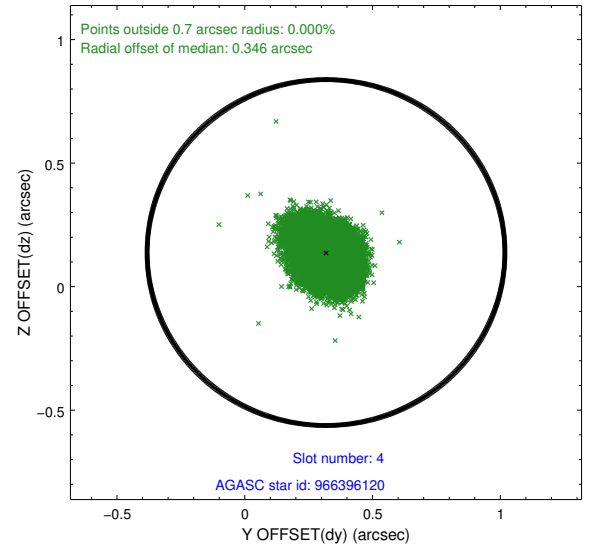
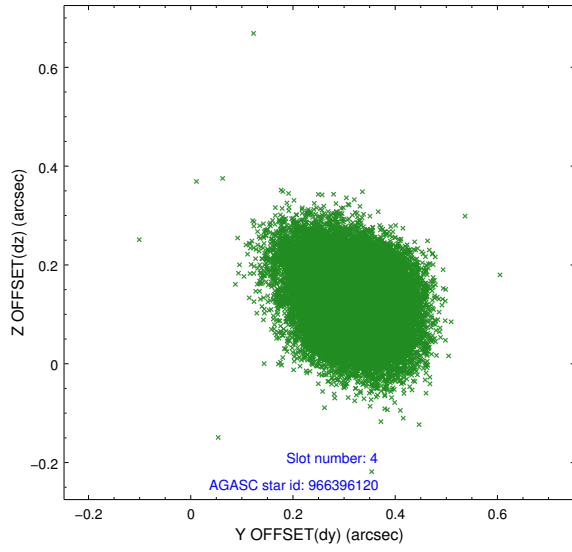
| slot | status | used | id        | mag  | n_pts | med_dy | med_dz | dr1   | dr2   | ra         | dec        | mean_y   | mean_z   |
|------|--------|------|-----------|------|-------|--------|--------|-------|-------|------------|------------|----------|----------|
| 0    | FID    |      | ACIS-S-1  | 7.20 | 9984  | 0.095  | 0.192  | 0.026 | 0.041 | 0.000000   | 0.000000   | 933.45   | -1897.92 |
| 1    | FID    |      | ACIS-S-2  | 7.10 | 9983  | -0.358 | -0.248 | 0.018 | 0.028 | 0.000000   | 0.000000   | -762.90  | -1902.85 |
| 2    | FID    |      | ACIS-S-4  | 7.17 | 9984  | 0.242  | 0.057  | 0.015 | 0.025 | 0.000000   | 0.000000   | 2150.93  | 6.00     |
| 3    | GUIDE  | used | 966267632 | 7.93 | 19961 | 0.270  | -0.078 | 0.102 | 0.164 | 256.428991 | -36.740525 | -1960.33 | 1861.52  |
| 4    | GUIDE  | used | 966396120 | 7.82 | 19962 | 0.318  | 0.138  | 0.102 | 0.159 | 256.737004 | -36.720258 | -1554.15 | 1067.83  |
| 5    | GUIDE  | used | 966402904 | 8.08 | 19960 | -0.076 | 0.413  | 0.071 | 0.118 | 257.709598 | -36.005094 | 1889.91  | -579.44  |
| 6    | GUIDE  | used | 965880312 | 8.22 | 19959 | -0.310 | -0.167 | 0.102 | 0.159 | 256.959867 | -35.621278 | 2352.54  | 1966.72  |
| 7    | GUIDE  | used | 966401448 | 7.85 | 19959 | -0.234 | -0.314 | 0.241 | 0.329 | 256.771484 | -35.758991 | 1685.29  | 2288.84  |

## 2.4 Star Slots

### 2.4.1 Slot 3

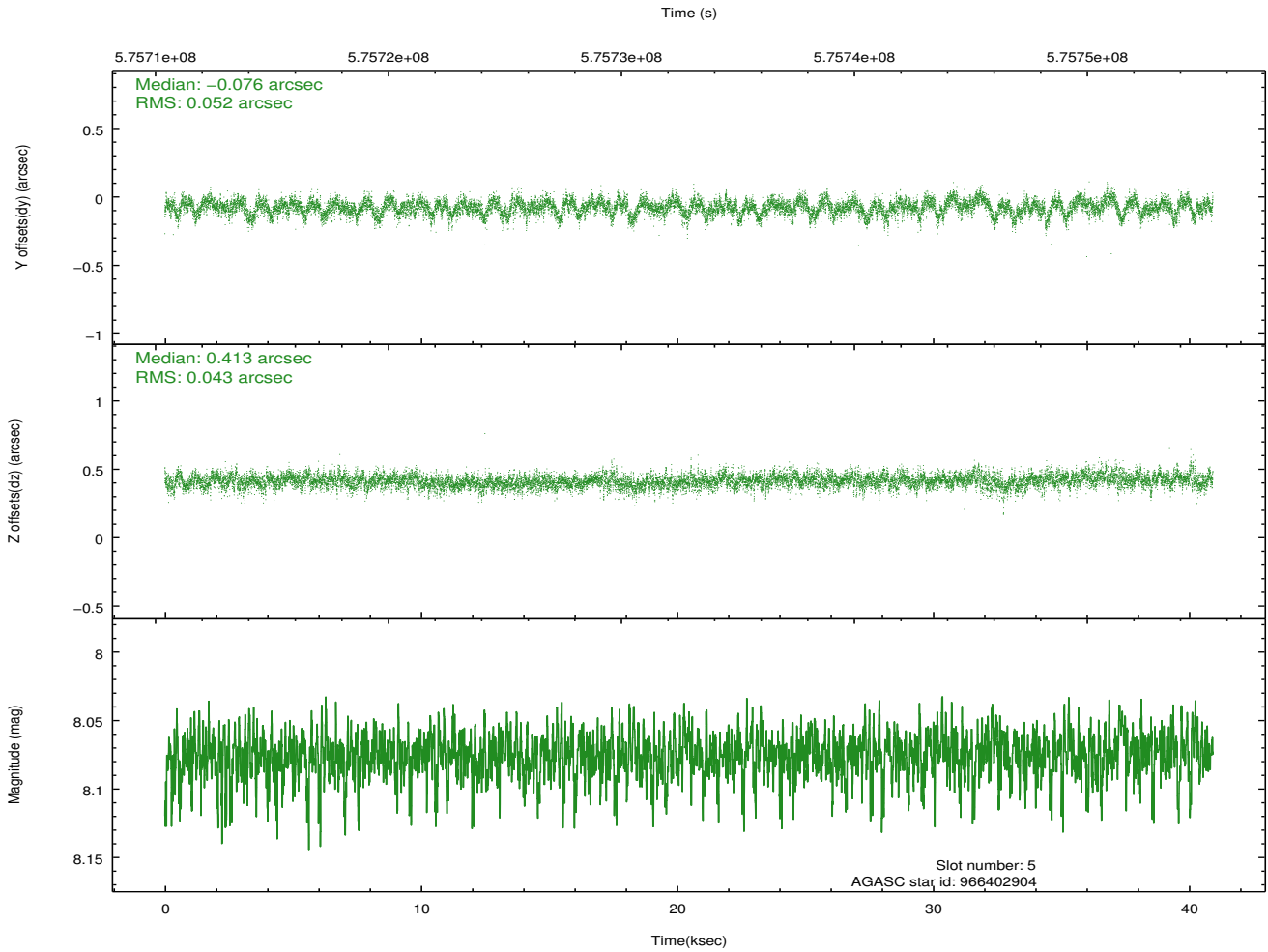
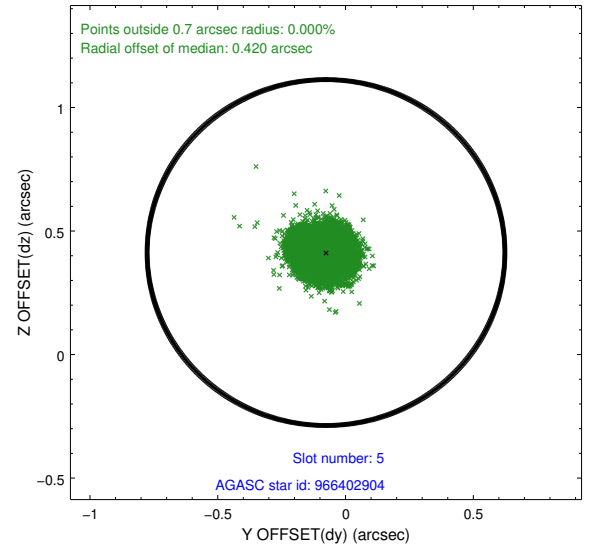
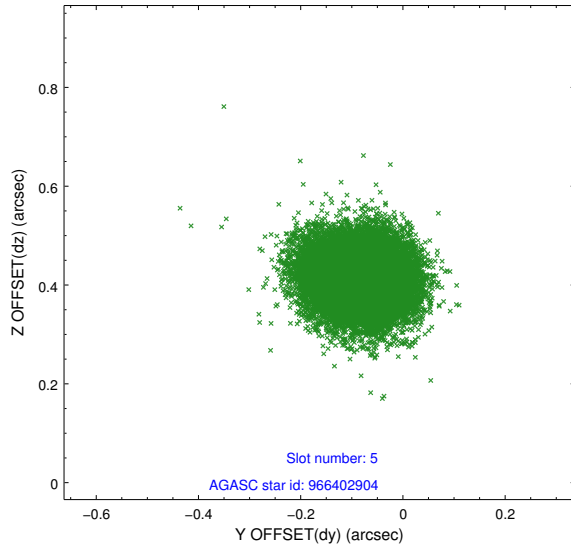


