

# V&V Reference Report

## L2 ASCDS Version : 8.4.3

Observation 13254 - L2 Version 3  
Chandra X-Ray Center

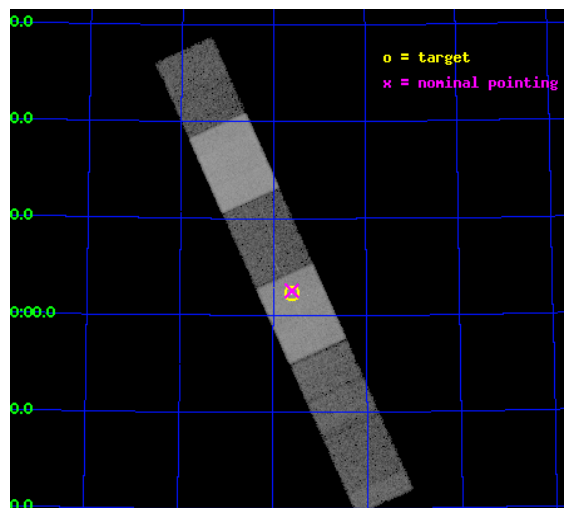
L2 Processing Date : Feb 21 2012

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# 1 Front

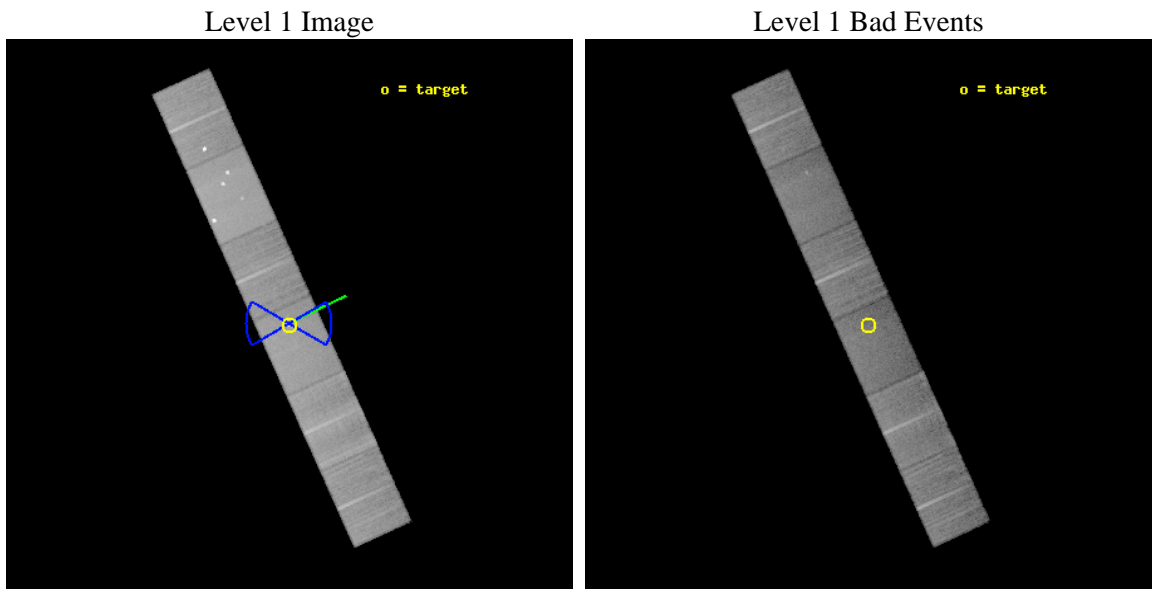
|          |   |   |
|----------|---|---|
| seq_num  | 702507  | Sequence number                             |
| obs_id   | 13254   | Observation id                              |
| title    | THE FIRST SPATIALLY RESOLVED SPECTRUM OF AN AGN OUTFLOW IN AN EARLY-TYPE GALAXY: A DEEP HETG OBSERVATION OF MRK 3 | Proposal title                              |
| observer | Dr Daniel Evans   | Principal investigator                      |
| object   | Markarian 3   | Source name                                 |
| dtcycle  | 0   | &#160                                       |
| cycle    | P   | events from which exps?<br>Prim/Second/Both |
| ra_targ  | 93.90125  | Observer's specified target<br>RA [deg]     |
| dec_targ | 71.0375   | Observer's specified target<br>Dec [deg]    |
| ra_nom   | 93.899353604187   | Nominal RA [deg]                            |
| dec_nom  | 71.042322635906   | Nominal Dec [deg]                           |
| roll_nom | 65.658422978415   | Nominal Roll [deg]                          |
| revision | 3   | Processing version of data                  |
| ontime   | 32047.5   | Sum of GTIs [s]                             |
| livetime | 31529.905078236   | Livetime [s]                                |
| ontime4  | 32047.5   | Sum of GTIs [s]                             |
| ontime5  | 32047.5   | Sum of GTIs [s]                             |
| ontime6  | 32047.5   | Sum of GTIs [s]                             |
| ontime7  | 32047.5   | Sum of GTIs [s]                             |
| ontime8  | 32047.5   | Sum of GTIs [s]                             |
| ontime9  | 32047.5   | Sum of GTIs [s]                             |
| l2events | 264271  | Number of level 2 events                    |



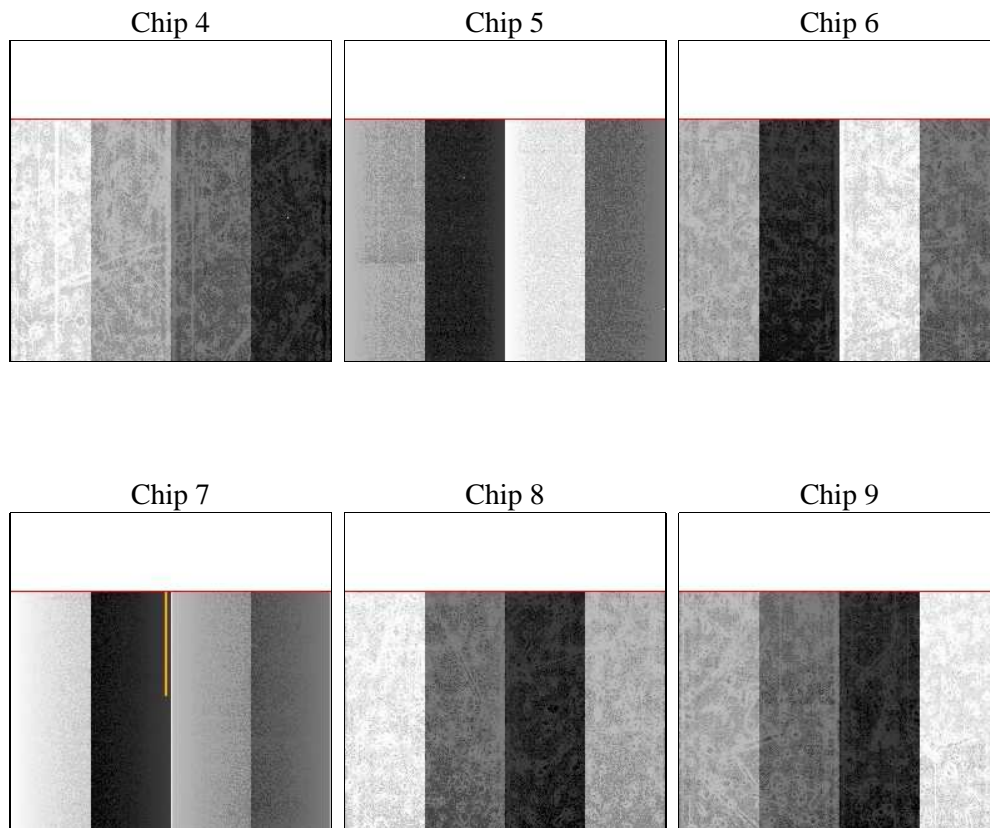
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |              |   |
|----------|---------------------|--------------------------------|----------------|--------------|---|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 32000.000000 | [s] Scheduled observation exposure time |
| ascdsver | 8.4.3               | Processing system revision     | ontime         | 32047.5      | Sum of GTIs [s]                         |
| caldsver | 4.4.8               | &#160                          | ontime4        | 32047.5      | Sum of GTIs [s]                         |
| date     | 2012-02-21T15:17:47 | Date and time of file creation | ontime5        | 32047.5      | Sum of GTIs [s]                         |
| revision | 3                   | Processing version of data     | ontime6        | 32047.5      | Sum of GTIs [s]                         |
|          |                     |                                | ontime7        | 32047.5      | Sum of GTIs [s]                         |
|          |                     |                                | ontime8        | 32047.5      | Sum of GTIs [s]                         |
|          |                     |                                | ontime9        | 32047.5      | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 1141109      | Number of level 1 events                |

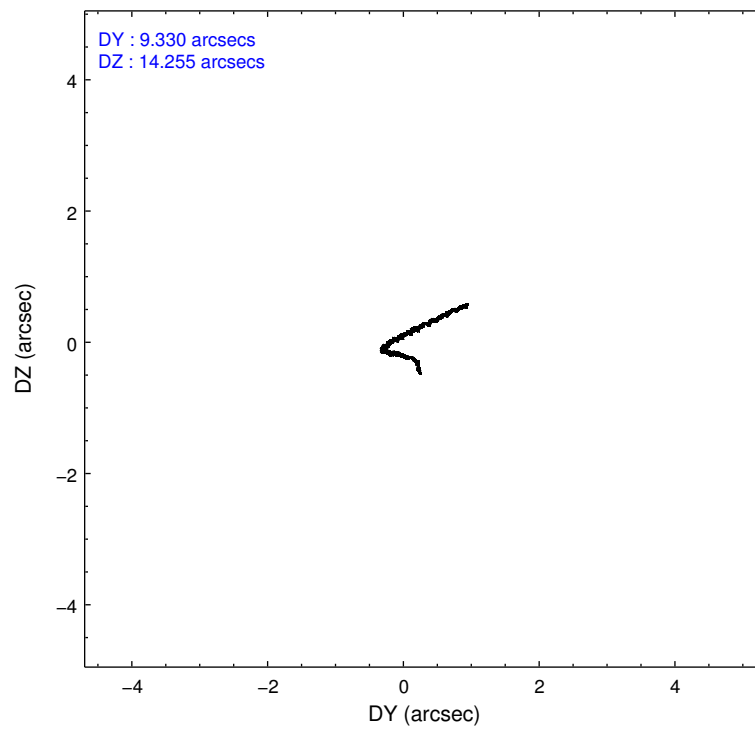
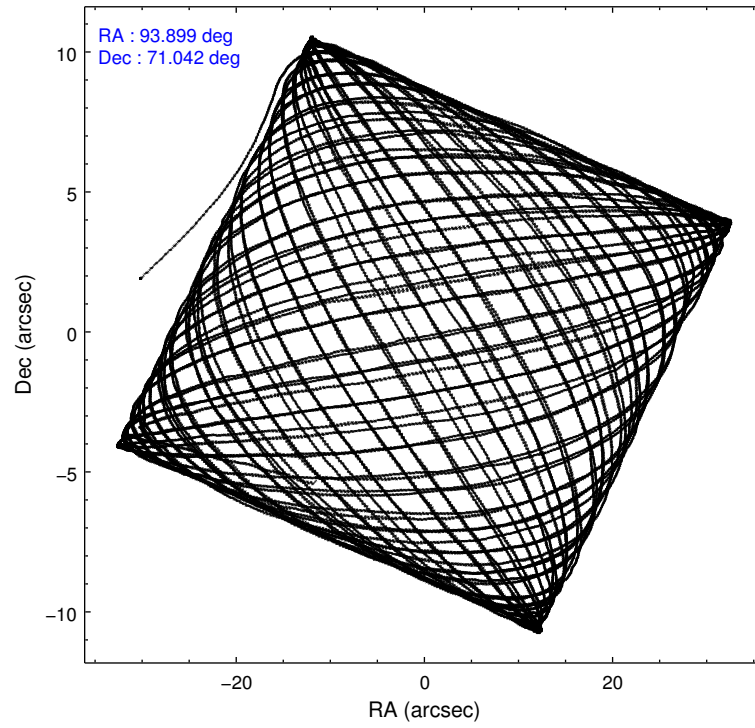
### 2.1.4 Events

