

# V&V Reference Report

## L2 ASCDS Version : 10.6.3

Observation 21115 - L2 Version 1  
Chandra X-Ray Center

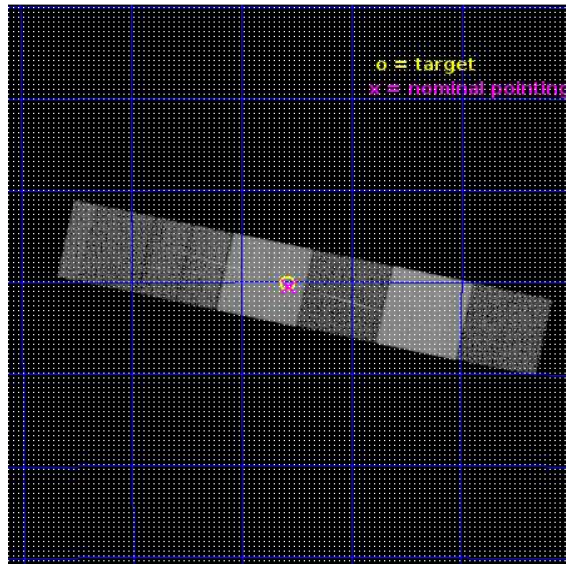
L2 Processing Date : Jul 7 2018

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# 1 Front

|          |                                                     |                                             |
|----------|-----------------------------------------------------|---------------------------------------------|
| seq_num  | 201176                                              | Sequence number                             |
| obs_id   | 21115                                               | Observation id                              |
| title    | Legacy HETG Spectrum of a Massive Star:<br>zeta Pup | Proposal title                              |
| observer | Wayne Waldron                                       | Principal investigator                      |
| object   | zeta Pup                                            | Source name                                 |
| dtcycle  | 0                                                   | &#160                                       |
| cycle    | P                                                   | events from which exps?<br>Prim/Second/Both |
| ra_targ  | 120.895833                                          | Observer's specified target RA [deg]        |
| dec_targ | -40.003139                                          | Observer's specified target Dec [deg]       |
| ra_nom   | 120.89108285883                                     | Nominal RA [deg]                            |
| dec_nom  | -40.008847512142                                    | Nominal Dec [deg]                           |
| roll_nom | 192.15354487092                                     | Nominal Roll [deg]                          |
| revision | 1                                                   | Processing version of data                  |
| ontime   | 18326.400273085                                     | Sum of GTIs [s]                             |
| livetime | 18094.340357993                                     | Livetime [s]                                |
| ontime4  | 18326.400273085                                     | Sum of GTIs [s]                             |
| ontime5  | 18326.400273085                                     | Sum of GTIs [s]                             |
| ontime6  | 18326.400273085                                     | Sum of GTIs [s]                             |
| ontime7  | 18326.400273085                                     | Sum of GTIs [s]                             |
| ontime8  | 18326.400273085                                     | Sum of GTIs [s]                             |
| ontime9  | 18326.400273085                                     | Sum of GTIs [s]                             |
| l2events | 237134                                              | Number of level 2 events                    |

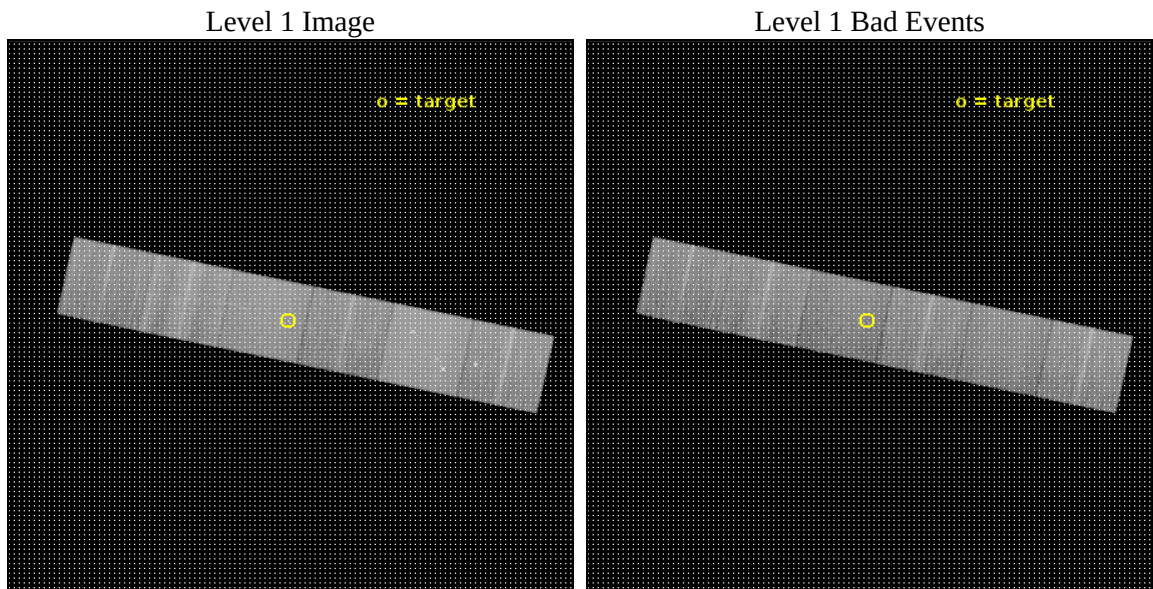




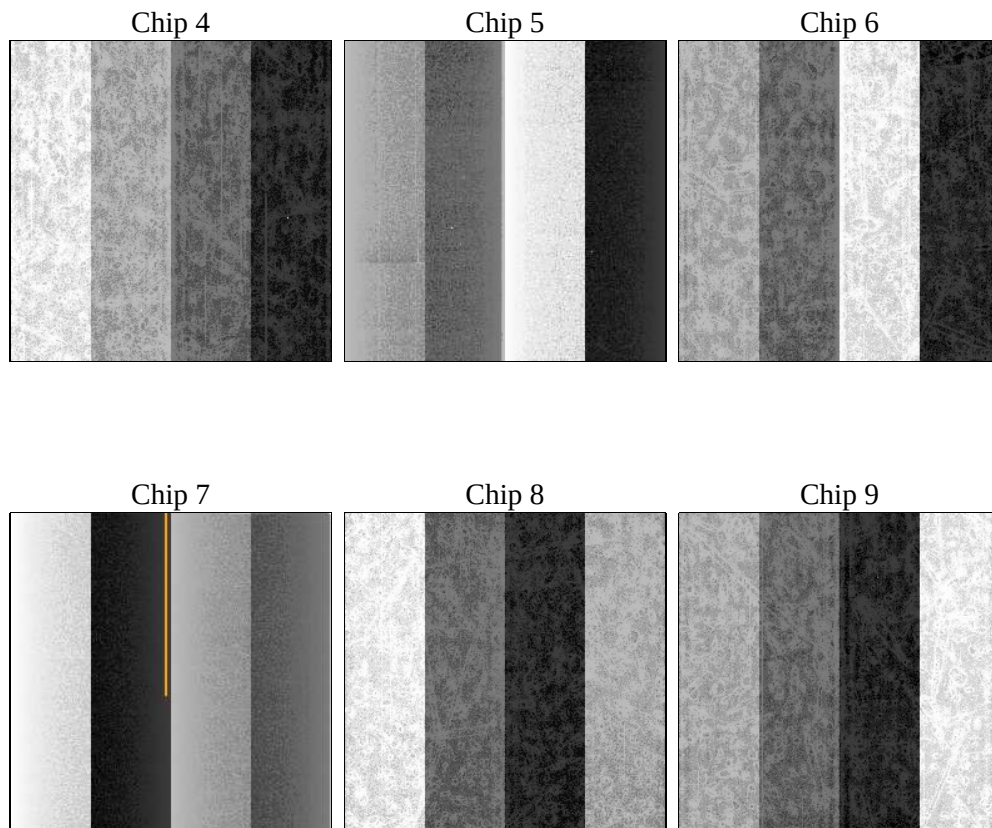
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |                    |                                         |
|----------|---------------------|--------------------------------|----------------|--------------------|-----------------------------------------|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 18377.000000       | [s] Scheduled observation exposure time |
| ascdsver | 10.6.3              | Processing system revision     | ontime         | 18326.400273085    | Sum of GTIs [s]                         |
| caldsver | 4.7.8               | &#160                          | ontime4        | 18326.400273085    | Sum of GTIs [s]                         |
| date     | 2018-07-07T16:04:58 | Date and time of file creation | ontime5        | 18326.400273085    | Sum of GTIs [s]                         |
| revision | 1                   | Processing version of data     | ontime6        | 18326.400273085    | Sum of GTIs [s]                         |
|          |                     |                                | ontime7        | 18326.400273085    | Sum of GTIs [s]                         |
|          |                     |                                | ontime8        | 18326.400273085    | Sum of GTIs [s]                         |
|          |                     |                                | ontime9        | 18326.400273085    | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 1014083            | Number of level 1 events                |
|          |                     |                                | tgmethod       | TGDETECT           | Method used to create src1a file        |
|          |                     |                                | src1a_pos      | (4070.26, 4120.12) | src1a sky pixel position                |