## 2.4.2 Slot 4

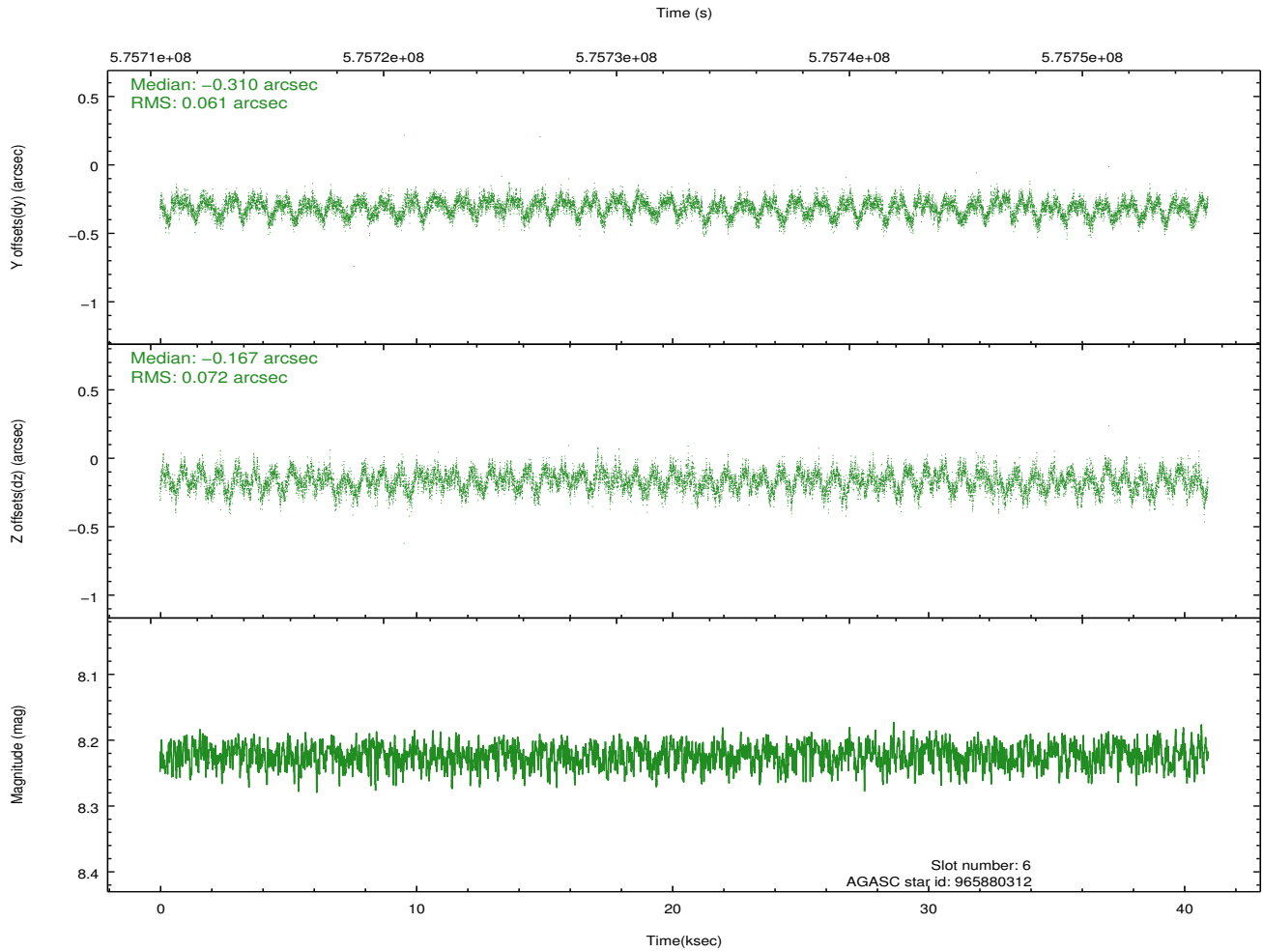
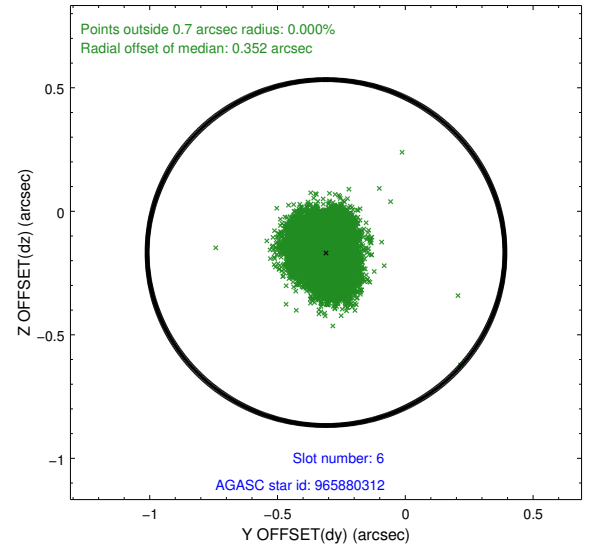
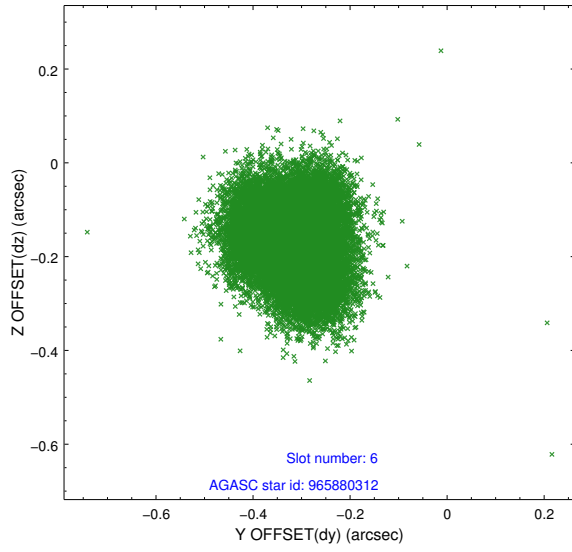