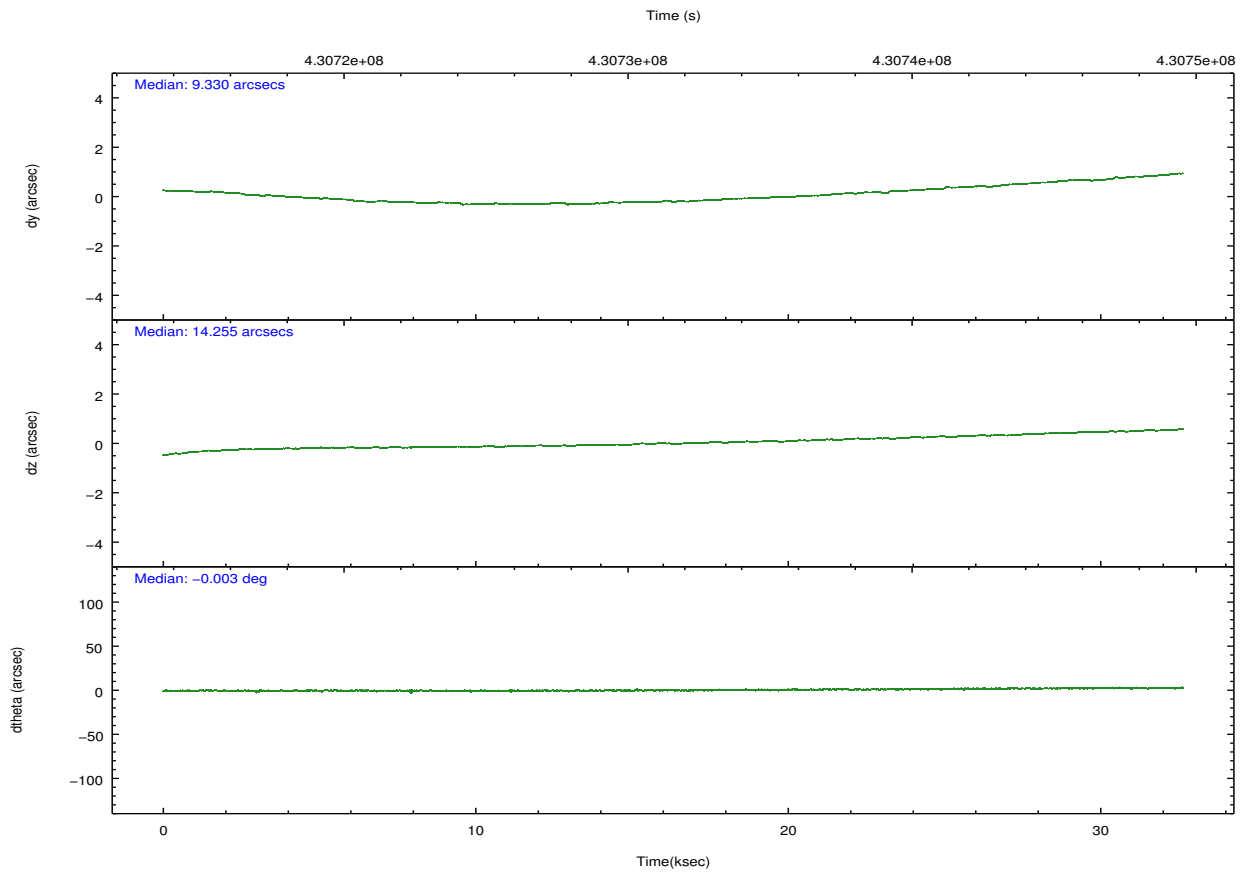
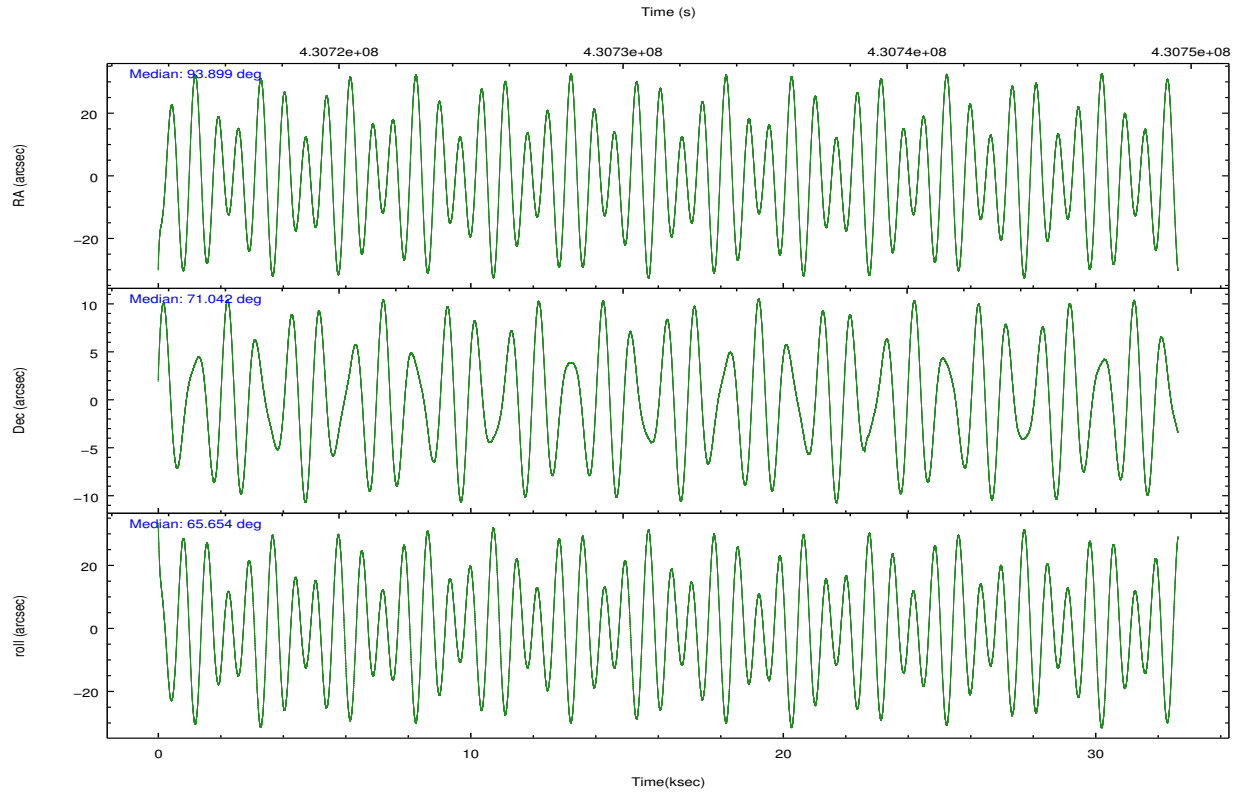
|                 | ccd 4  | ccd 5  | ccd 6  | ccd 7  | ccd 8  | ccd 9  |                | ccd 4  | ccd 5  | ccd 6  | ccd 7 | ccd 8  | ccd 9  |
|-----------------|--------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|-------|--------|--------|
| level 1 events  | 184300 | 253233 | 154182 | 195487 | 202701 | 151206 | grade 0 events | 17625  | 24632  | 6164   | 8266  | 16149  | 6664   |
| rejected events | 154247 | 121954 | 135967 | 106242 | 148179 | 132124 |                | 9%     | 9%     | 3%     | 4%    | 7%     | 4%     |
| rejected %      | 83%    | 48%    | 88%    | 54%    | 73%    | 87%    | grade 1 events | 146    | 395    | 64     | 247   | 127    | 88     |
|                 |        |        |        |        |        |        |                | 0%     | 0%     | 0%     | 0%    | 0%     | 0%     |
|                 |        |        |        |        |        |        | grade 2 events | 4957   | 35213  | 4135   | 18295 | 12425  | 4228   |
|                 |        |        |        |        |        |        |                | 2%     | 13%    | 2%     | 9%    | 6%     | 2%     |
|                 |        |        |        |        |        |        | grade 3 events | 2084   | 5062   | 1994   | 8045  | 6023   | 2207   |
|                 |        |        |        |        |        |        |                | 1%     | 1%     | 1%     | 4%    | 2%     | 1%     |
|                 |        |        |        |        |        |        | grade 4 events | 1960   | 4831   | 1997   | 8068  | 5609   | 1992   |
|                 |        |        |        |        |        |        |                | 1%     | 1%     | 1%     | 4%    | 2%     | 1%     |
|                 |        |        |        |        |        |        | grade 5 events | 7100   | 18733  | 7087   | 20151 | 10321  | 7926   |
|                 |        |        |        |        |        |        |                | 3%     | 7%     | 4%     | 10%   | 5%     | 5%     |
|                 |        |        |        |        |        |        | grade 6 events | 3430   | 61561  | 3927   | 46587 | 14318  | 3994   |
|                 |        |        |        |        |        |        |                | 1%     | 24%    | 2%     | 23%   | 7%     | 2%     |
|                 |        |        |        |        |        |        | grade 7 events | 146998 | 102806 | 128814 | 85828 | 137729 | 124107 |
|                 |        |        |        |        |        |        |                | 79%    | 40%    | 83%    | 43%   | 67%    | 82%    |