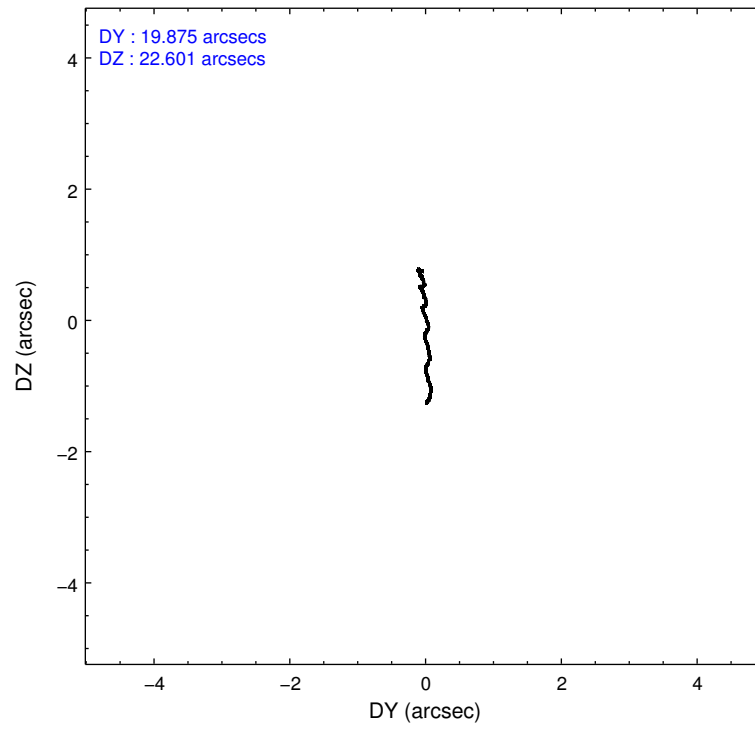
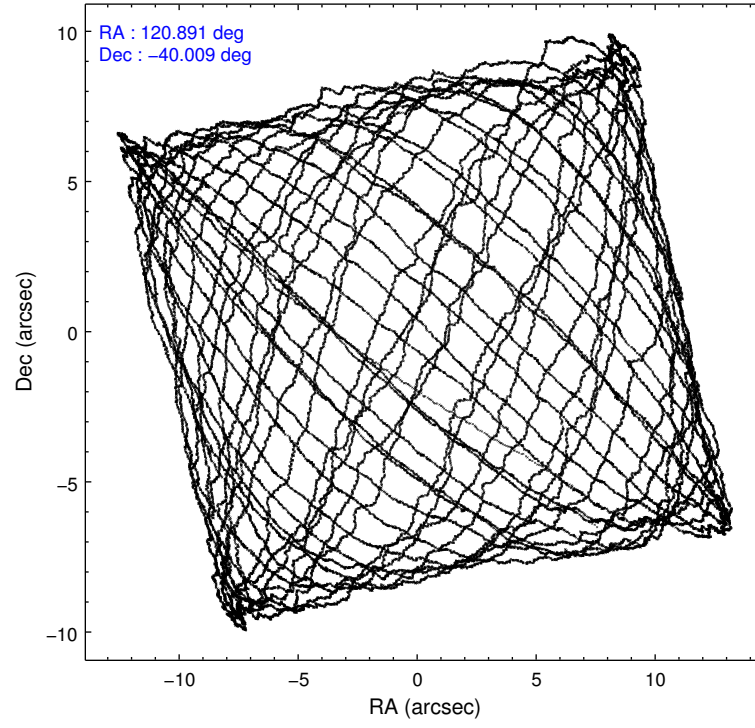
### 2.1.4 Events