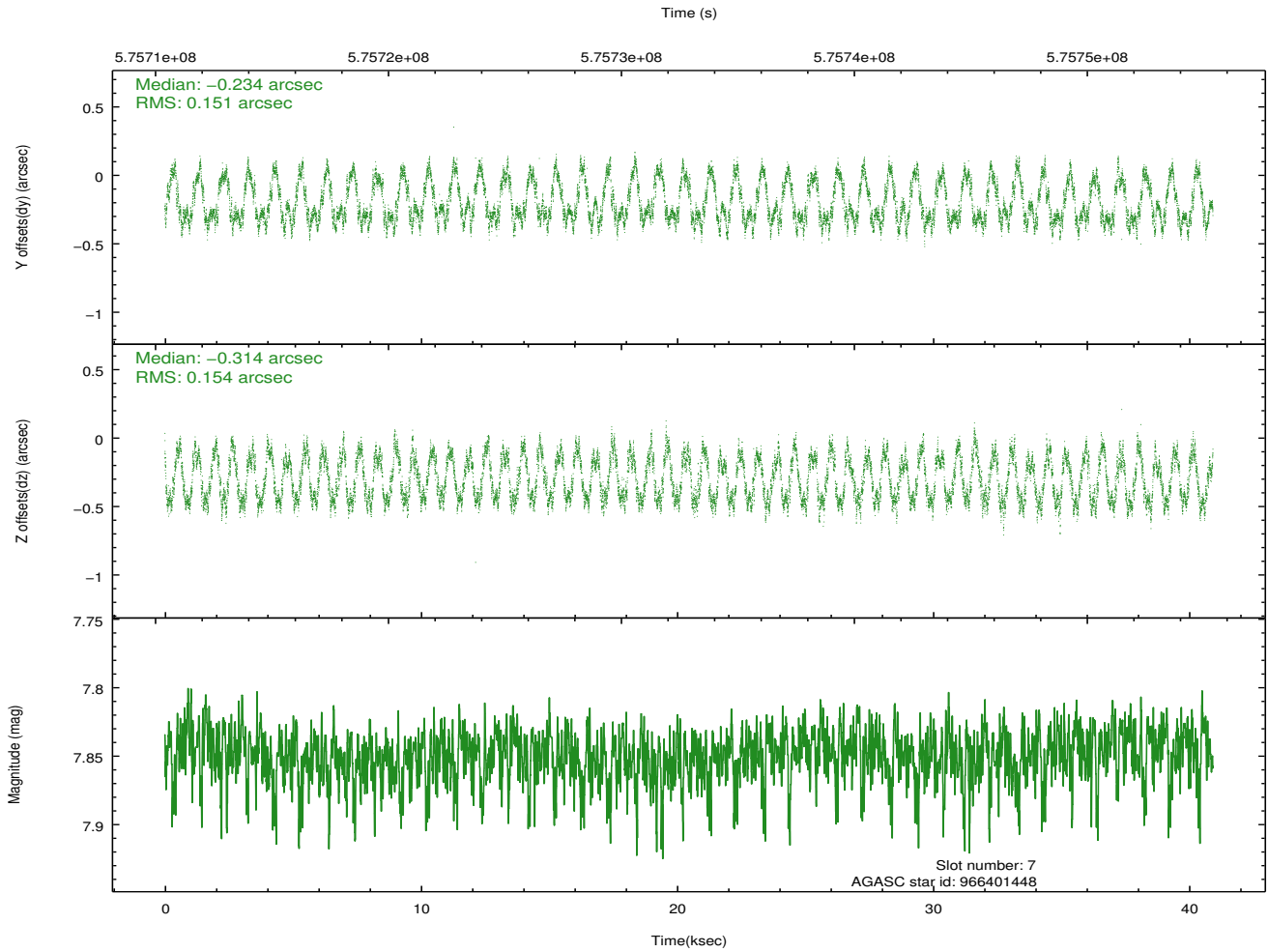
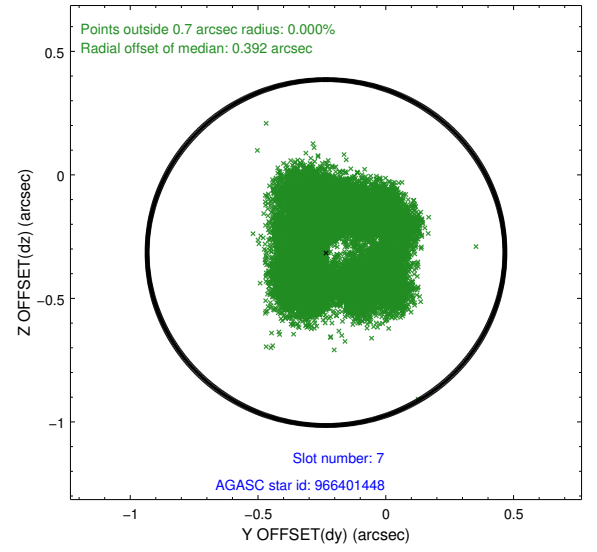
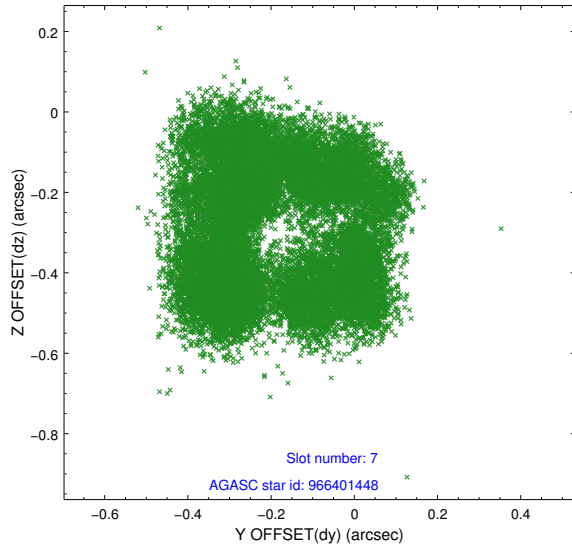
### 2.4.3 Slot 5