## 2.2 Compared Parameters

| Parameter                            | Planned             | Actual               | Parameter                             | Planned   | Actual  |
|--------------------------------------|---------------------|----------------------|---------------------------------------|-----------|---------|
| Instrument                           | ACIS                | ACIS                 | Obspar format version number          | 7         | 7       |
| Detector                             | ACIS-456789         | ACIS-456789          | 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                    | 93.908783           | 93.89935360418694    | Subarray requested                    | CUSTOM    | CUSTOM  |
| [deg] Pointing Dec                   | 71.015150           | 71.04232263590622    | Subarray start row                    | 1         | 1       |
| [deg] Pointing Roll                  | 65.492875           | 65.65842297841488    | Subarray row count                    | 774       | 774     |
| [deg] Roll angle                     | 270.000000          | 270.000000           | Alternating exposures requested       | N         | N       |
| [deg] Roll tolerance                 | 30.000000           | 30.000000            | [s] Primary exposure time             | 0.000000  | 2.5     |
| Roll constraint allows 180D rotation | Y                   | Y                    |                                       |           |         |
| [mm] SIM focus pos                   | -0.684267           | -0.6828225247311905  |                                       |           |         |
| [mm] SIM defocus                     | 0                   | 0.001444936568705701 |                                       |           |         |
| [mm] SIM translation stage pos       | -187.132523         | -187.1254020033014   |                                       |           |         |
| [mm] SIM translation stage offset    | -3                  | -3.007120579706367   |                                       |           |         |
| [s] Observation start time (MET)     | 430715894.184000    | 430714618.83988      |                                       |           |         |
| Observation start date               | 2011-08-26T03:17:08 | 2011-08-26T02:56:58  |                                       |           |         |
| [s] Observation end time (MET)       | 430747894.184000    | 430748987.09169      |                                       |           |         |
| Observation end date                 | 2011-08-26T12:10:28 | 2011-08-26T12:29:47  |                                       |           |         |
| Read mode                            | TIMED               | TIMED                |                                       |           |         |

## 2.3 Aspect



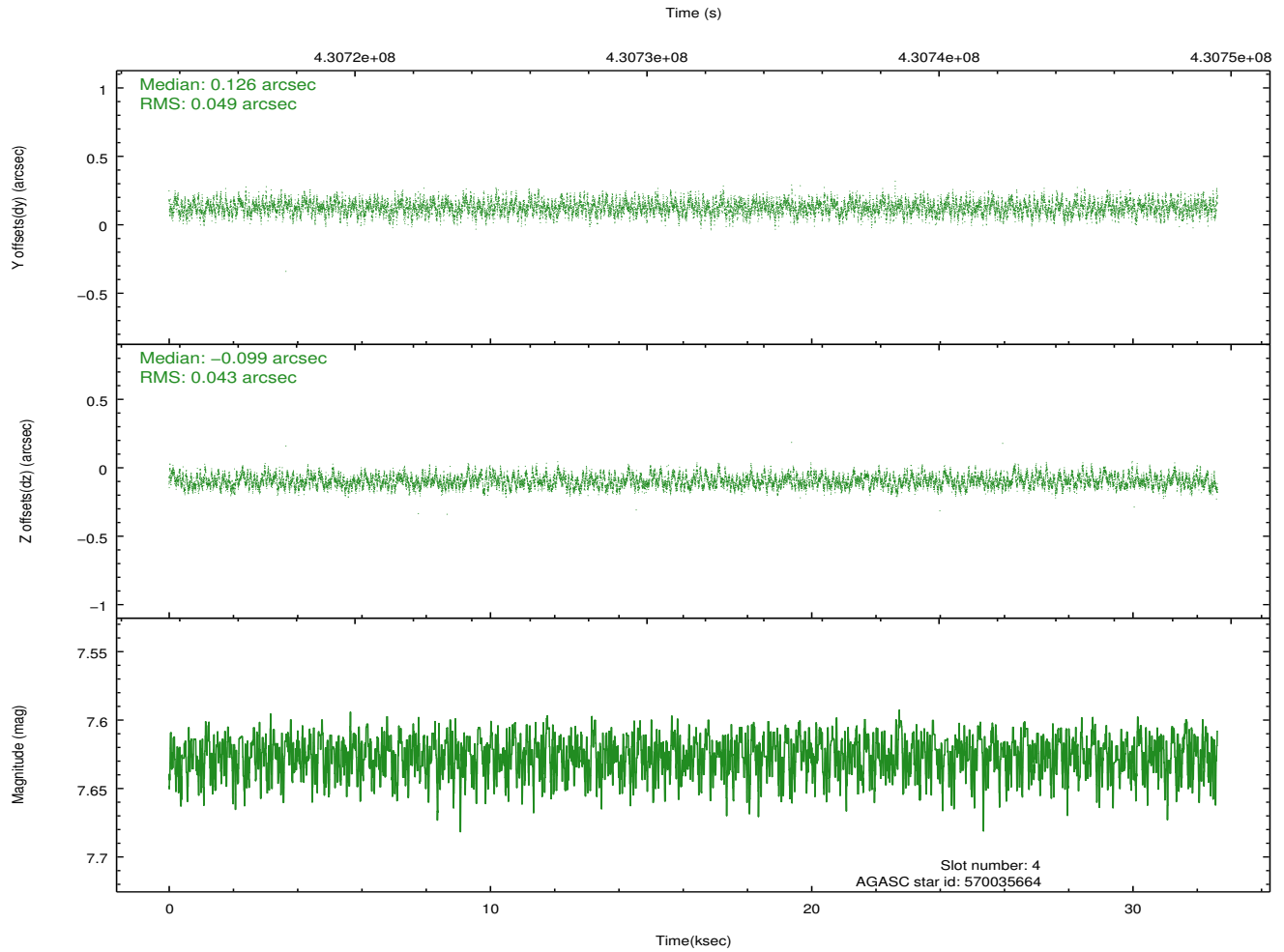
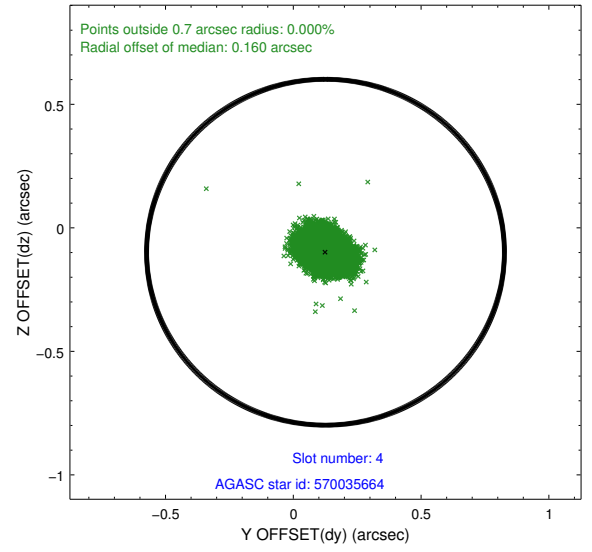
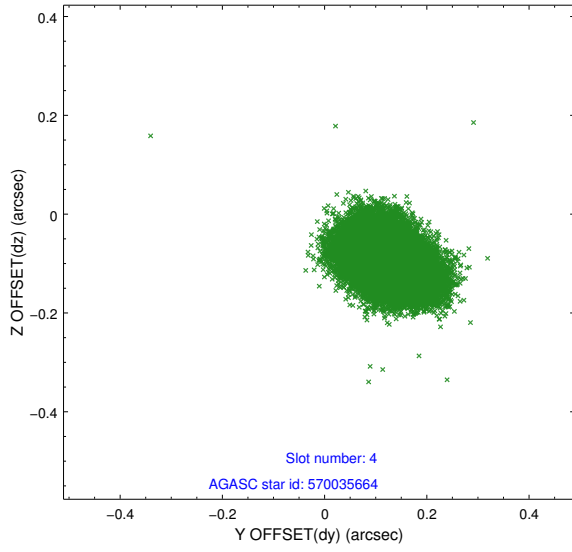