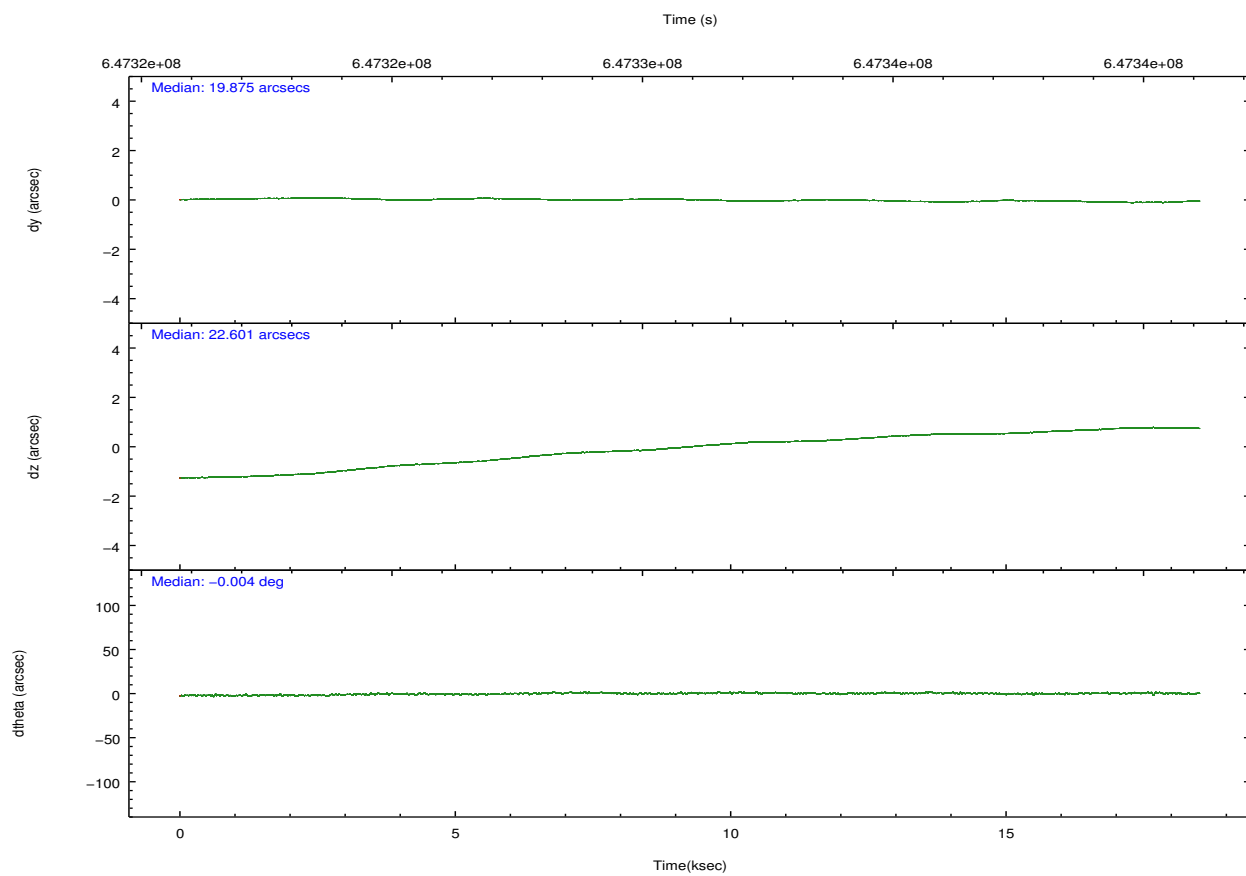
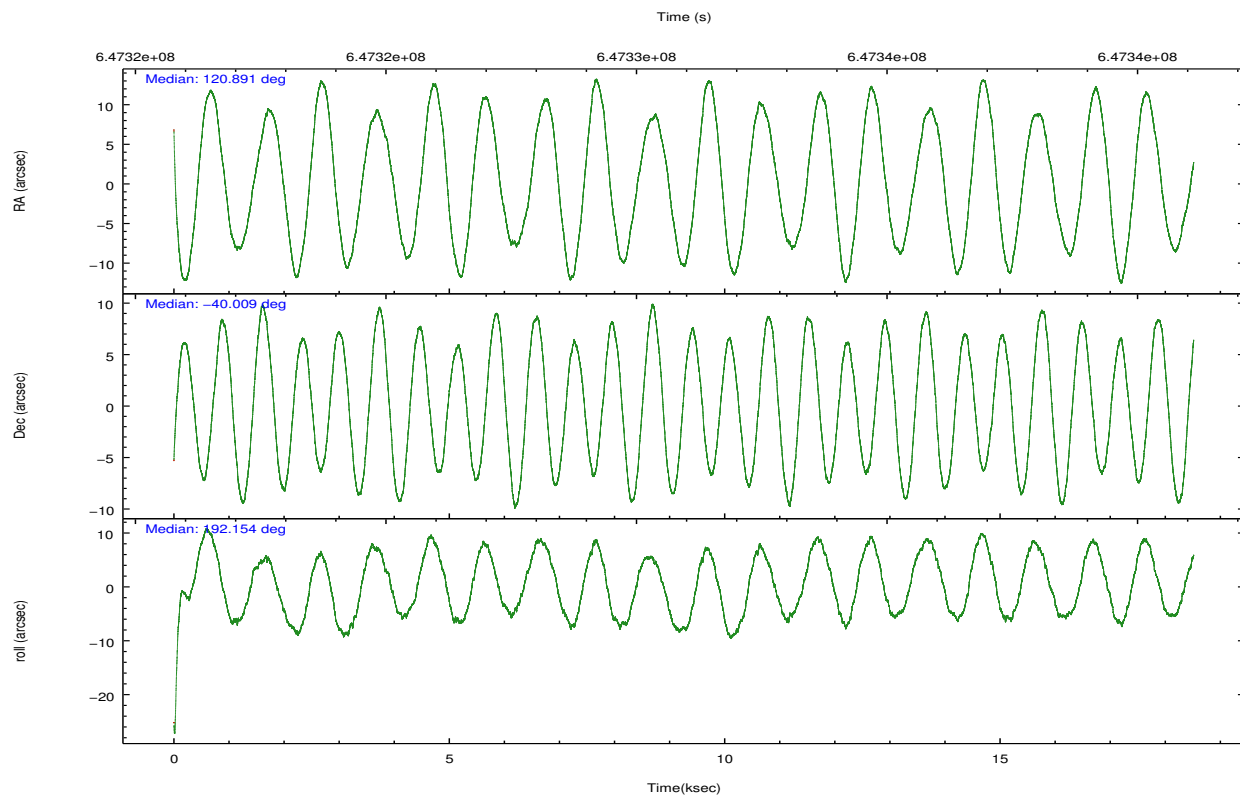
|                 | ccd 4  | ccd 5  | ccd 6  | ccd 7  | ccd 8  | ccd 9  |                | ccd 4  | ccd 5 | ccd 6  | ccd 7 | ccd 8  | ccd 9  |
|-----------------|--------|--------|--------|--------|--------|--------|----------------|--------|-------|--------|-------|--------|--------|
| level 1 events  | 159341 | 219641 | 138110 | 177401 | 183143 | 136447 | grade 0 events | 8418   | 10077 | 6028   | 7100  | 15102  | 6087   |
| rejected events | 140206 | 111591 | 121827 | 98034  | 131930 | 119601 |                | 5%     | 4%    | 4%     | 4%    | 8%     | 4%     |
| rejected %      | 87%    | 50%    | 88%    | 55%    | 72%    | 87%    | grade 1 events | 155    | 682   | 68     | 265   | 153    | 96     |
|                 |        |        |        |        |        |        |                | 0%     | 0%    | 0%     | 0%    | 0%     | 0%     |
|                 |        |        |        |        |        |        | grade 2 events | 4395   | 33894 | 3724   | 17208 | 12257  | 3776   |
|                 |        |        |        |        |        |        |                | 2%     | 15%   | 2%     | 9%    | 6%     | 2%     |
|                 |        |        |        |        |        |        | grade 3 events | 1752   | 3487  | 1514   | 6403  | 5256   | 1669   |
|                 |        |        |        |        |        |        |                | 1%     | 1%    | 1%     | 3%    | 2%     | 1%     |
|                 |        |        |        |        |        |        | grade 4 events | 1625   | 3393  | 1485   | 6242  | 4993   | 1663   |
|                 |        |        |        |        |        |        |                | 1%     | 1%    | 1%     | 3%    | 2%     | 1%     |
|                 |        |        |        |        |        |        | grade 5 events | 6762   | 15994 | 6307   | 17452 | 9889   | 7306   |
|                 |        |        |        |        |        |        |                | 4%     | 7%    | 4%     | 9%    | 5%     | 5%     |
|                 |        |        |        |        |        |        | grade 6 events | 2947   | 57216 | 3534   | 42425 | 13611  | 3656   |
|                 |        |        |        |        |        |        |                | 1%     | 26%   | 2%     | 23%   | 7%     | 2%     |
|                 |        |        |        |        |        |        | grade 7 events | 133287 | 94898 | 115450 | 80306 | 121882 | 112194 |