## 2.4.4 Slot 6

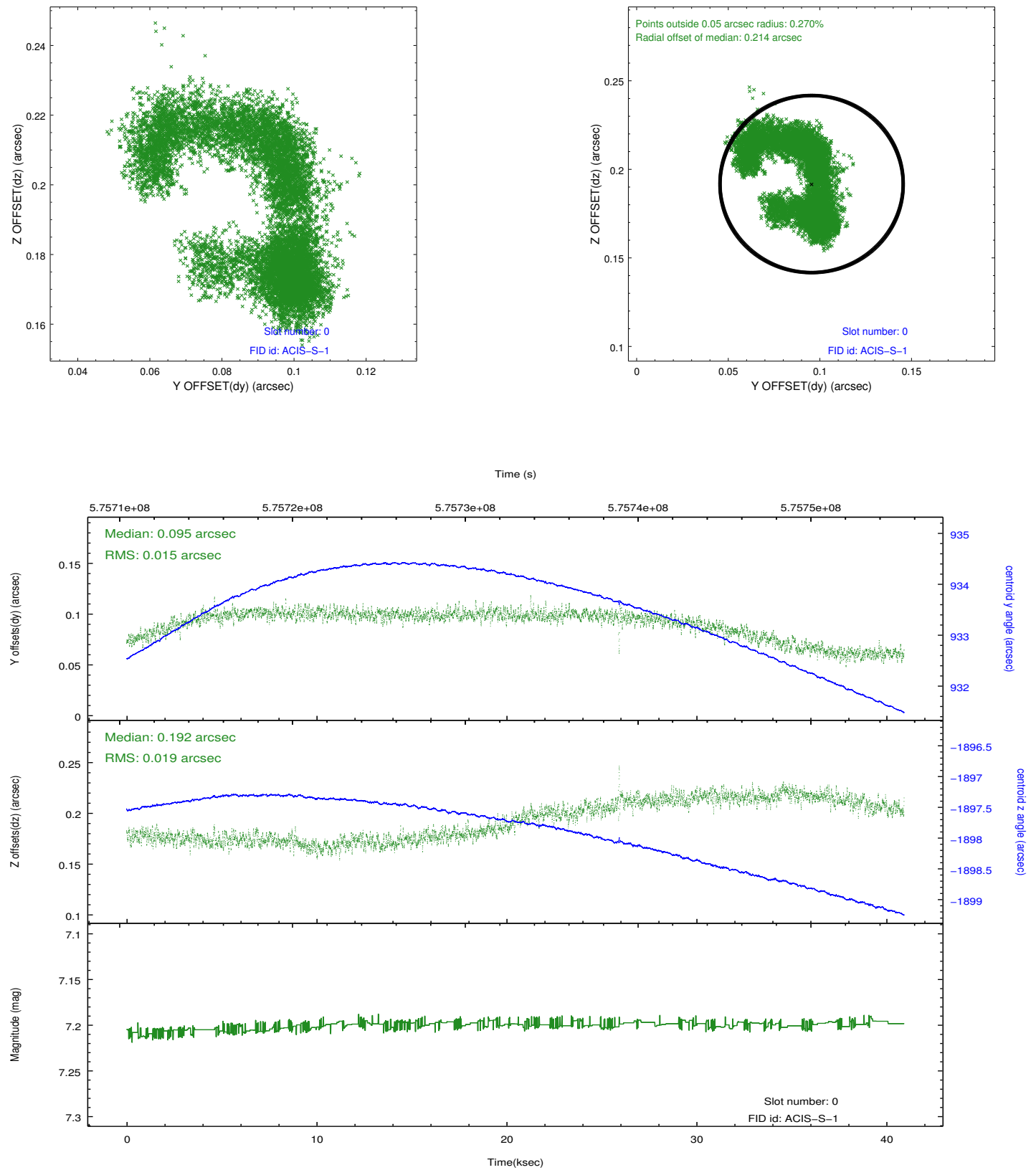


## 2.4.5 Slot 7

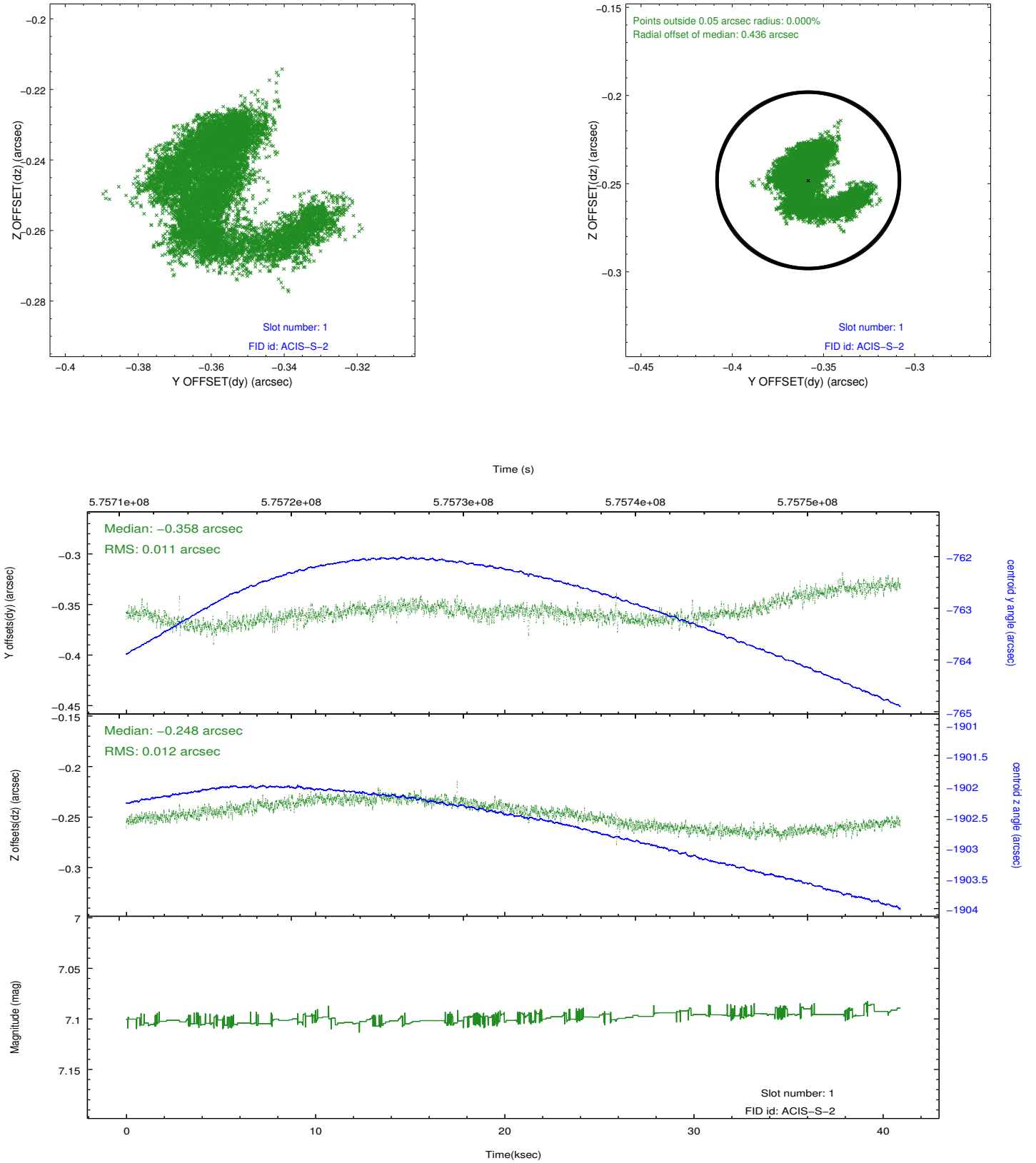