### Slot Statistics

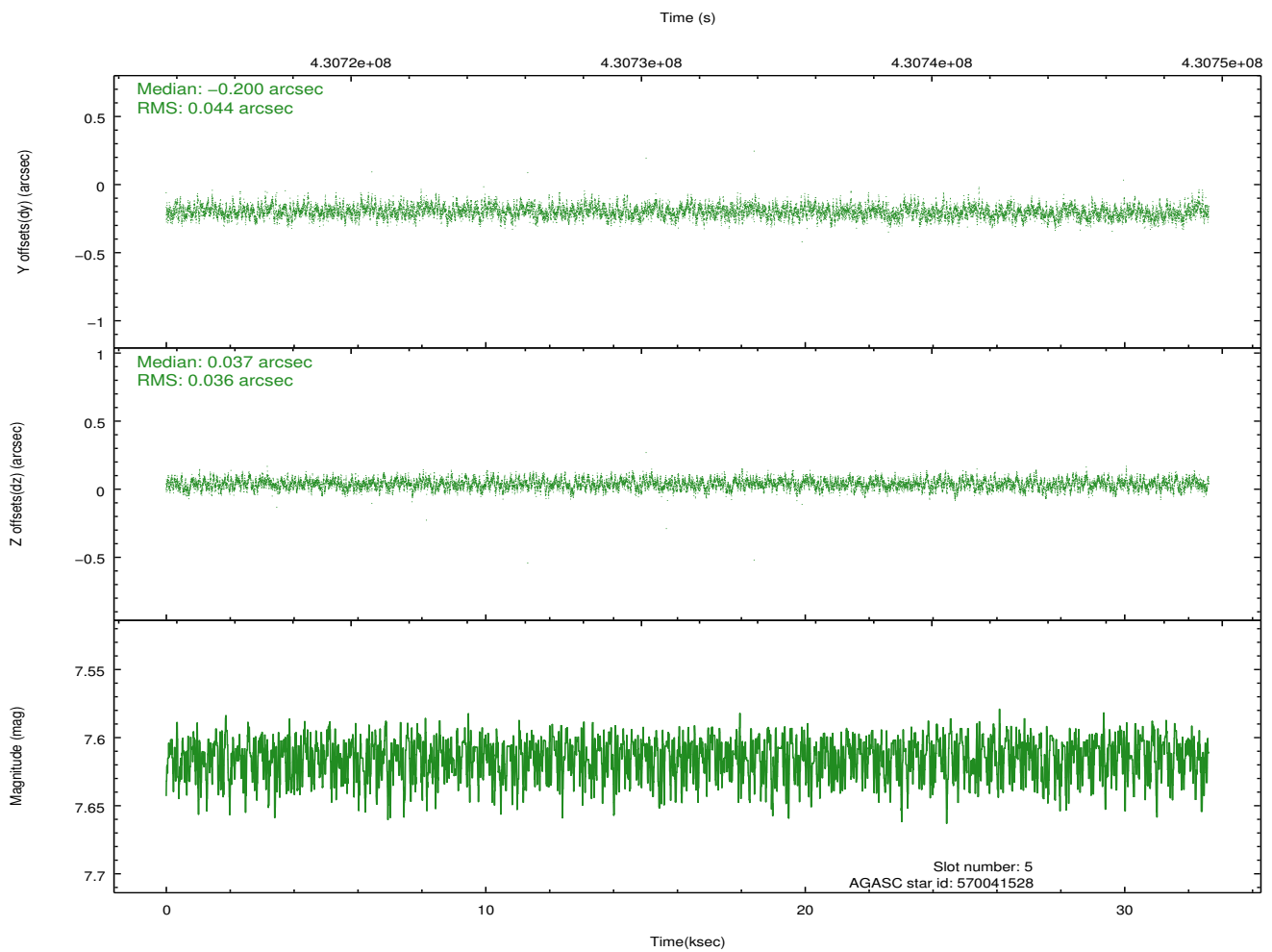
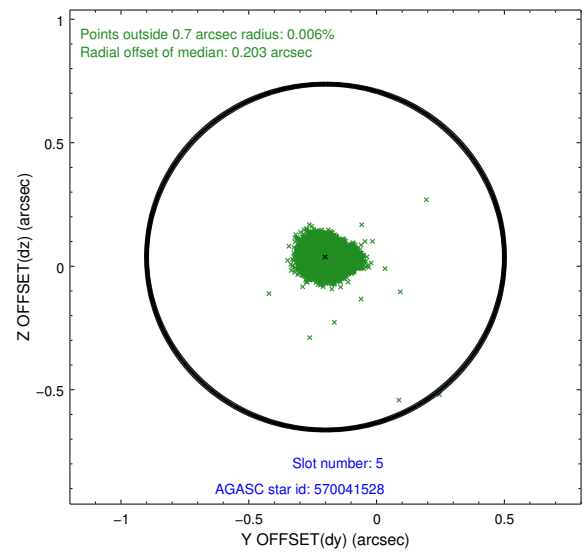
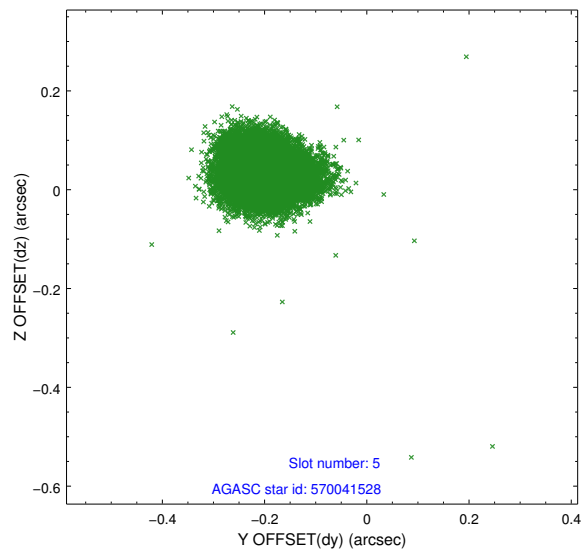
| slot | status  | id        | mag  | n_pts | med_dy | med_dz | dr1   | dr2   | ra        | dec       | mean_y   | mean_z   |
|------|---------|-----------|------|-------|--------|--------|-------|-------|-----------|-----------|----------|----------|
| 0    | FID     | ACIS-S-2  | 6.89 | 7959  | -0.085 | -0.070 | 0.015 | 0.027 | 0.000000  | 0.000000  | -762.14  | -1797.81 |
| 1    | FID     | ACIS-S-4  | 6.97 | 7960  | 0.237  | 0.060  | 0.012 | 0.020 | 0.000000  | 0.000000  | 2151.46  | 110.69   |
| 2    | FID     | ACIS-S-5  | 7.02 | 7960  | -0.184 | 0.020  | 0.011 | 0.018 | 0.000000  | 0.000000  | -1814.98 | 104.44   |
| 3    | OMITTED |           | 0.00 | 0     | 0.000  | 0.000  | 0.000 | 0.000 | 0.000000  | 0.000000  | 0.00     | 0.00     |
| 4    | GUIDE   | 570035664 | 7.63 | 15921 | 0.126  | -0.099 | 0.070 | 0.110 | 92.975426 | 71.130782 | -63.98   | 1165.29  |
| 5    | GUIDE   | 570041528 | 7.61 | 15920 | -0.200 | 0.037  | 0.059 | 0.096 | 93.751561 | 70.667714 | -1215.52 | -348.27  |
| 6    | GUIDE   | 570565312 | 8.29 | 15913 | -0.096 | -0.117 | 0.064 | 0.104 | 94.342210 | 71.606805 | 2143.44  | 436.20   |
| 7    | GUIDE   | 570566592 | 8.45 | 15913 | 0.166  | 0.176  | 0.075 | 0.123 | 95.385239 | 71.260466 | 1531.68  | -1178.35 |

## 2.4 Star Slots

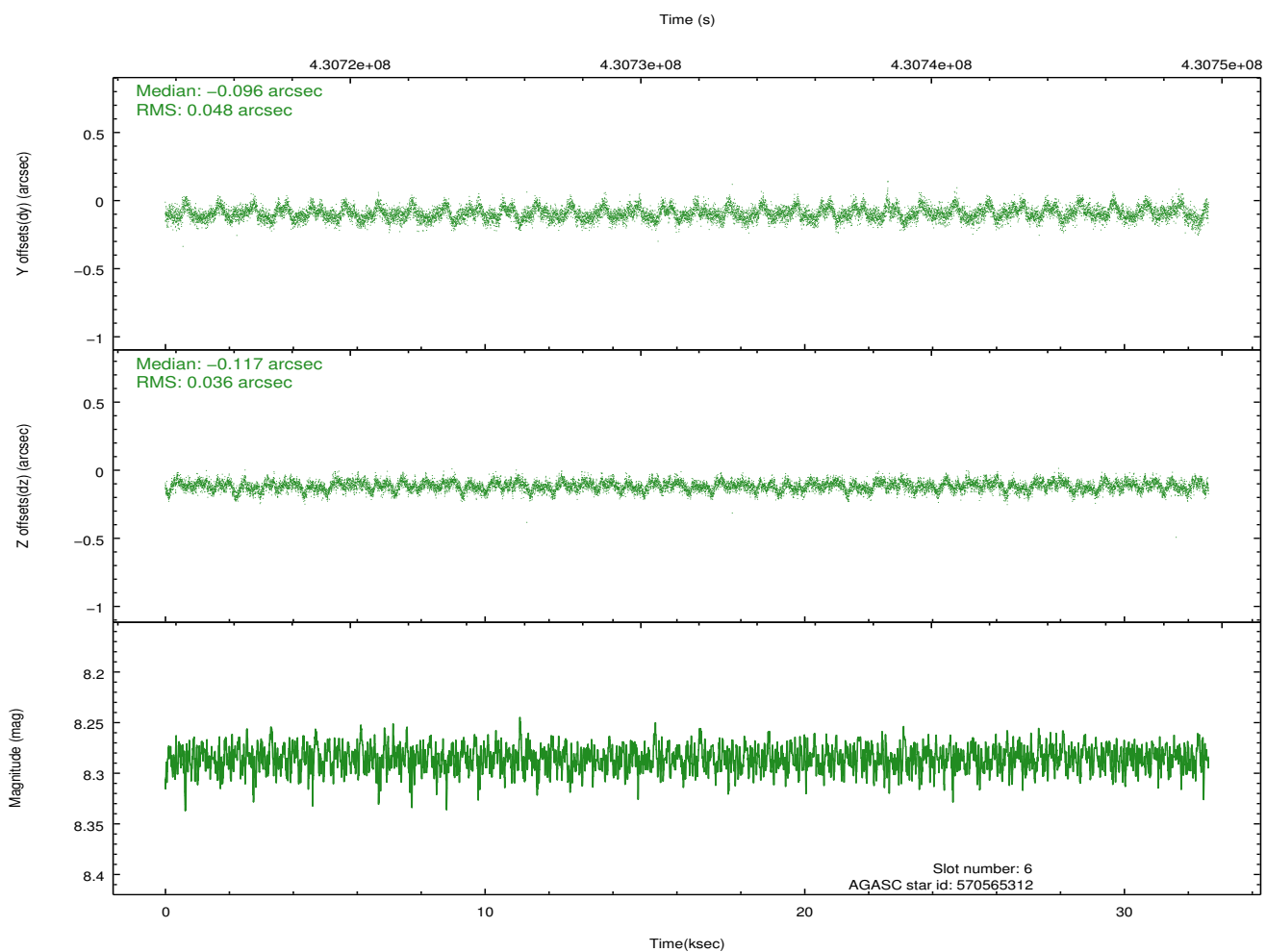
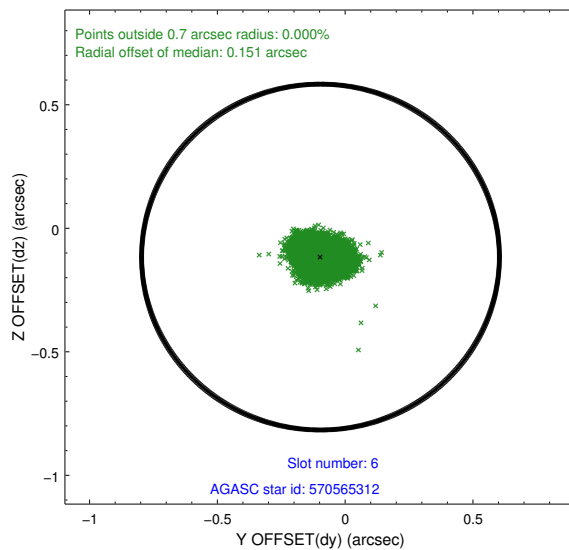
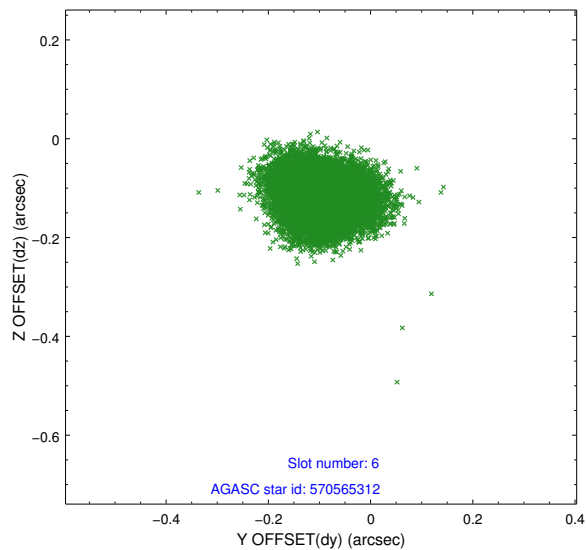
### 2.4.1 Slot 4