|                 |        |        |        |        |        |        |                | 83%    | 43%   | 83%    | 45%   | 66%    | 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                | CCD I0 on                             | N         | N       |
| Observation mode                  | POINTING            | POINTING             | CCD I1 on                             | N         | N       |
| [deg] Pointing RA                 | 120.917356          | 120.8910828588339    | CCD I2 on                             | N         | N       |
| [deg] Pointing Dec                | -39.990159          | -40.00884751214176   | CCD I3 on                             | N         | N       |
| [deg] Pointing Roll               | 192.013832          | 192.1535448709241    | CCD S0 on                             | O2        | Y       |
| [mm] SIM focus pos                | -0.684267           | -0.6828225247311905  | CCD S1 on                             | Y         | Y       |
| [mm] SIM defocus                  | 0                   | 0.001444936568705701 | CCD S2 on                             | Y         | Y       |
| [mm] SIM translation stage pos    | -190.132523         | -190.1400660498719   | CCD S3 on                             | Y         | Y       |
| [mm] SIM translation stage offset | 0                   | 0.00754346686406393  | CCD S4 on                             | Y         | Y       |
| [s] Observation start time (MET)  | 647321811.184000    | 647320631.6312       | CCD S5 on                             | O1        | Y       |
| Observation start date            | 2018-07-07T03:35:42 | 2018-07-07T03:17:11  | Number of optional ACIS chips dropped | 0         | 0       |
| [s] Observation end time (MET)    | 647340188.184000    | 647340761.09489      | On-chip summing requested             | N         | N       |
| Observation end date              | 2018-07-07T08:41:59 | 2018-07-07T08:52:41  | Subarray requested                    | NONE      | NONE    |
| Read mode                         | TIMED               | TIMED                | Alternating exposures requested       | N         | N       |
|                                   |                     |                      | [s] Primary exposure time             | 0.000000  | 3.2     |

## 2.3 Aspect



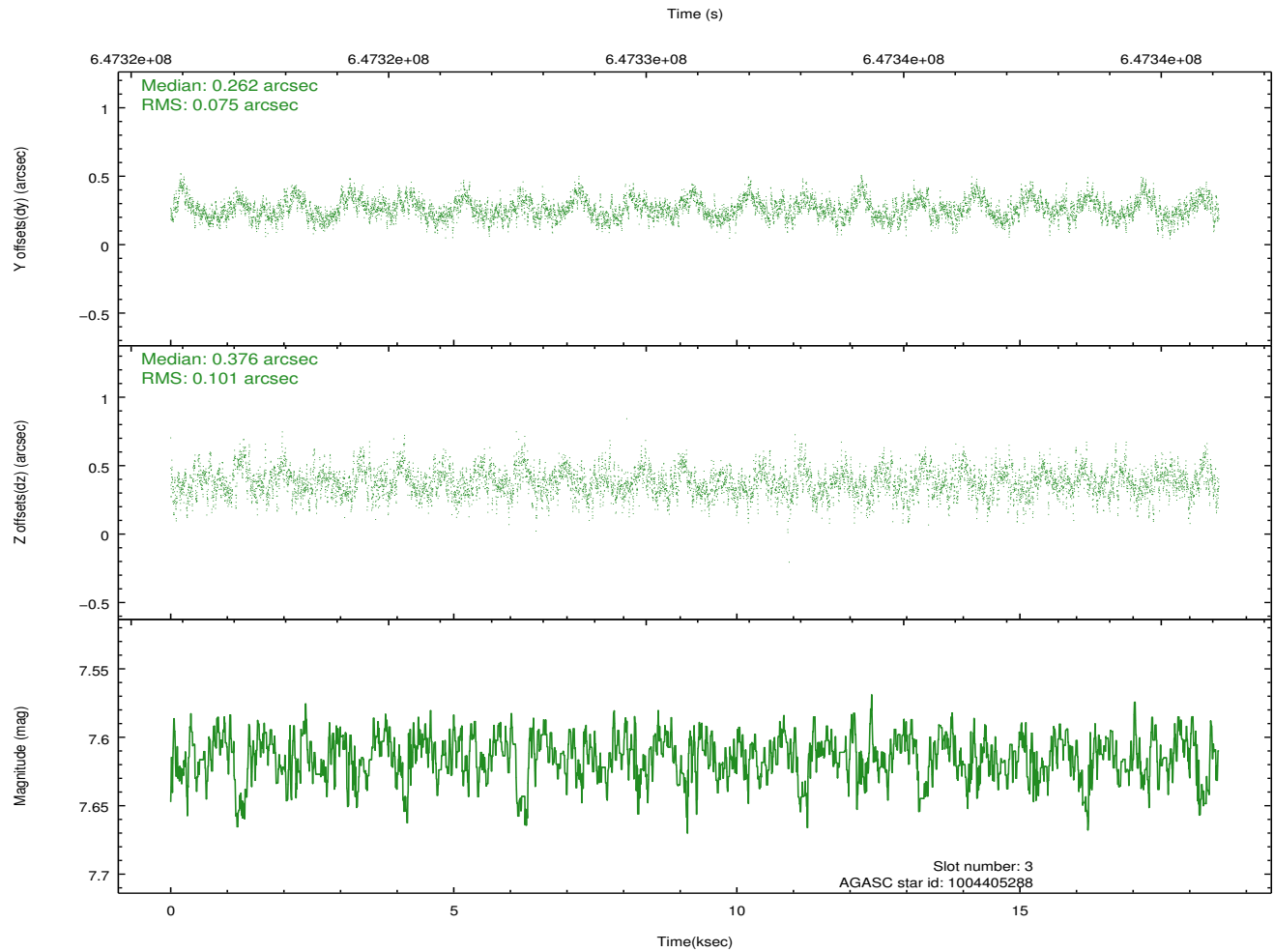
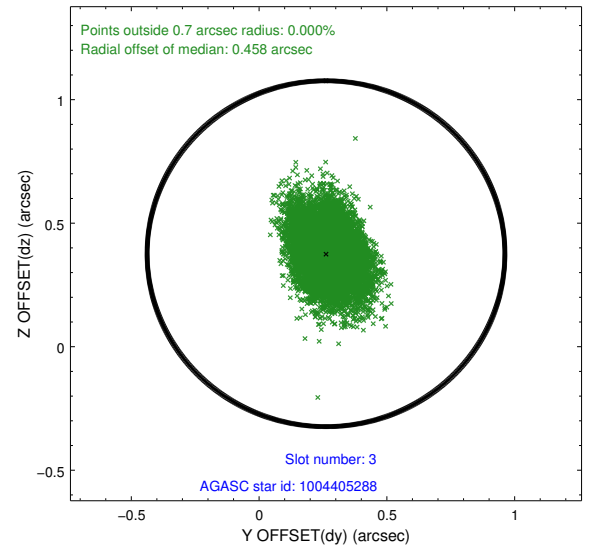
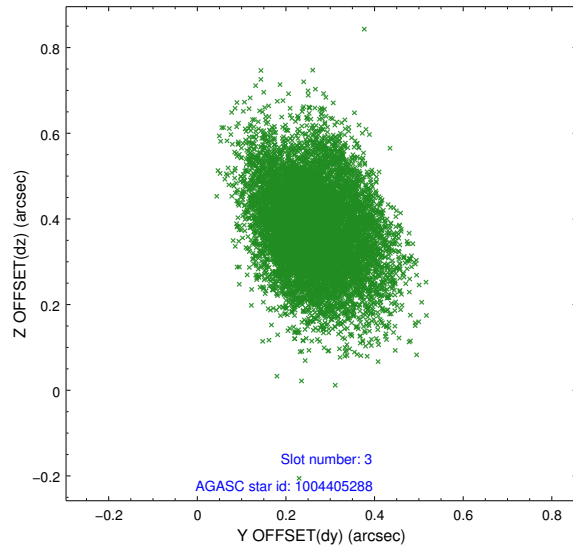