## 2.5 FID Slots

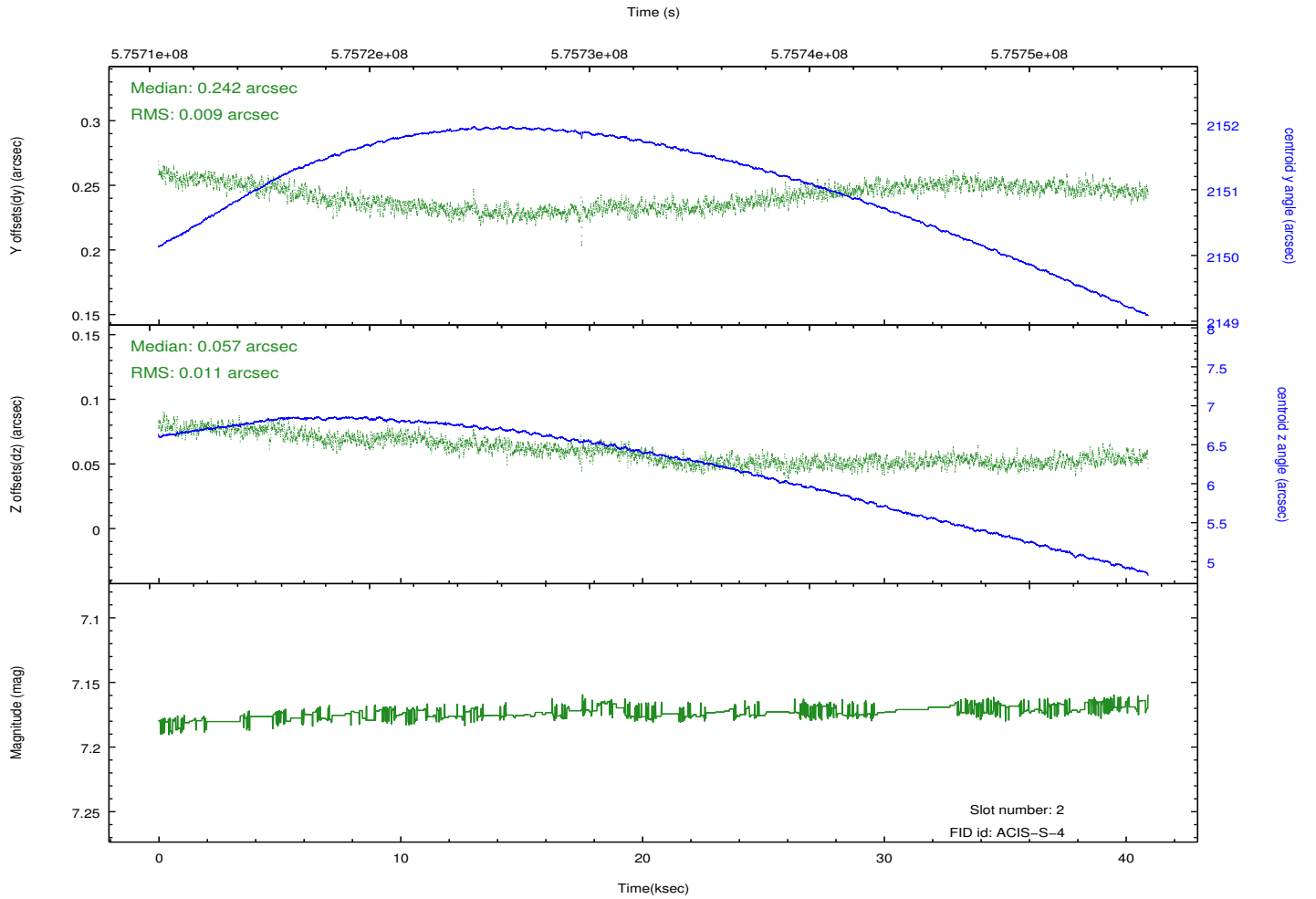
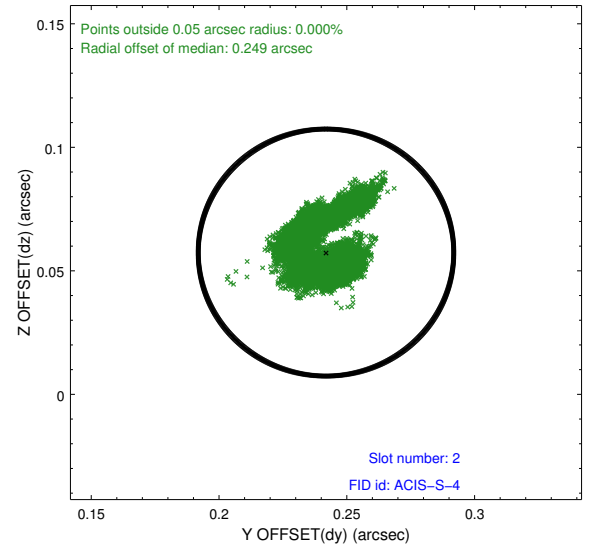
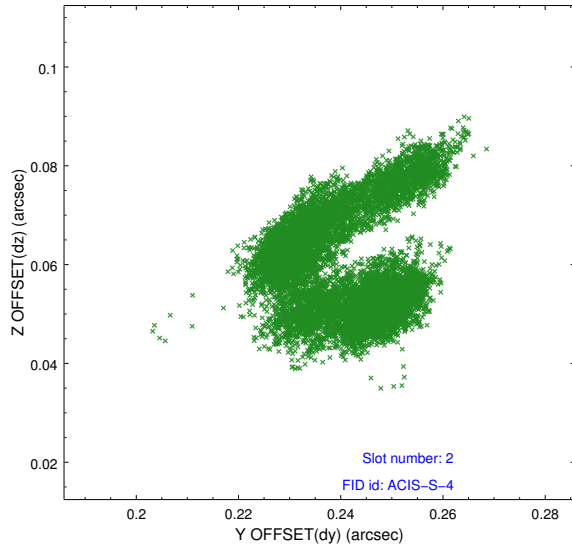
### 2.5.1 Slot 0