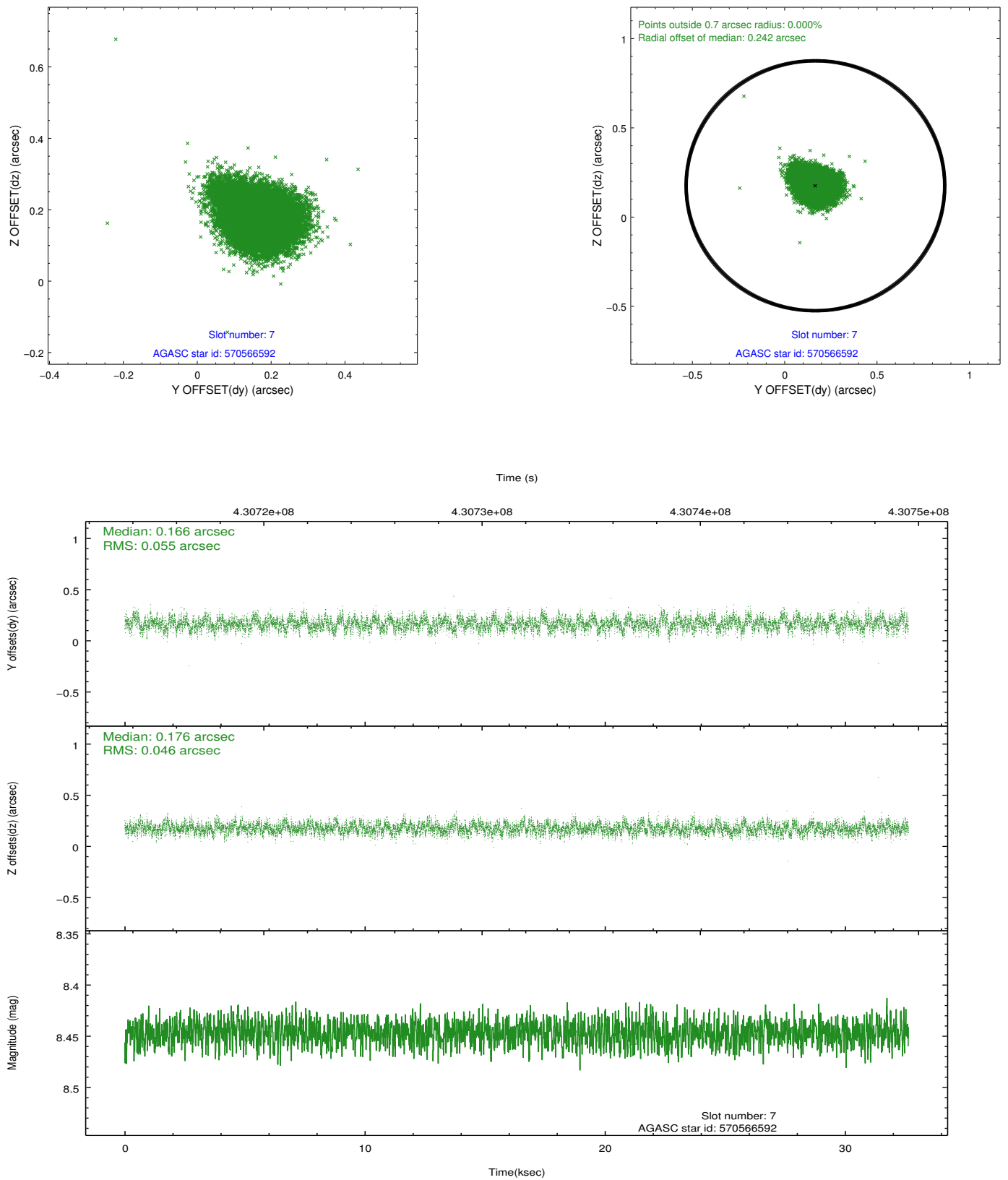
## 2.4.2 Slot 5



### 2.4.3 Slot 6

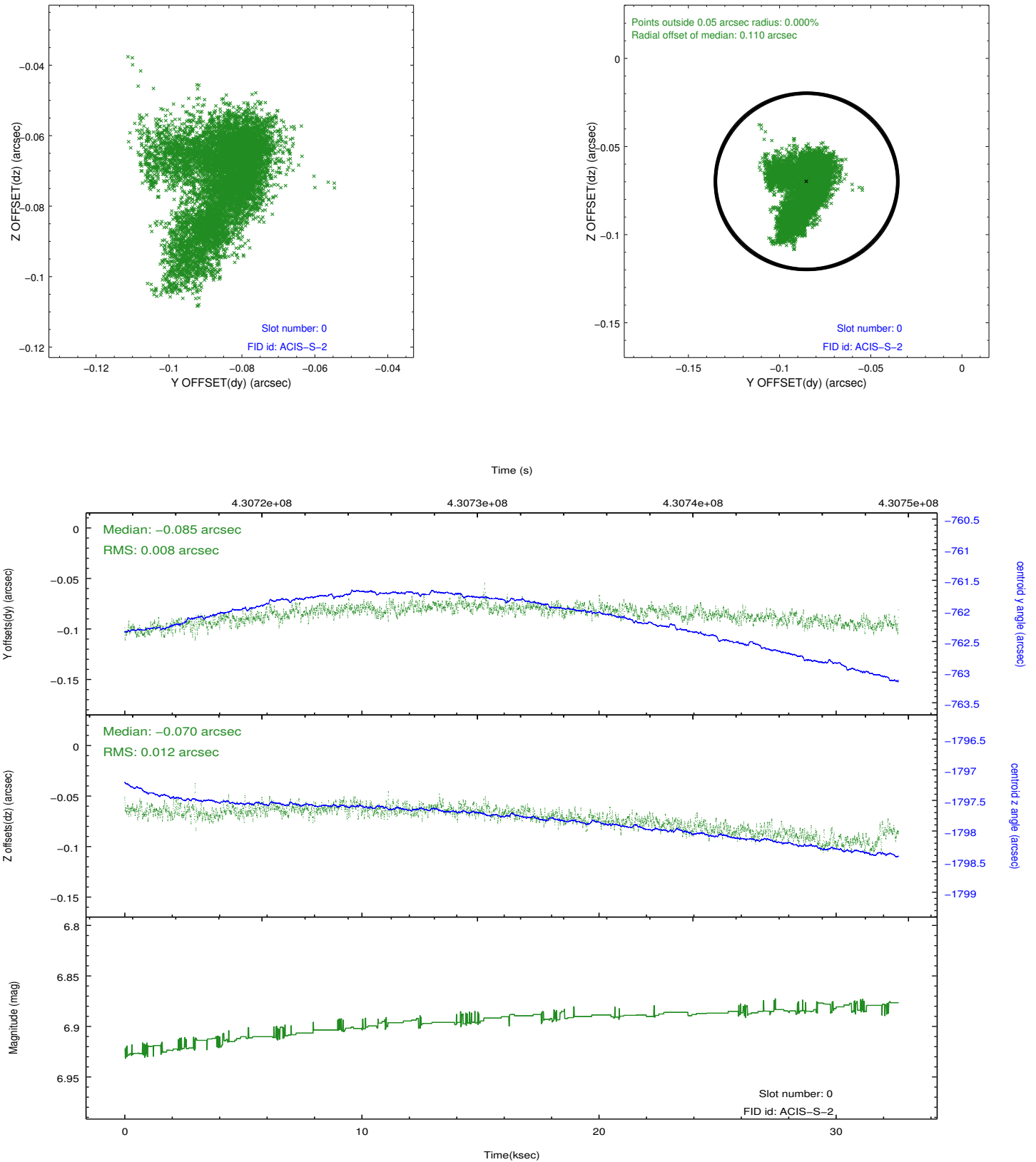


## 2.4.4 Slot 7

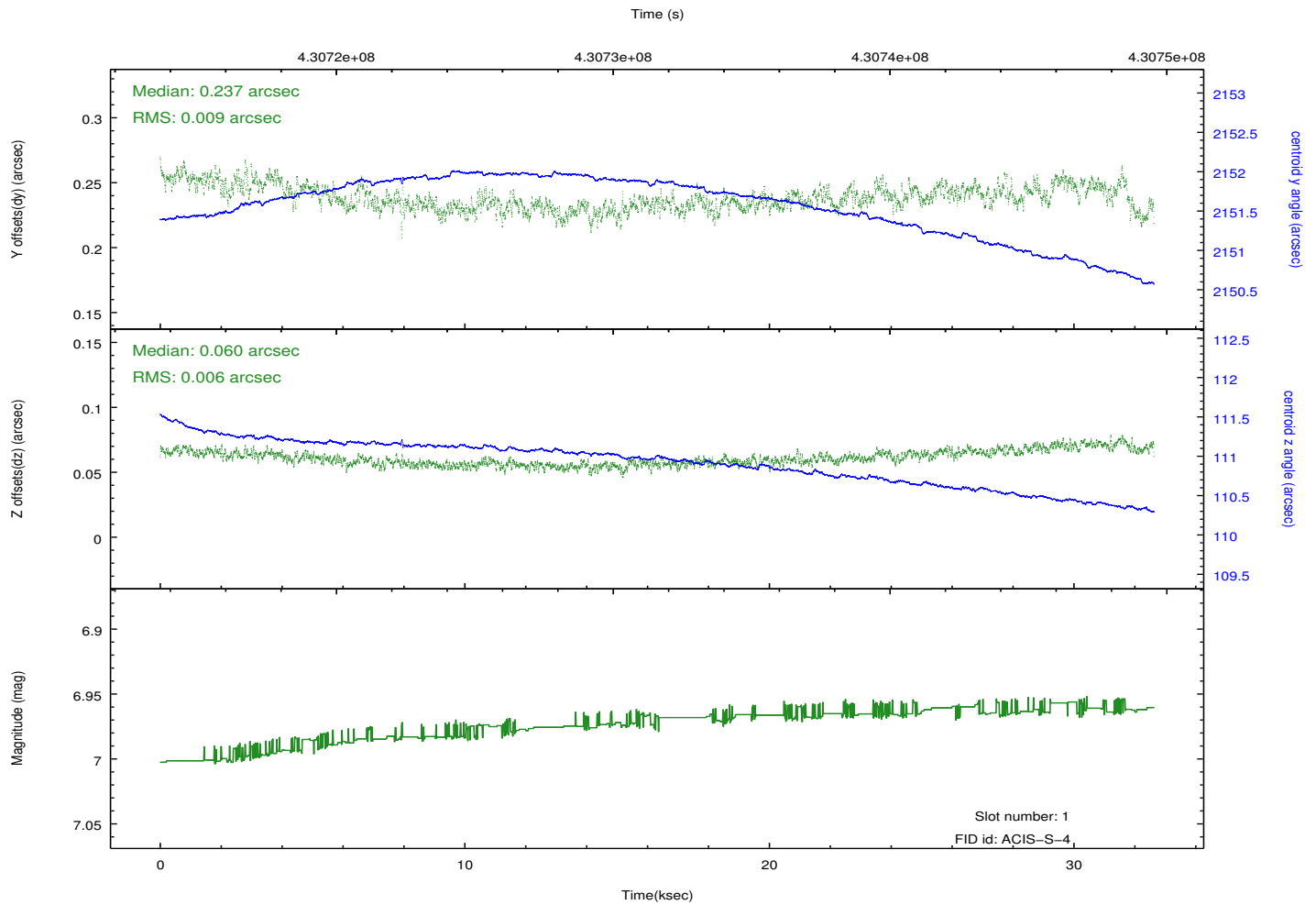
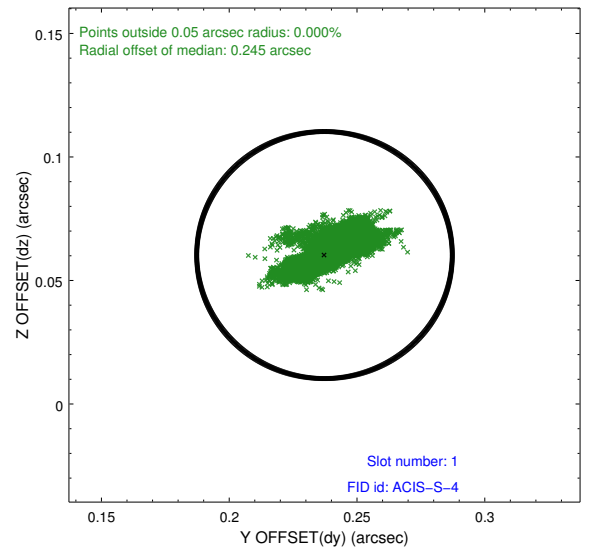