# Slot Statistics

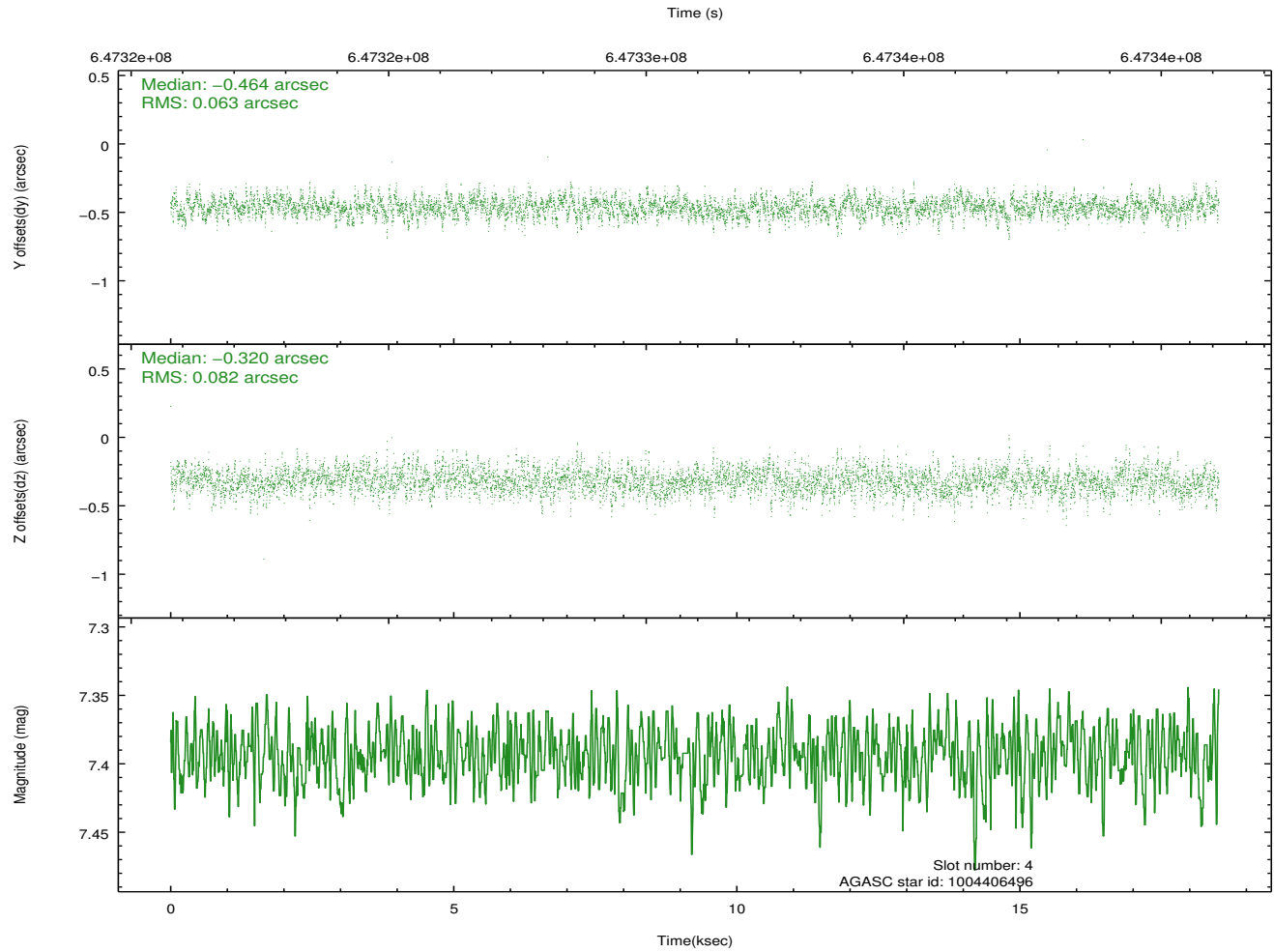
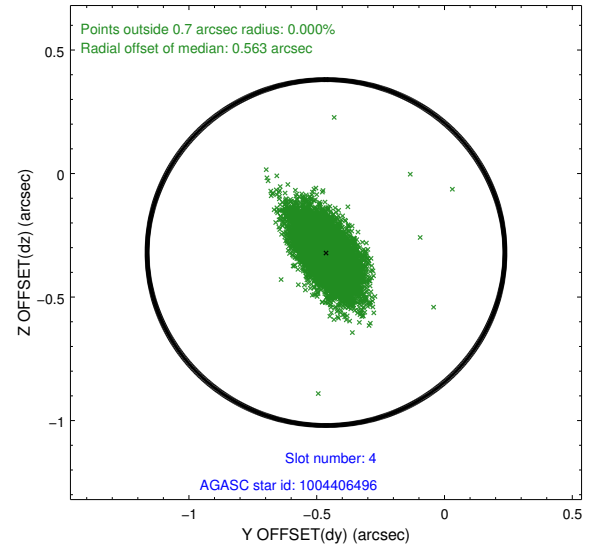
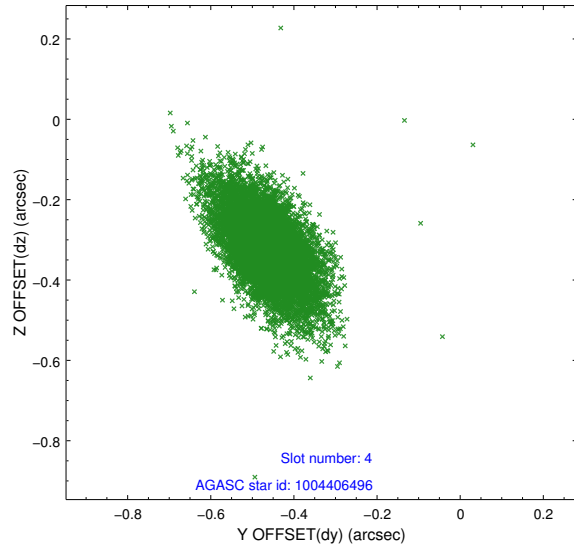
| ot | status | used | id         | mag  | n_pts | frac_pts | med_dy | med_dz | dr1   | dr2   | ra         | dec        | mean_y   | mea   |
|----|--------|------|------------|------|-------|----------|--------|--------|-------|-------|------------|------------|----------|-------|
| 0  | FID    |      | ACIS-S-1   | 7.04 | 4516  | 1.000    | -0.100 | -0.023 | 0.030 | 0.071 | 0.000000   | 0.000000   | 922.93   | -1739 |
| 1  | FID    |      | ACIS-S-4   | 7.07 | 4516  | 1.000    | 0.231  | 0.065  | 0.010 | 0.021 | 0.000000   | 0.000000   | 2140.81  | 164   |
| 2  | FID    |      | ACIS-S-6   | 7.23 | 4517  | 1.000    | -0.153 | -0.026 | 0.025 | 0.048 | 0.000000   | 0.000000   | 389.13   | 801   |
| 3  | GUIDE  | used | 1004405288 | 7.61 | 9027  | 1.000    | 0.262  | 0.376  | 0.132 | 0.220 | 121.091785 | -39.410922 | -908.10  | -1937 |
| 4  | GUIDE  | used | 1004406496 | 7.39 | 9032  | 1.000    | -0.464 | -0.320 | 0.105 | 0.189 | 120.210035 | -40.527356 | 2296.88  | 1496  |
| 5  | GUIDE  | used | 1004435080 | 8.95 | 9019  | 1.000    | 0.358  | 0.438  | 0.127 | 0.217 | 121.357562 | -39.510372 | -1554.03 | -1431 |
| 6  | GUIDE  | used | 1004413080 | 8.78 | 9027  | 1.000    | -0.286 | -0.288 | 0.142 | 0.233 | 120.242432 | -40.499402 | 2189.94  | 1415  |
| 7  | GUIDE  | used | 1004425112 | 8.83 | 9027  | 1.000    | 0.130  | -0.206 | 0.123 | 0.216 | 121.364029 | -39.923076 | -1255.28 | 23    |