## 2.5.2 Slot 1

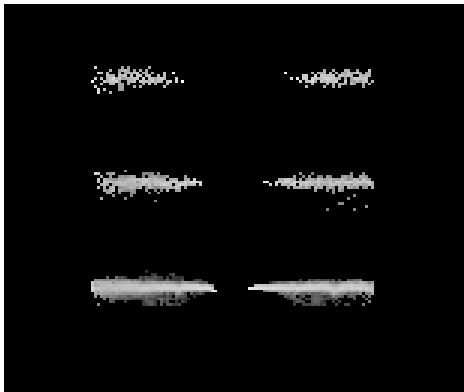


### 2.5.3 Slot 2

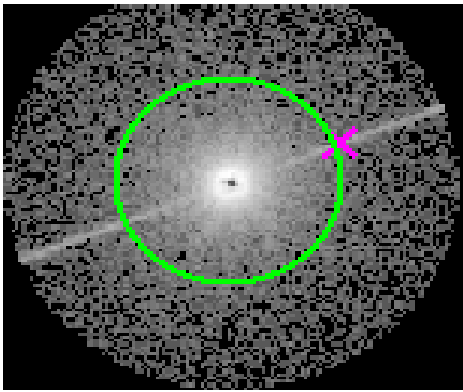


# 3 Gratings

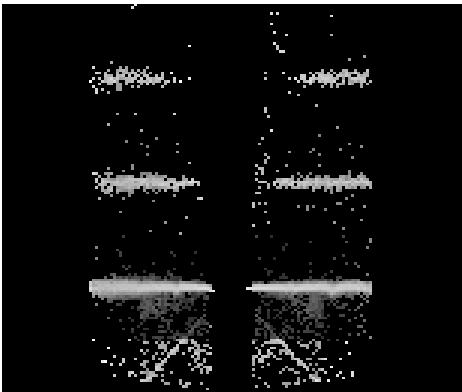
## 3.1 HEG Arm



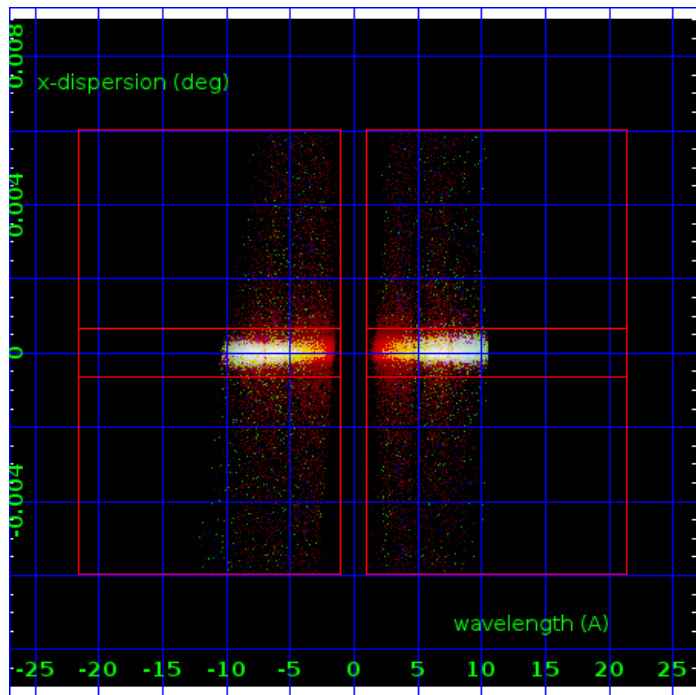
HEG Order Sort 123



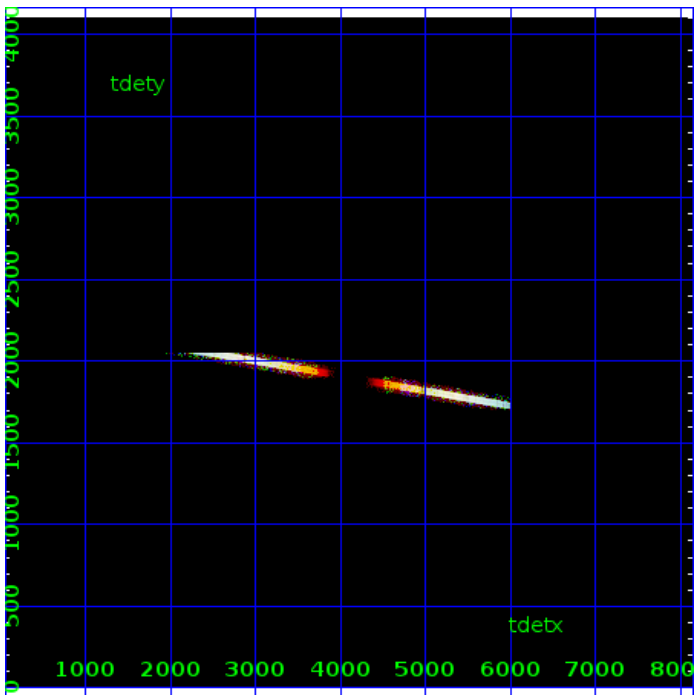
HEG Zero Order



HEG Order Sort ALL

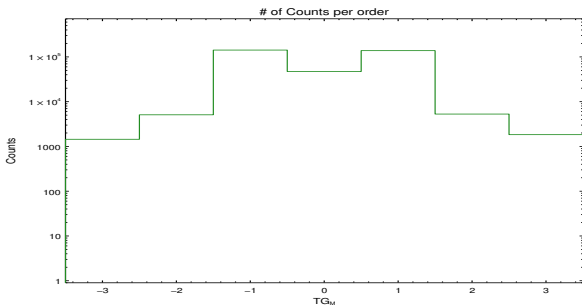


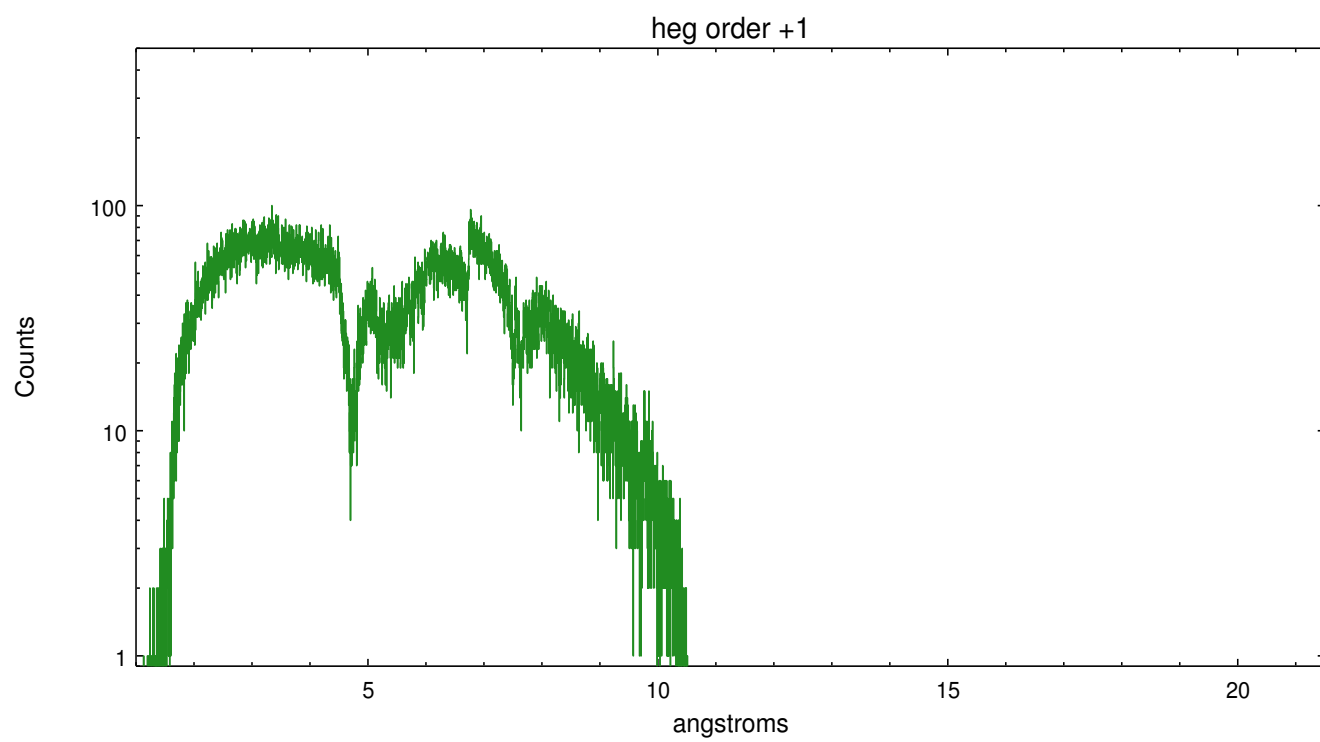
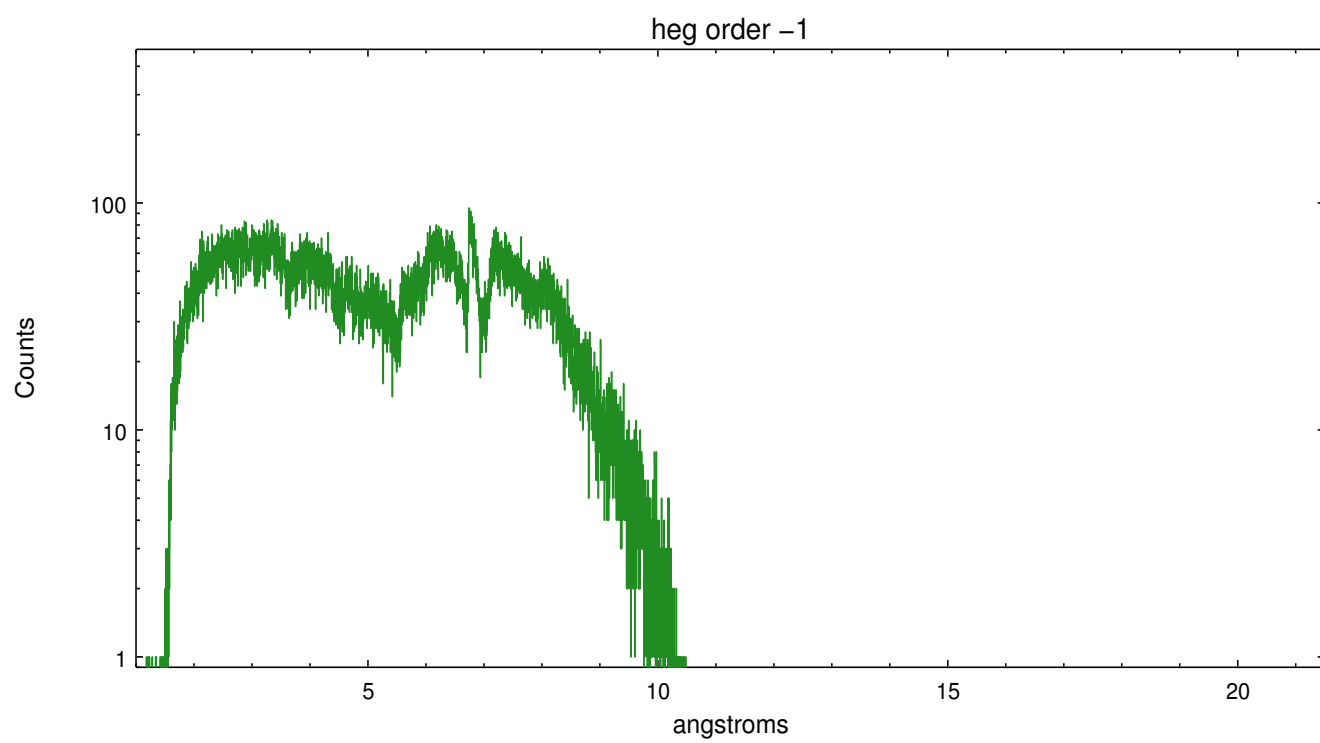
Spot Image HEG