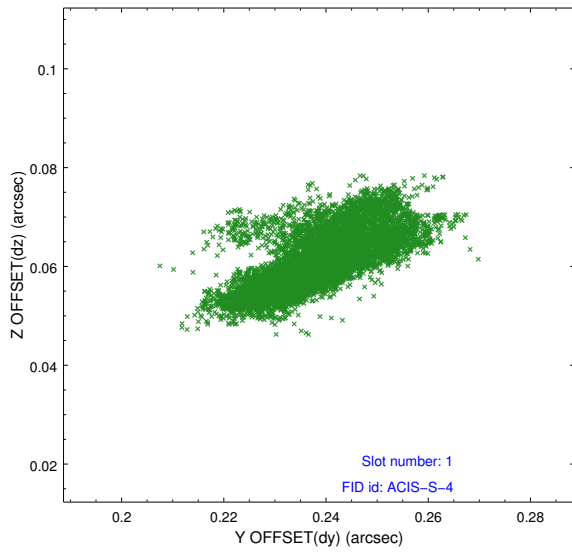


## 2.5 FID Slots

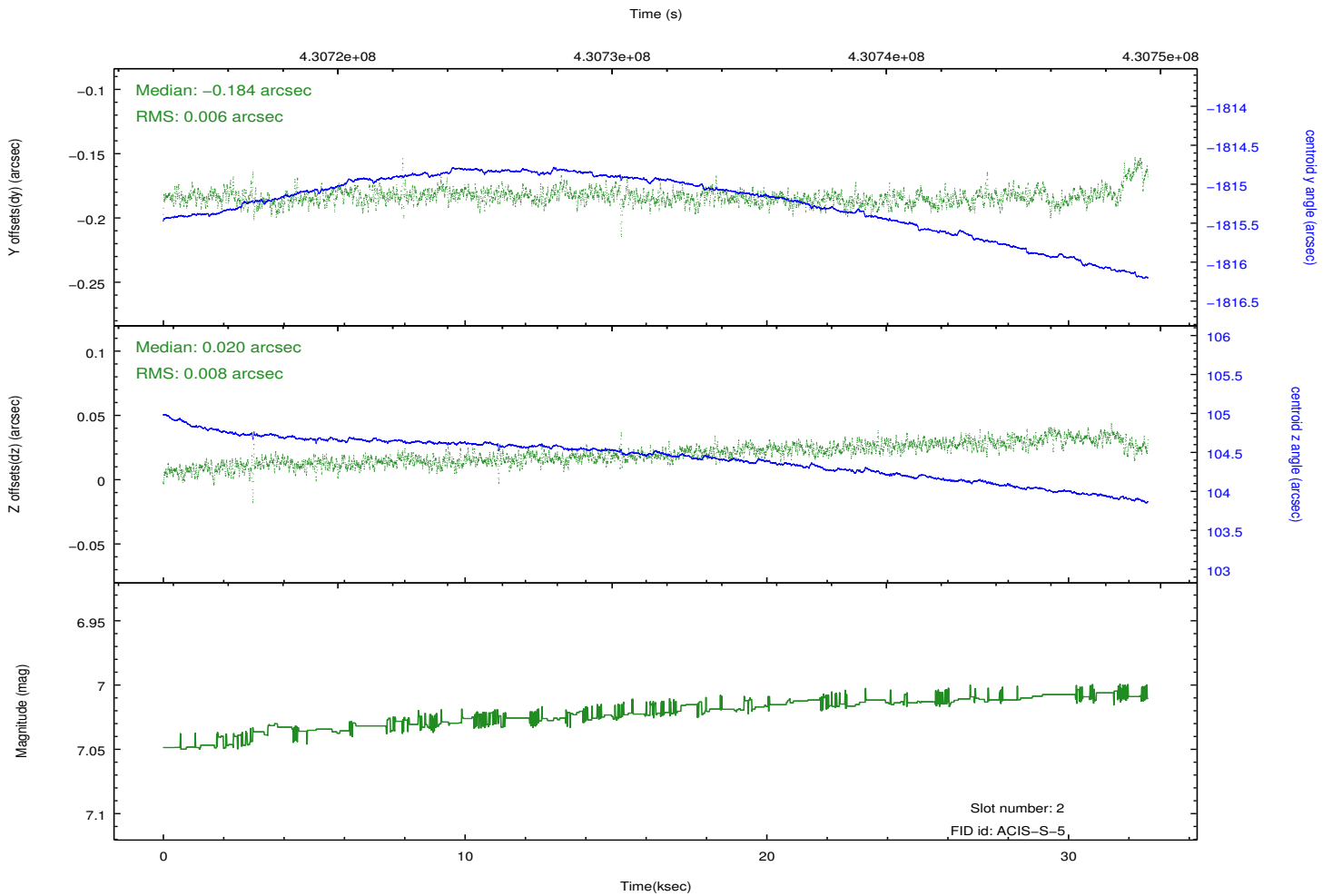
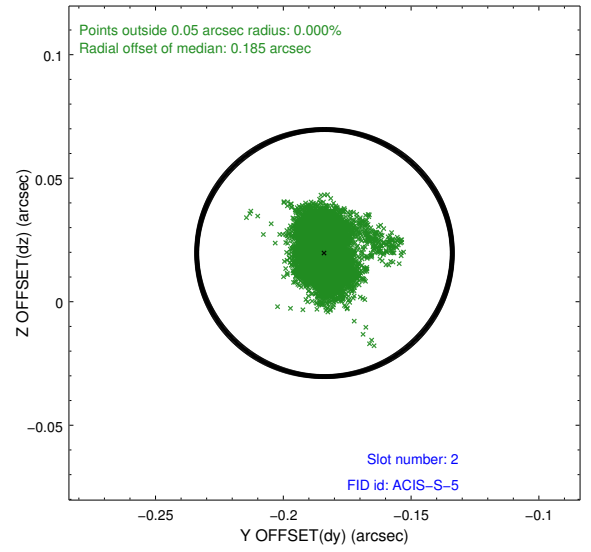
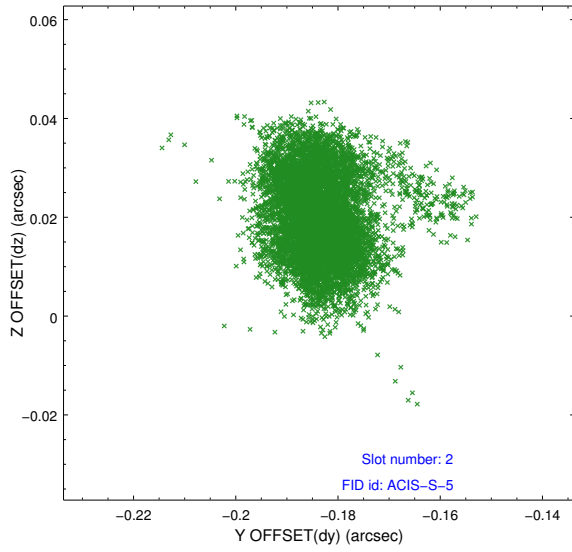
### 2.5.1 Slot 0