## 2.4 Star Slots

### 2.4.1 Slot 3

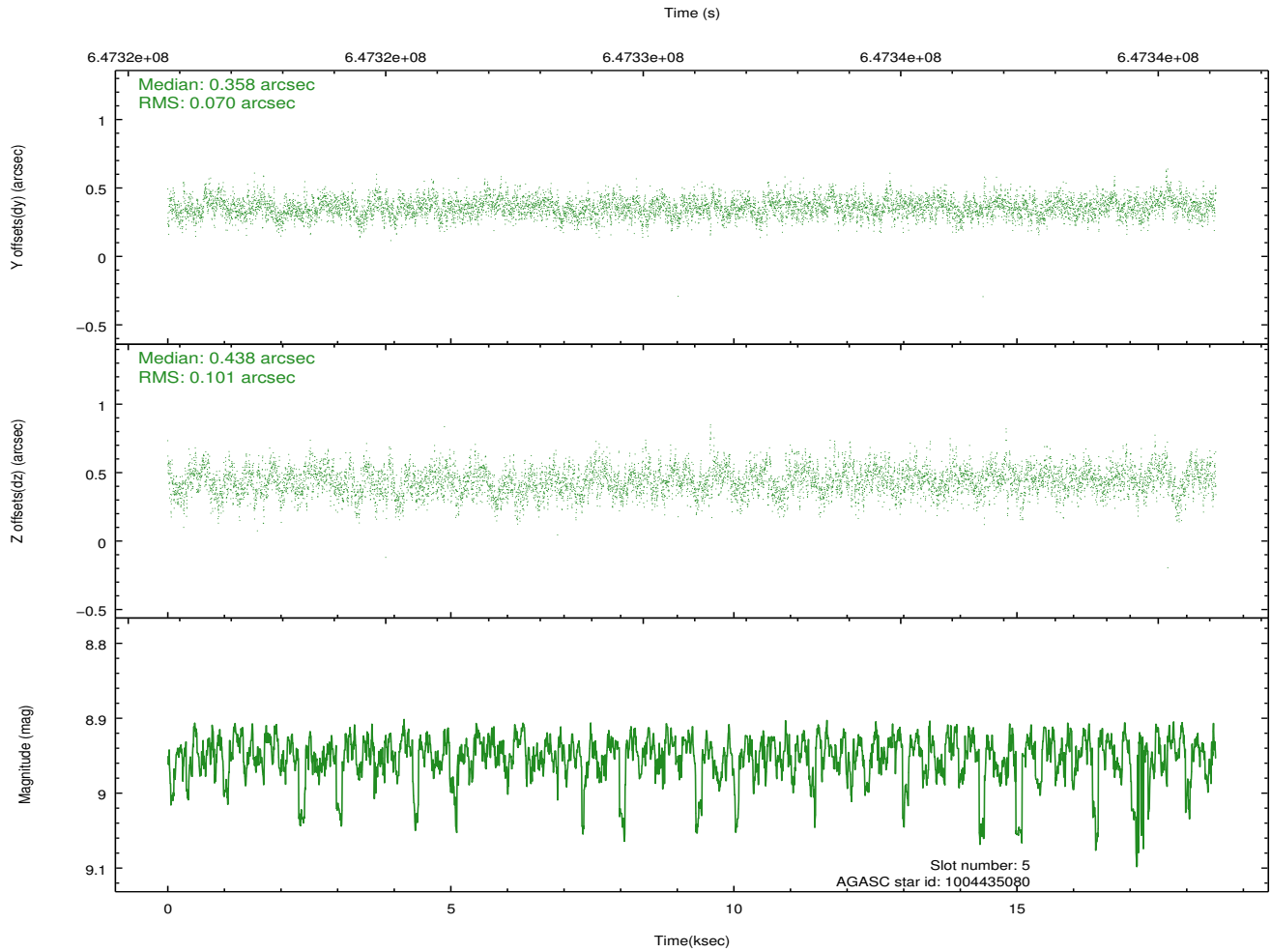
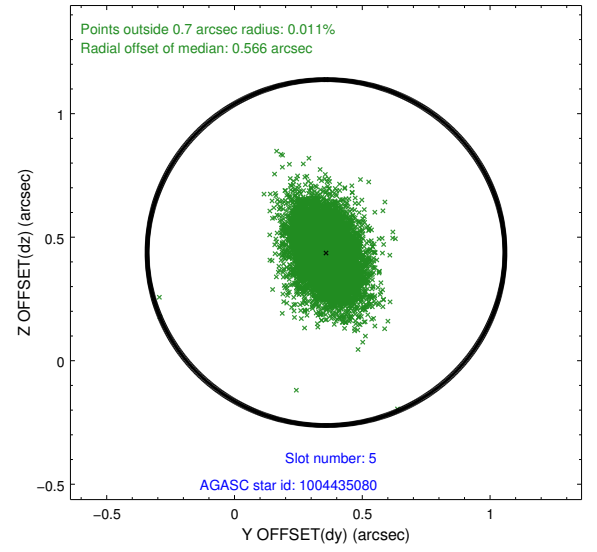
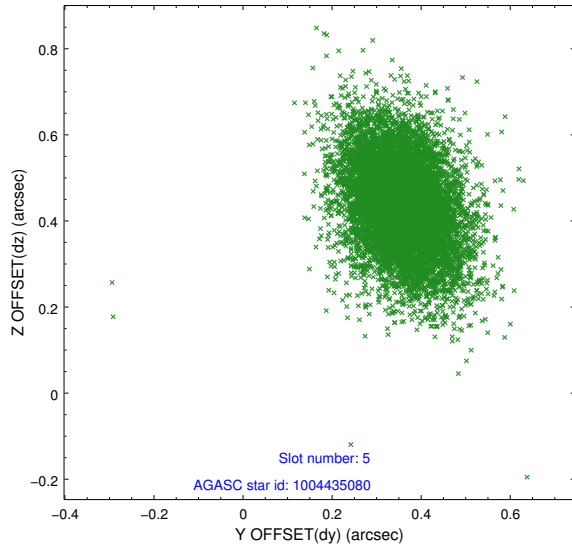