Full Detector HEG

|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order 1 | order 2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|---------|---------|------------|
| Events | 1445        | 5094        | 142186      | 47220      | 138153  | 5289    | 1835       |



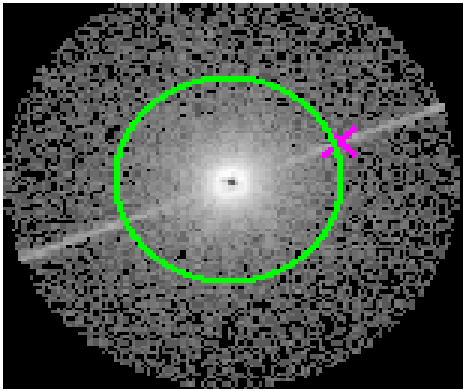




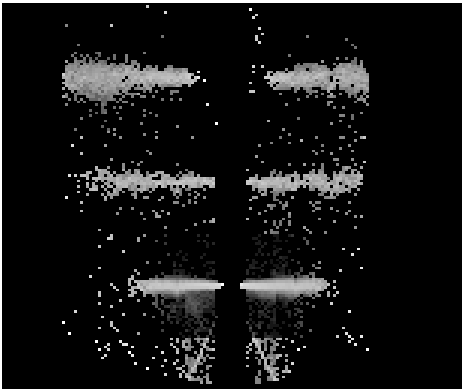
3.2 MEG Arm



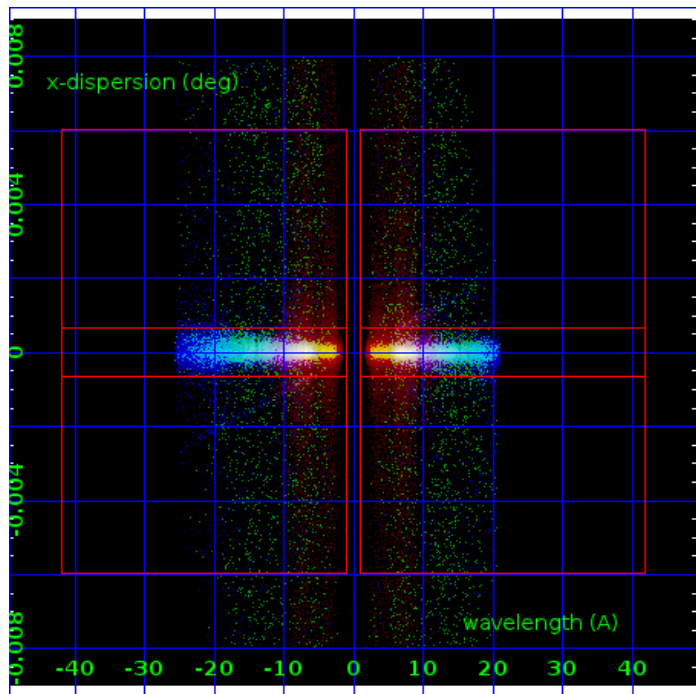
MEG Order Sort 123



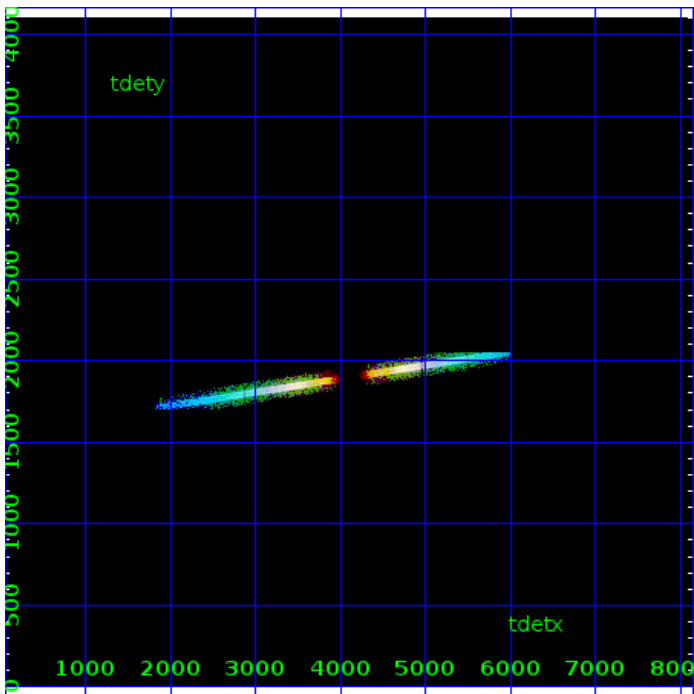
MEG Zero Order



MEG Order Sort ALL

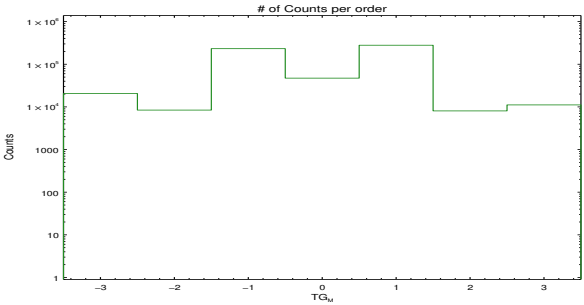


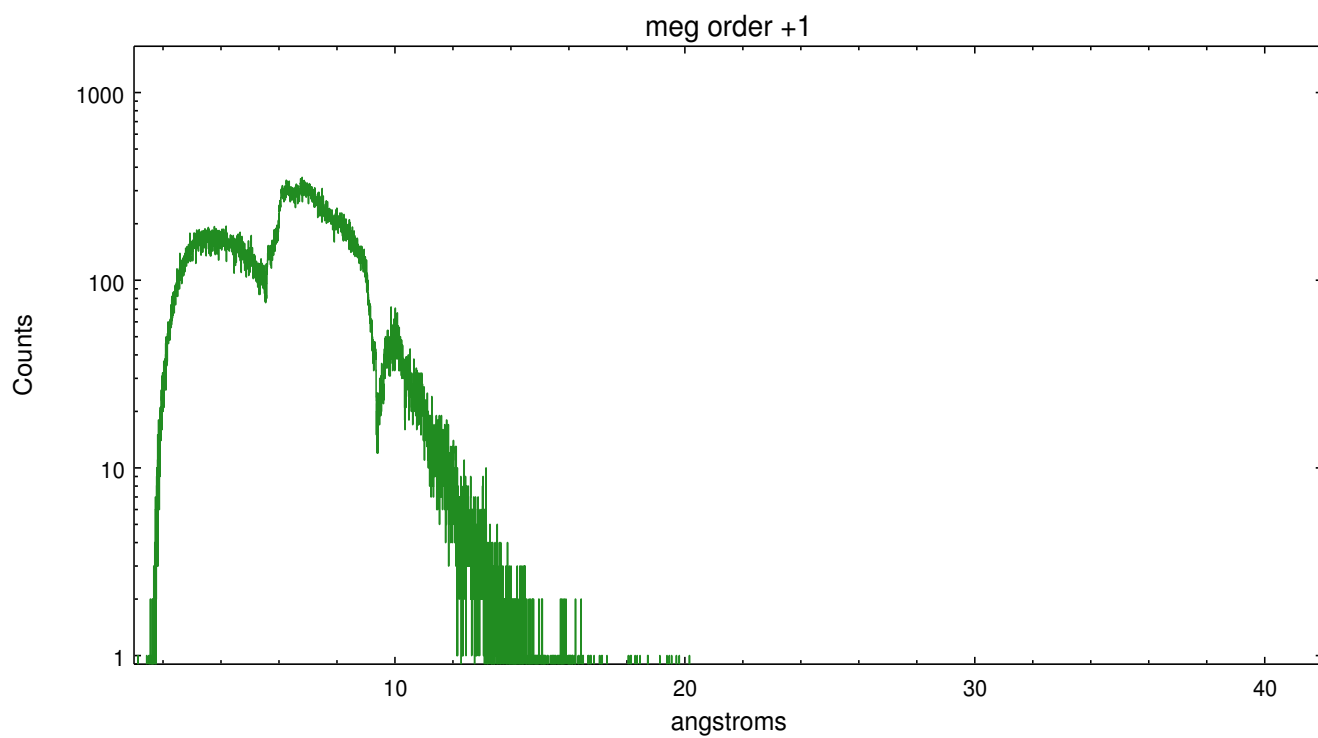
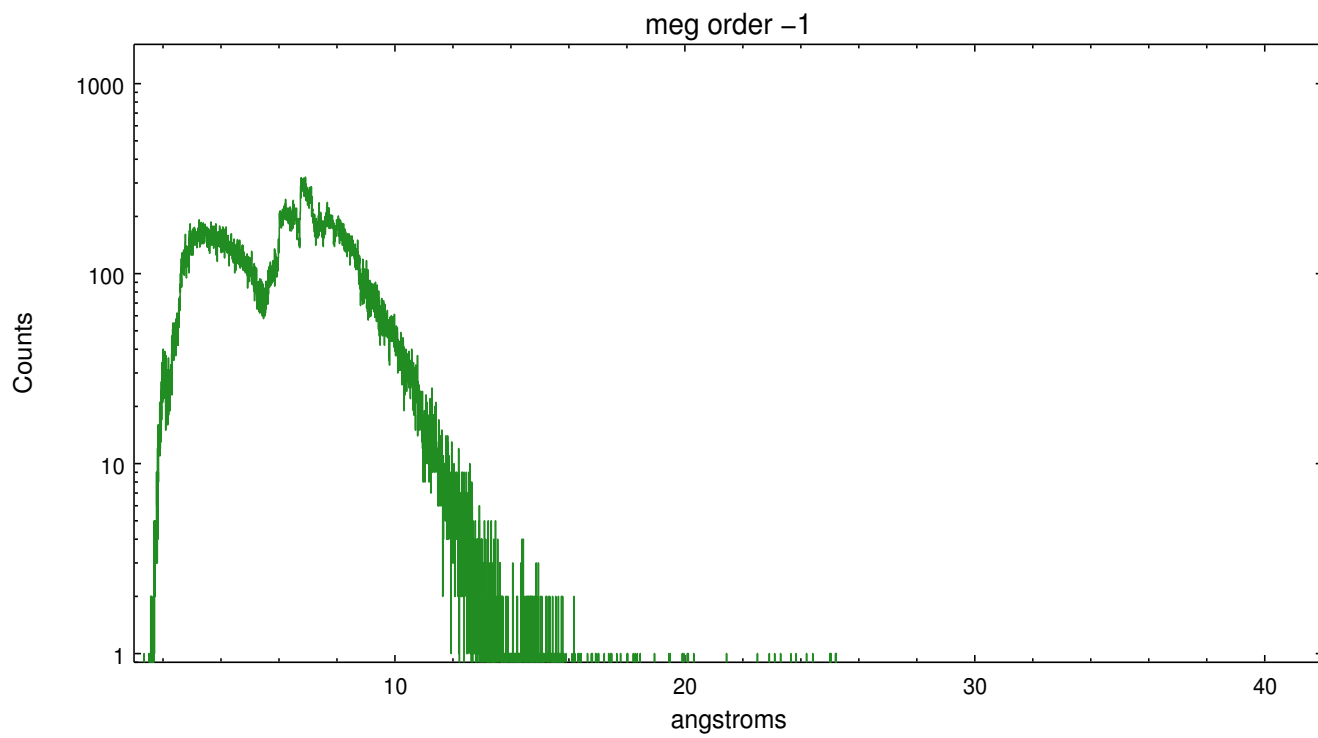
Spot Image MEG



Full Detector MEG

|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order 1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|---------|------------|------------|
| Events | 20573       | 8414        | 232239      | 47220      | 279242  | 8056       | 11138      |





# A Summary

## A.1 Status

|                            |                 |
|----------------------------|-----------------|
| V&V Scientist              | Joy Nichols     |
| V&V Date (YYYY-MM-DD)      | 2016.03.31      |
| V&V Edition                | 1               |
| V&V Disposition and Status | OK              |
| V&V Charge Time            | 40.828374919057 |

## A.2 Comments

Zeroth order piled up. The zeroth order sky position was determined using a software tool developed by CXC called findzero, which is available in CIAO as part of the tgdetect2 tool. The tool calculates the point of intersection of the readout streak on the ACIS CCD and the meg or leg dispersed spectral arm, rather than using a centroid position of the source. The findzero results are more accurate than source centroid in this case.

===

Faint grating spectra can be seen in an image of bad events. This is probably due to pileup in the spectrum, causing migration to bad grades. This should be considered in analysis.