## 2.5.2 Slot 1



### 2.5.3 Slot 2

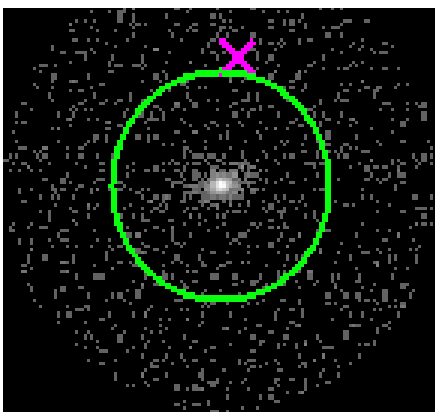


### 3 Gratings

#### 3.1 HEG Arm



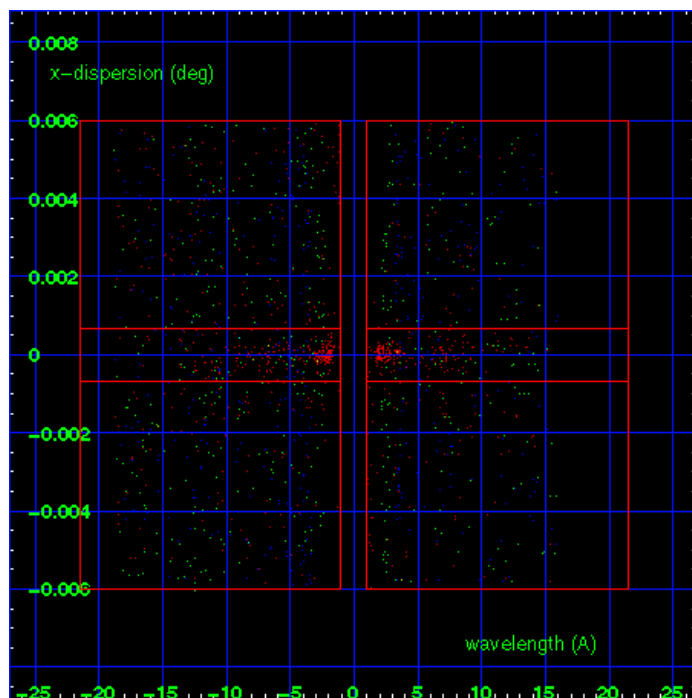
HEG Order Sort 123



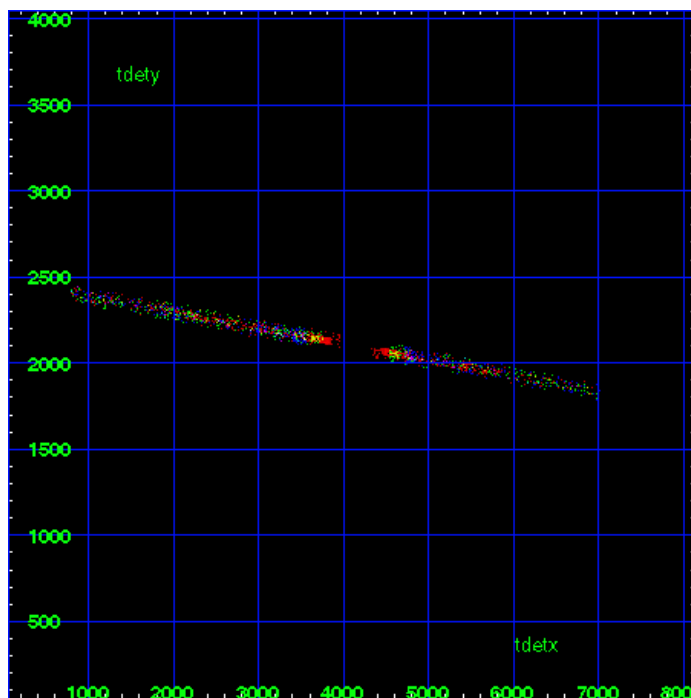
HEG Zero Order



HEG Order Sort ALL

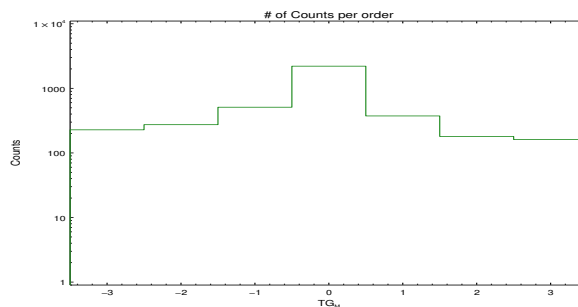


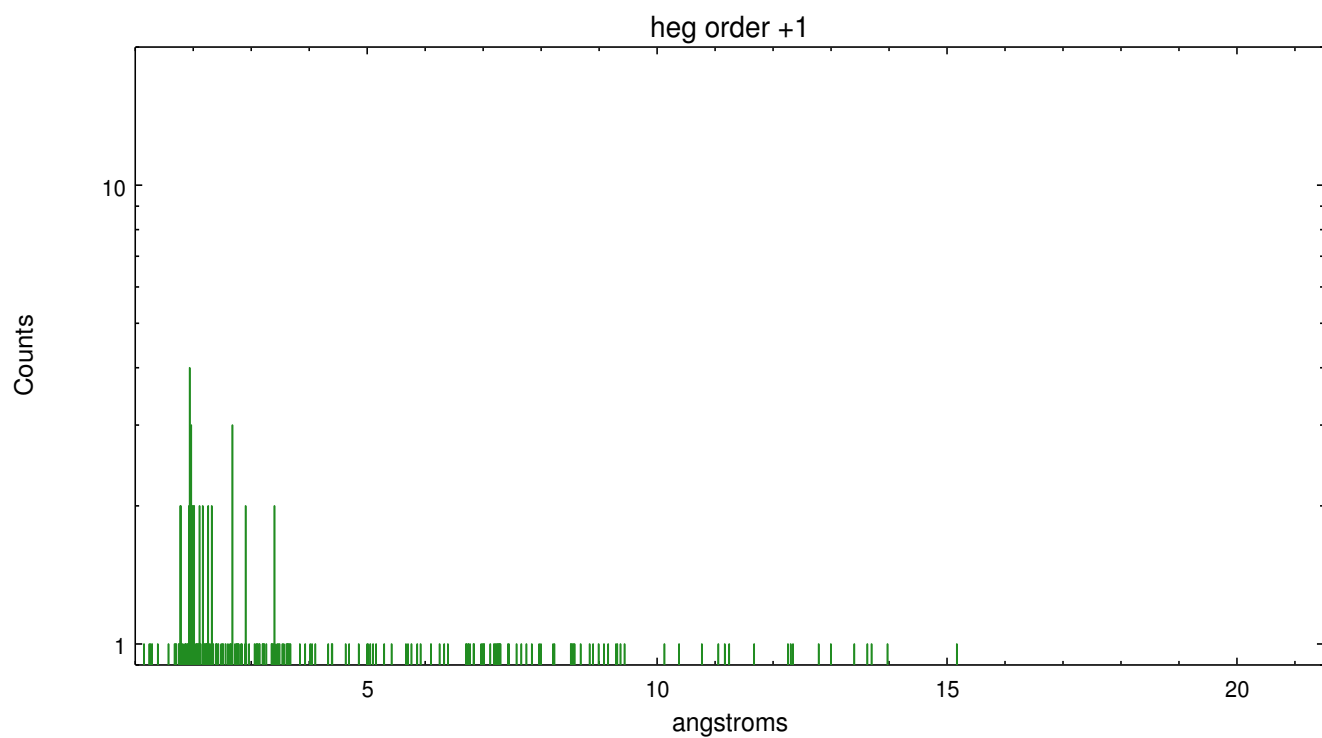
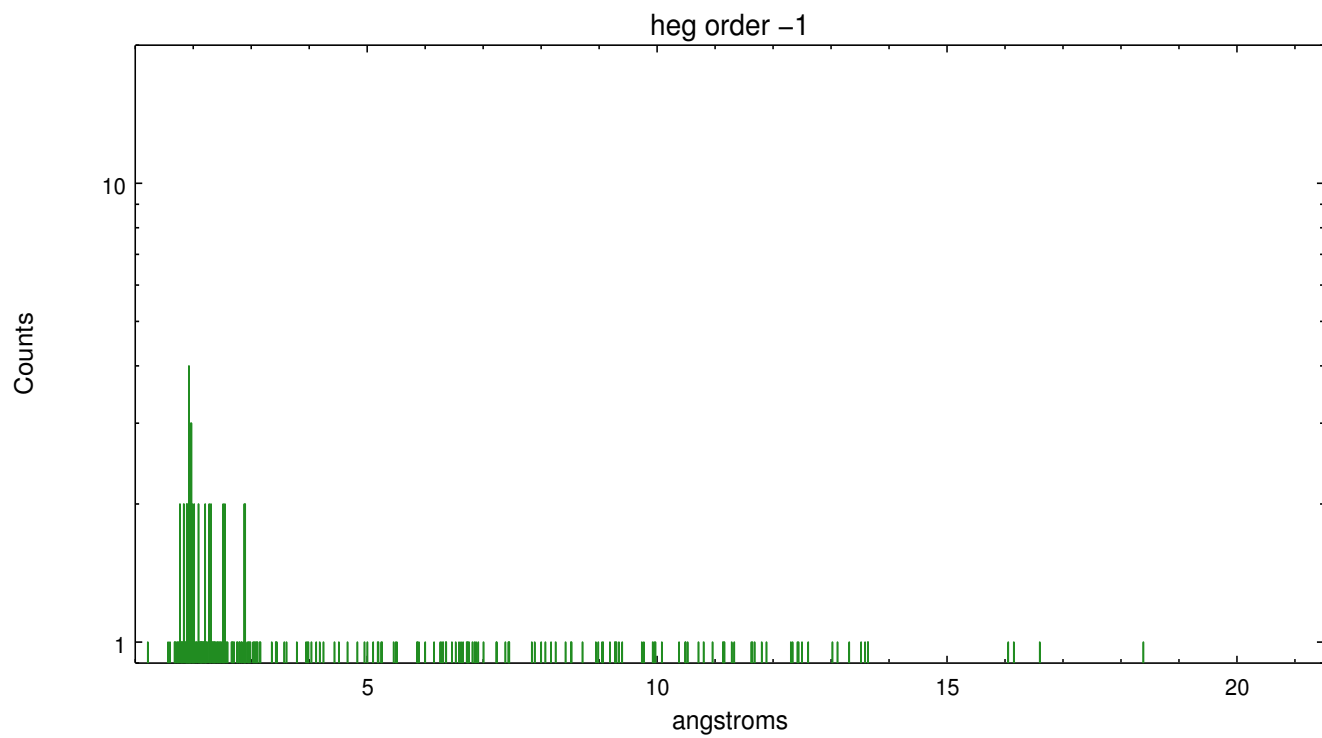
Spot Image HEG



Full Detector HEG

|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order<br>1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 228         | 274         | 510         | 2204       | 374        | 180        | 161        |