## 2.4.2 Slot 4

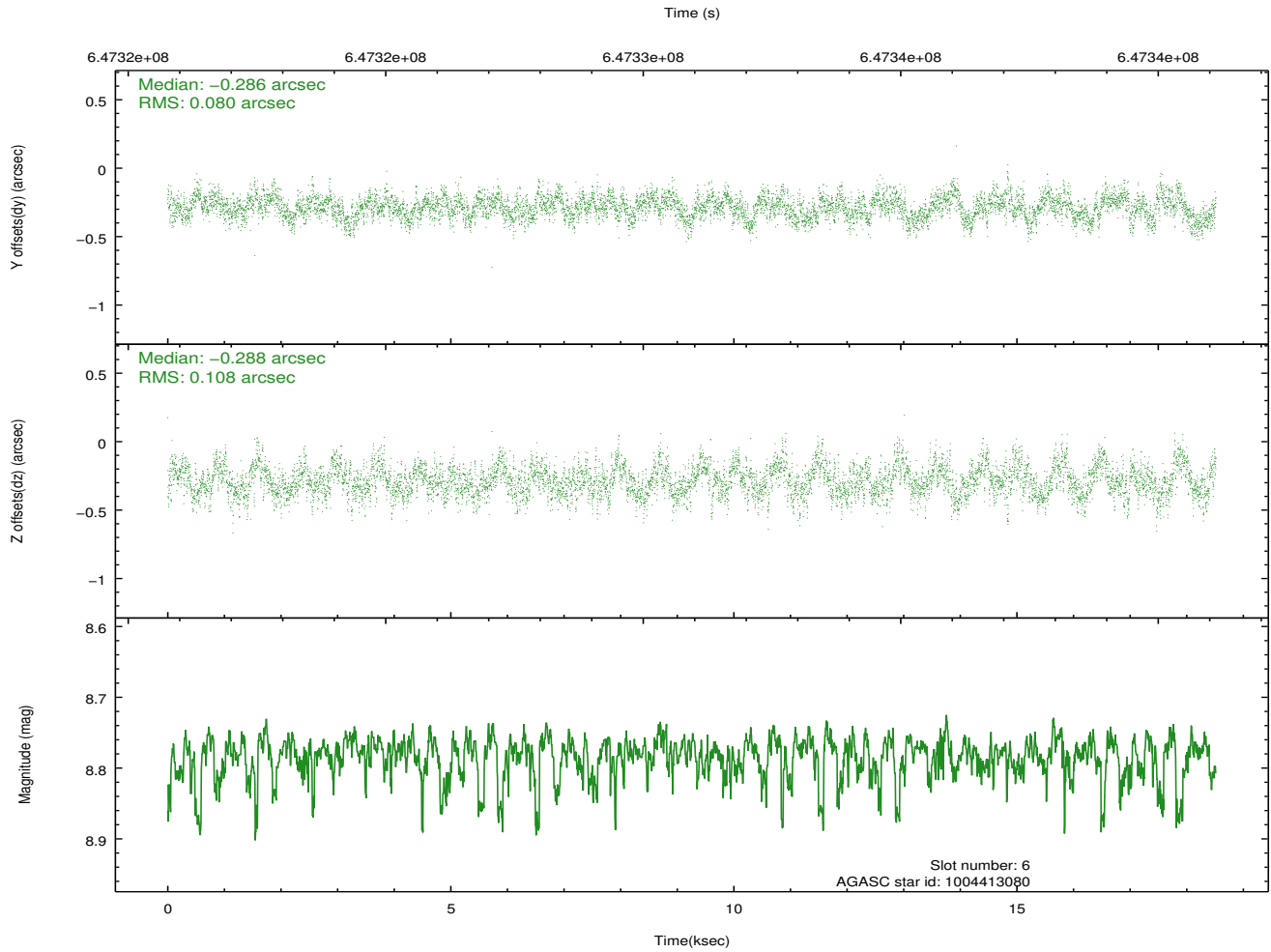
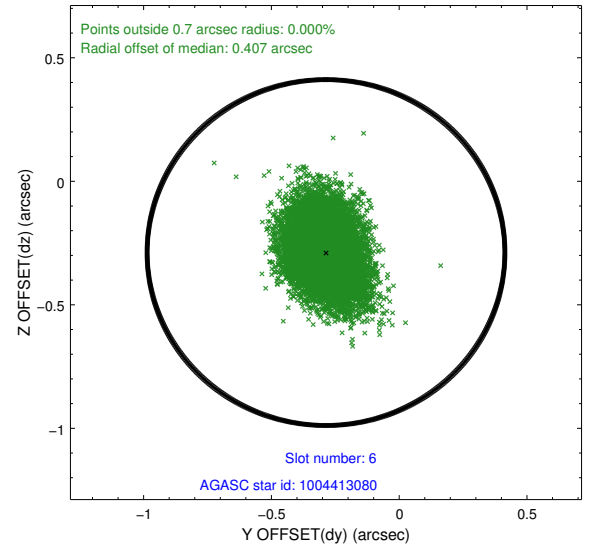
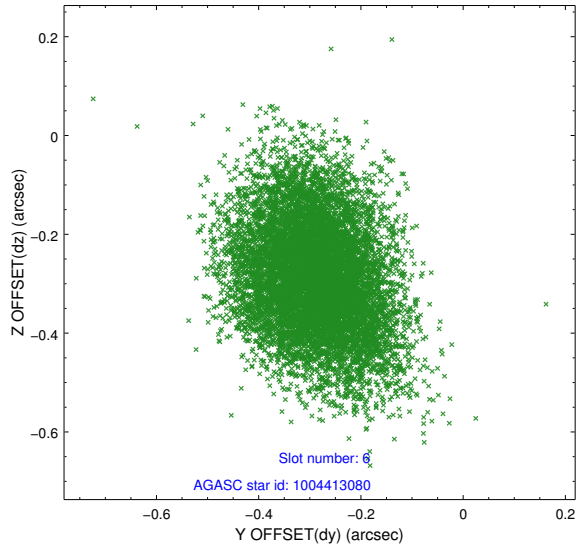




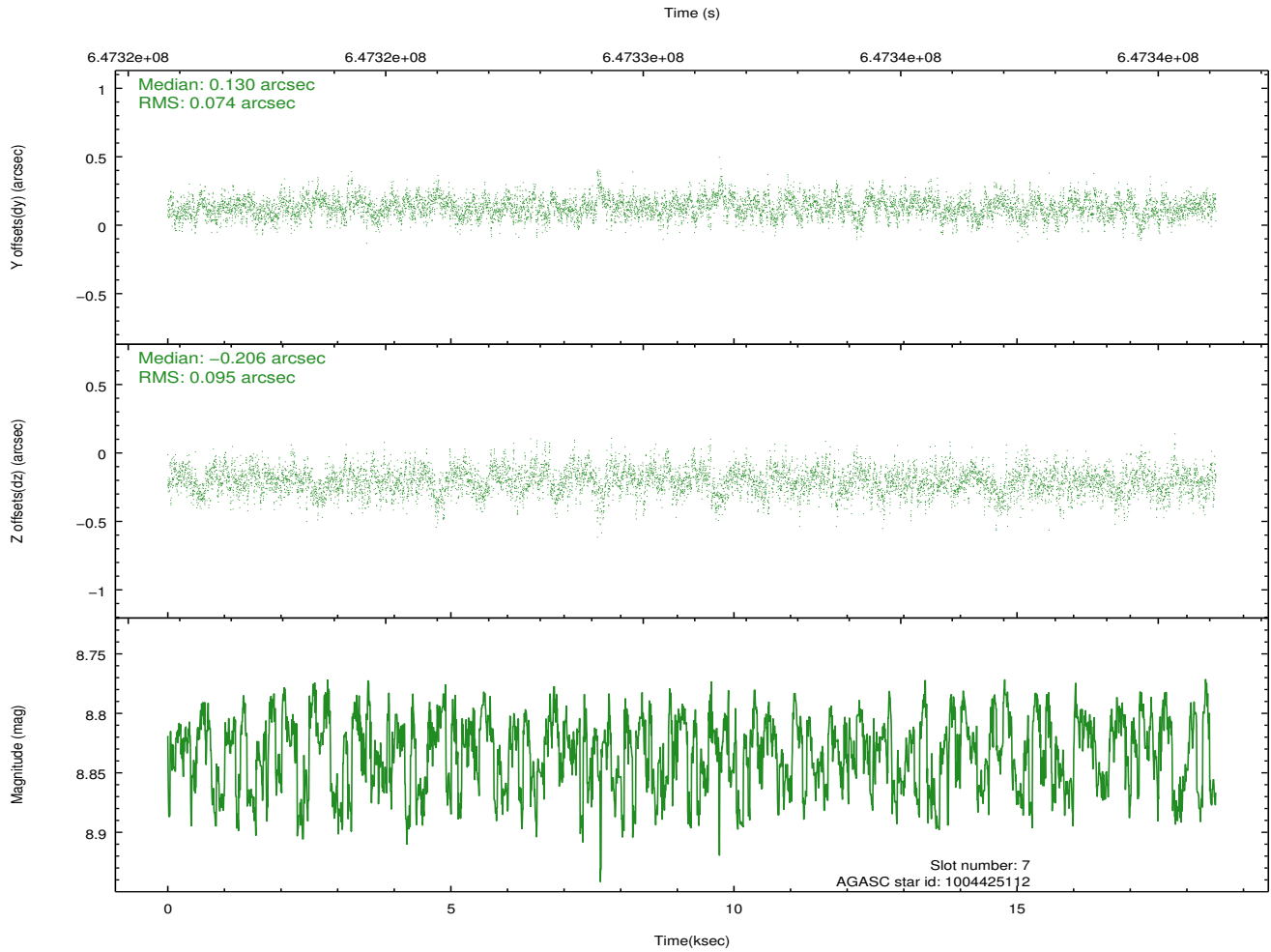
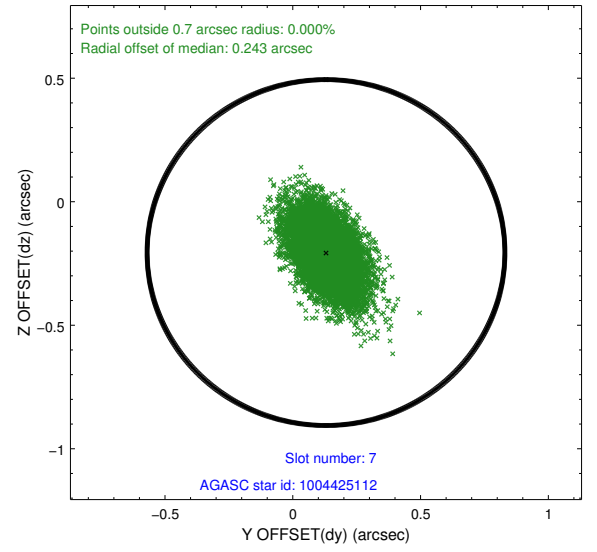
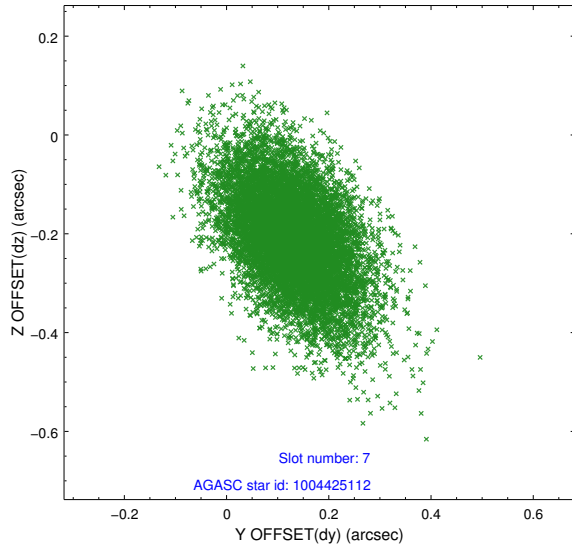
### 2.4.3 Slot 5