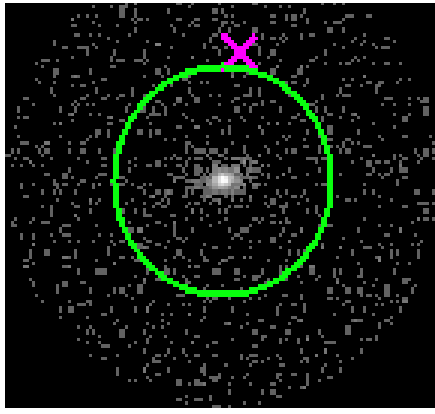




### 3.2 MEG Arm



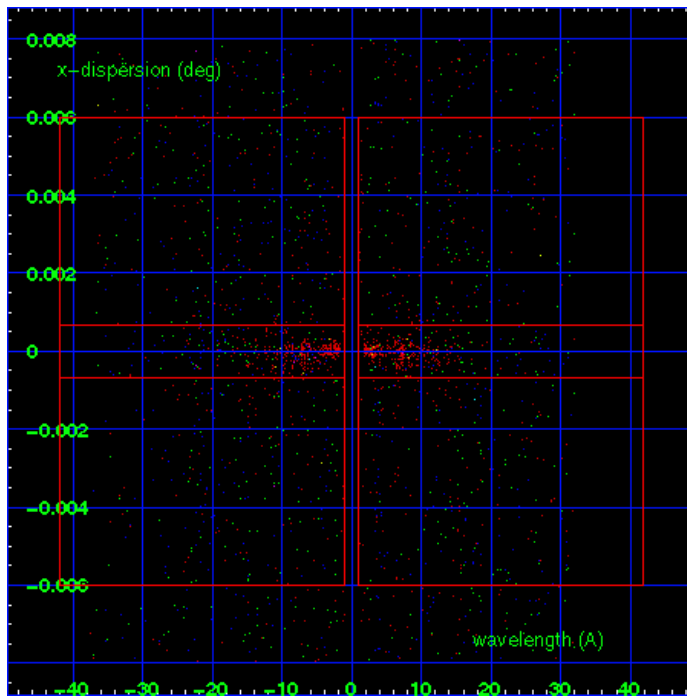
MEG Order Sort 123



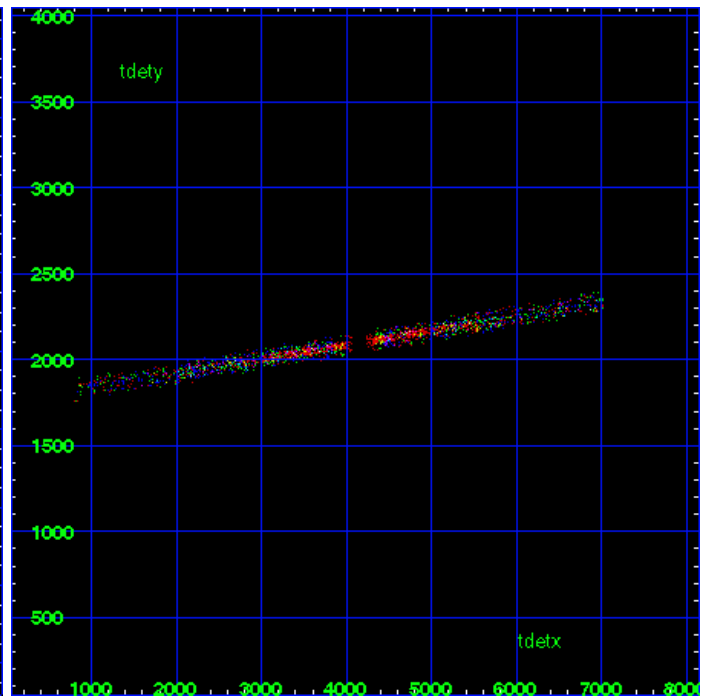
MEG Zero Order



MEG Order Sort ALL

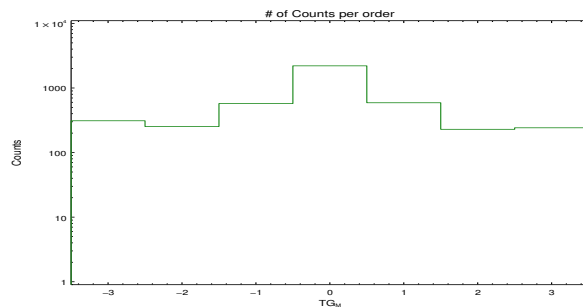


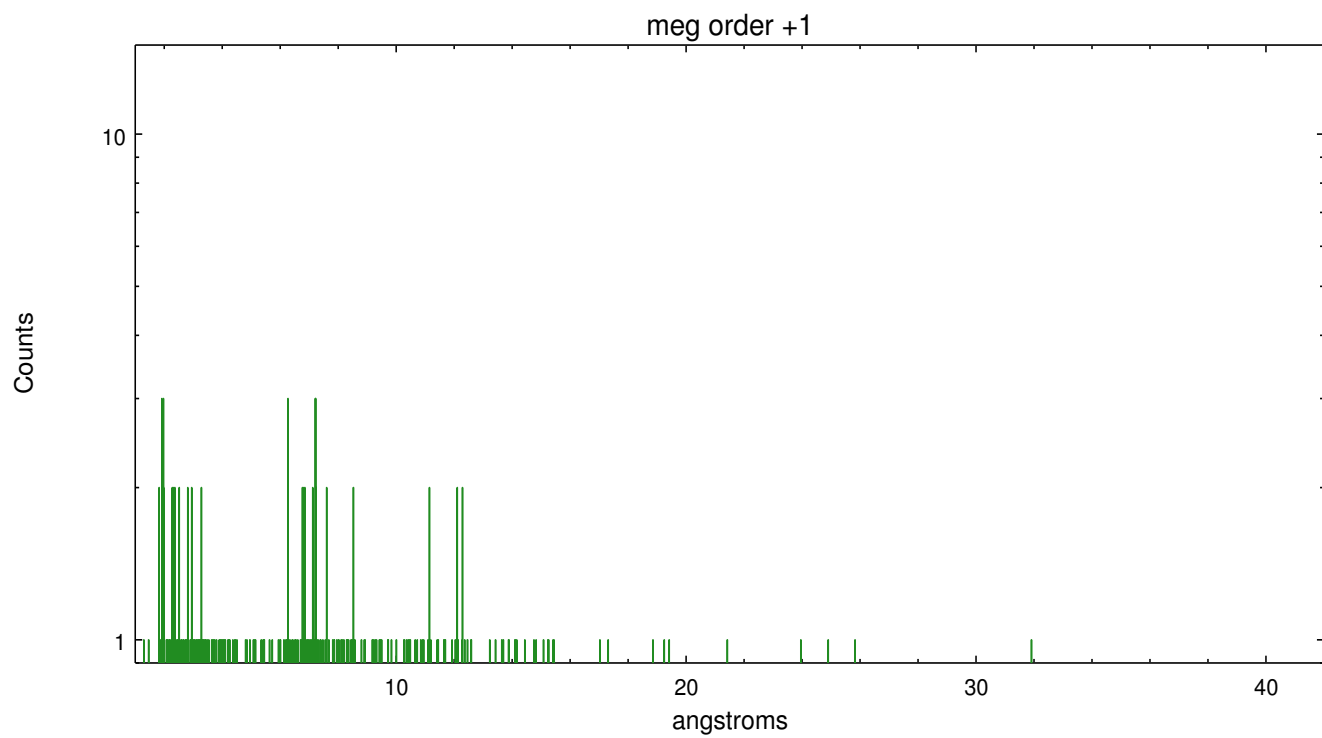
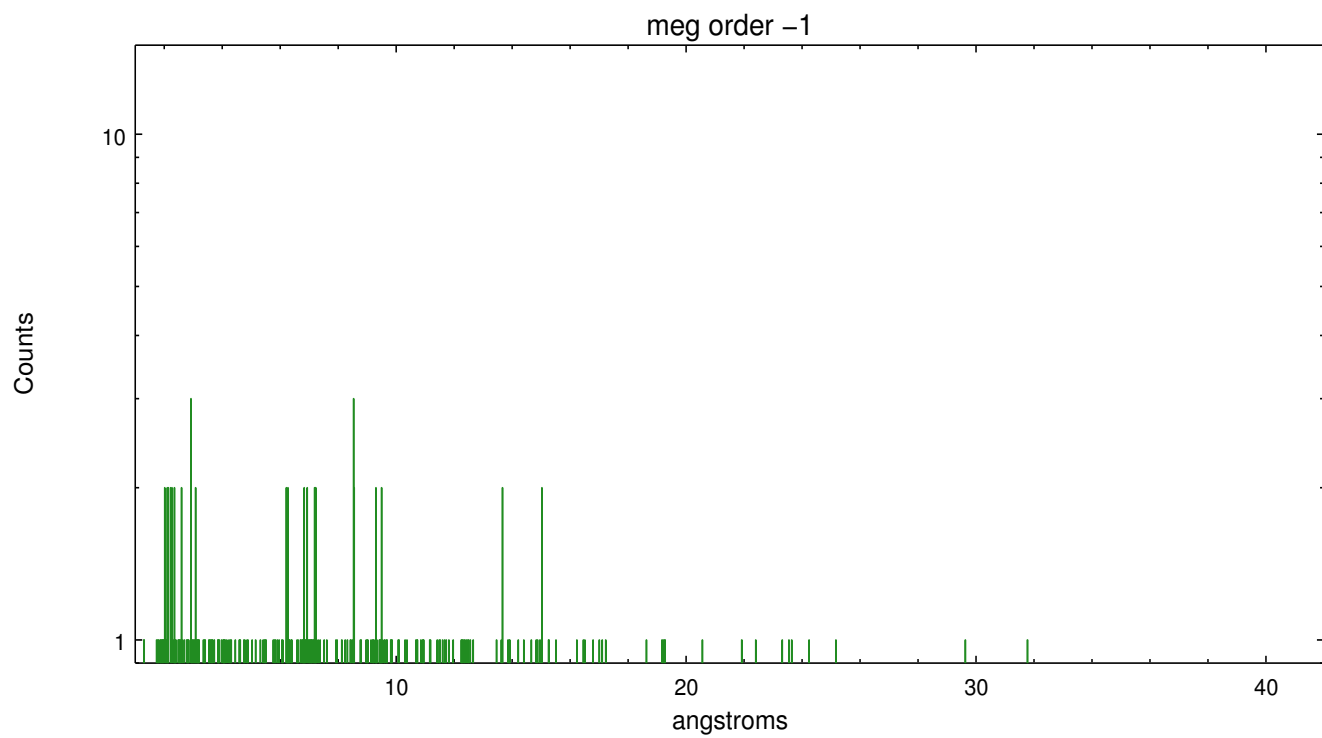
Spot Image MEG



Full Detector MEG

|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order<br>1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 311         | 253         | 574         | 2204       | 591        | 229        | 242        |





# A Summary

## A.1 Status

|                            |             |
|----------------------------|-------------|
| V&V Scientist              | Joy Nichols |
| V&V Date (YYYY-MM-DD)      | 2012.03.06  |
| V&V Edition                | 1           |
| V&V Disposition and Status | OK          |
| V&V Charge Time            | 32.0475     |

## A.2 Comments

Roll constraint met.

===

The guide star in slot 3 was removed from the aspect solution due to poor data quality. The aspect solution is expected to be improved by removing this guide star from the solution.