## 2.4.4 Slot 6

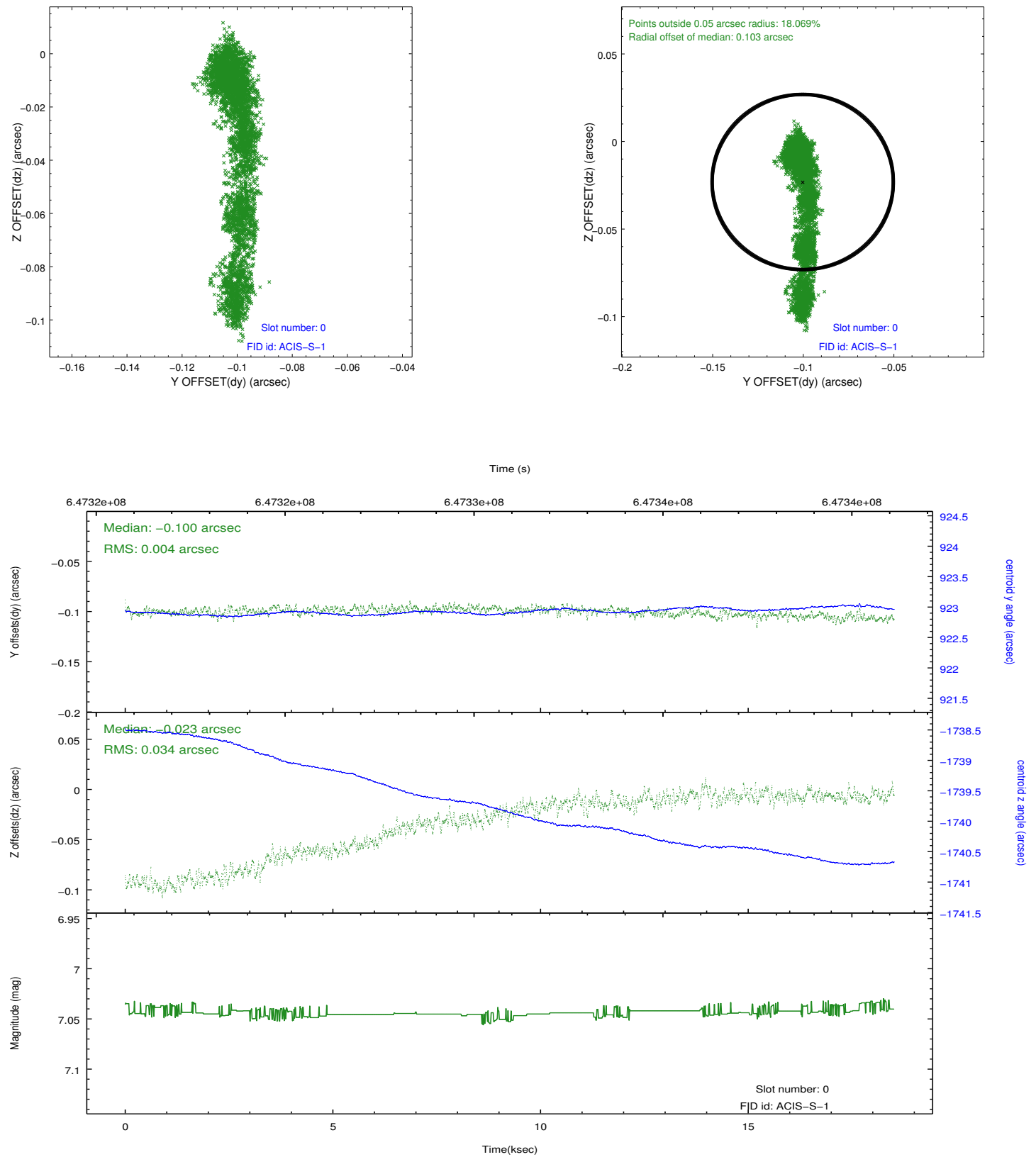


## 2.4.5 Slot 7

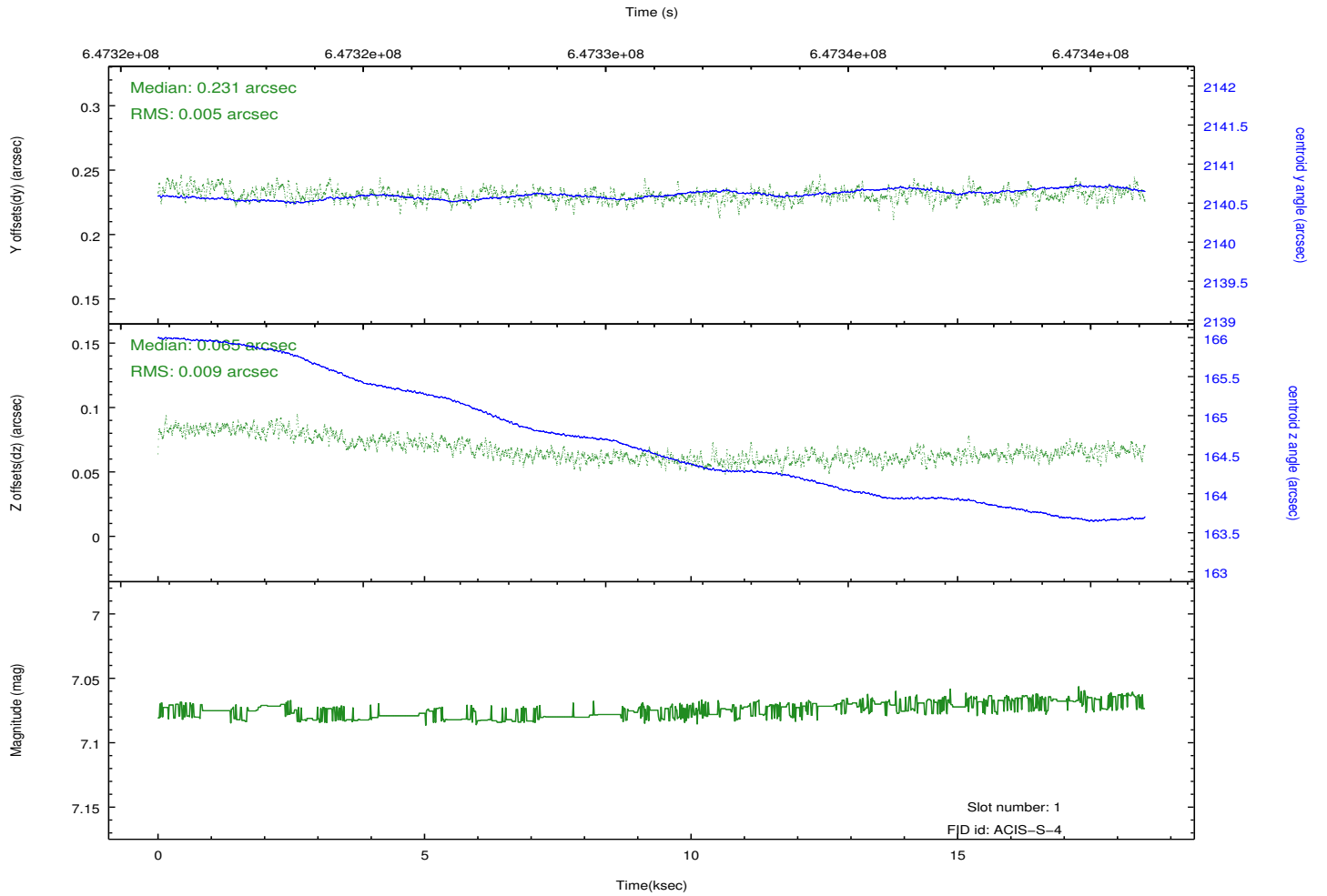
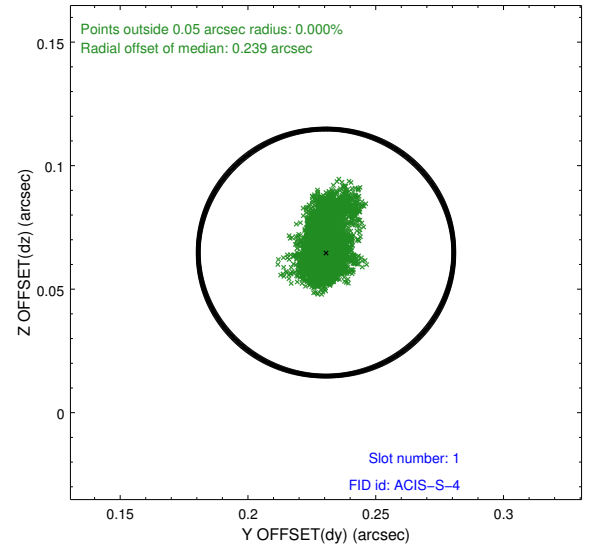
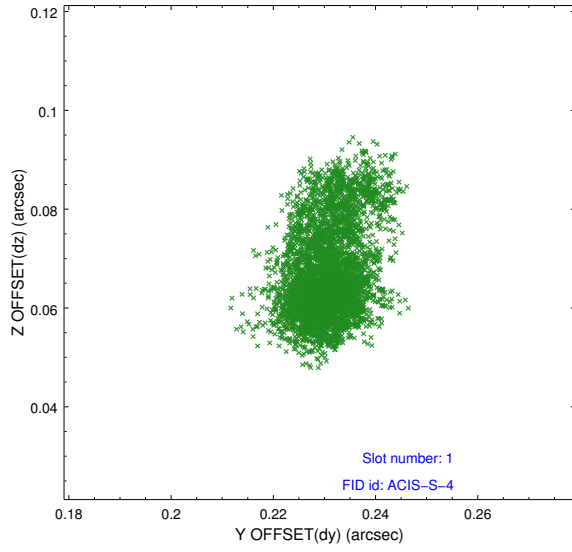


## 2.5 FID Slots

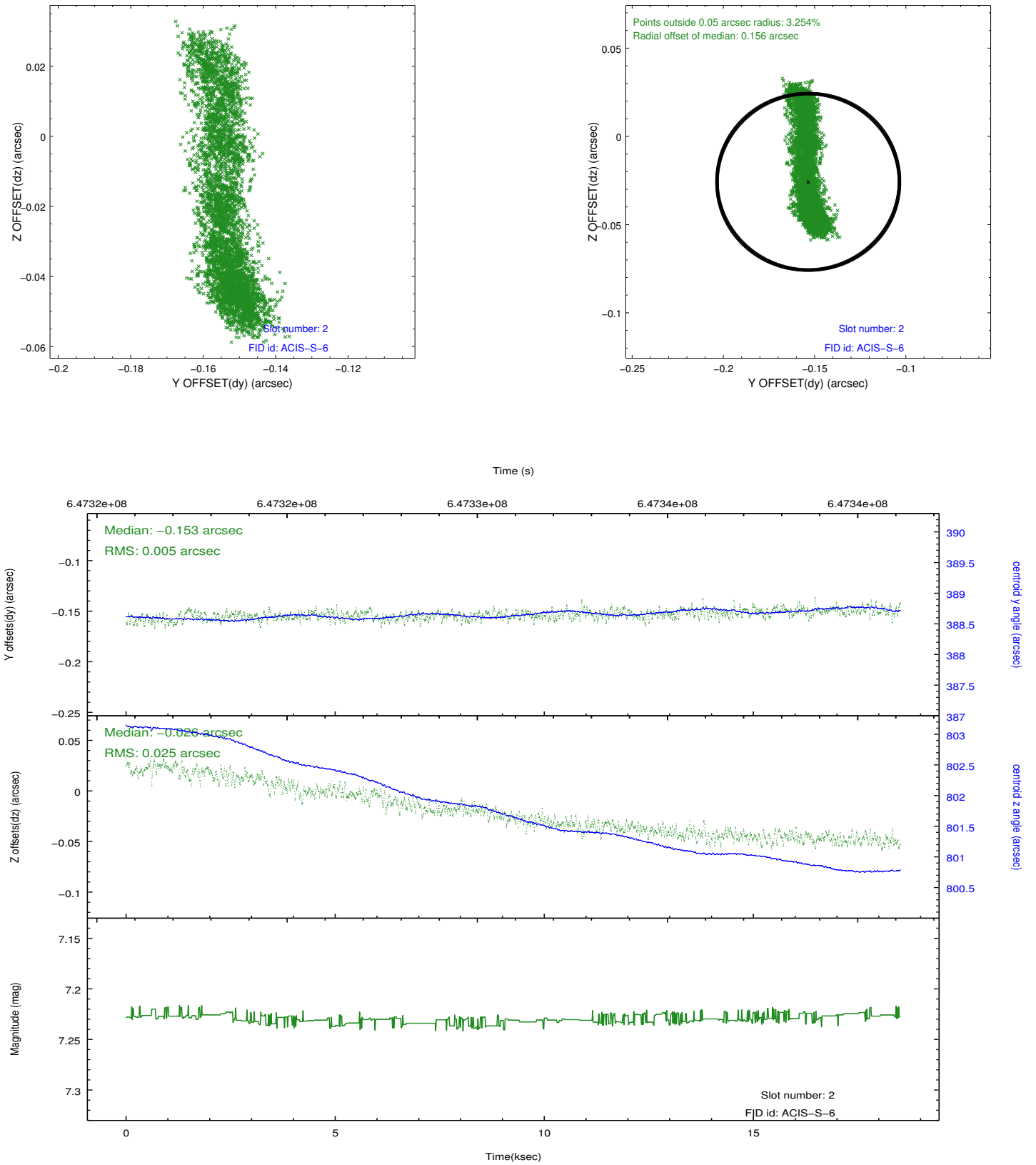
### 2.5.1 Slot 0



## 2.5.2 Slot 1

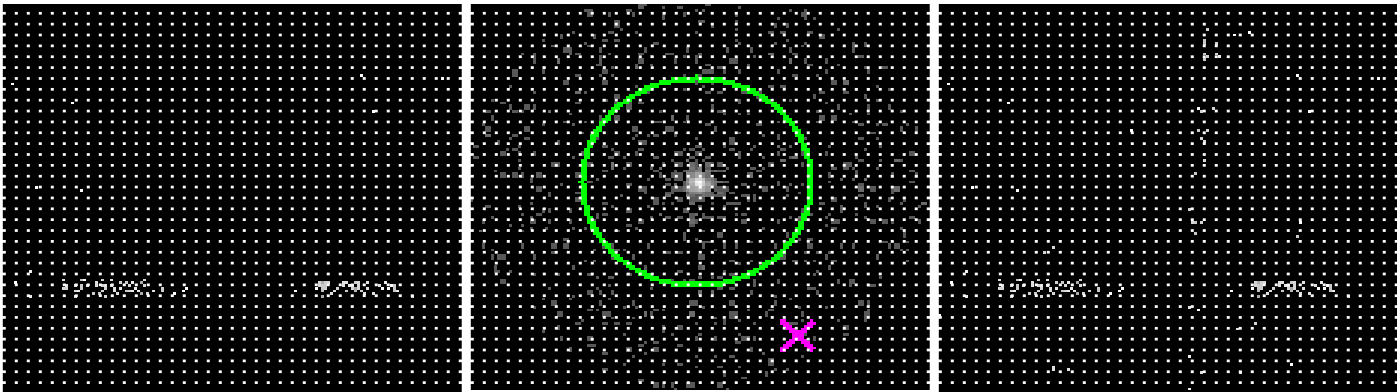


### 2.5.3 Slot 2



# 3 Gratings

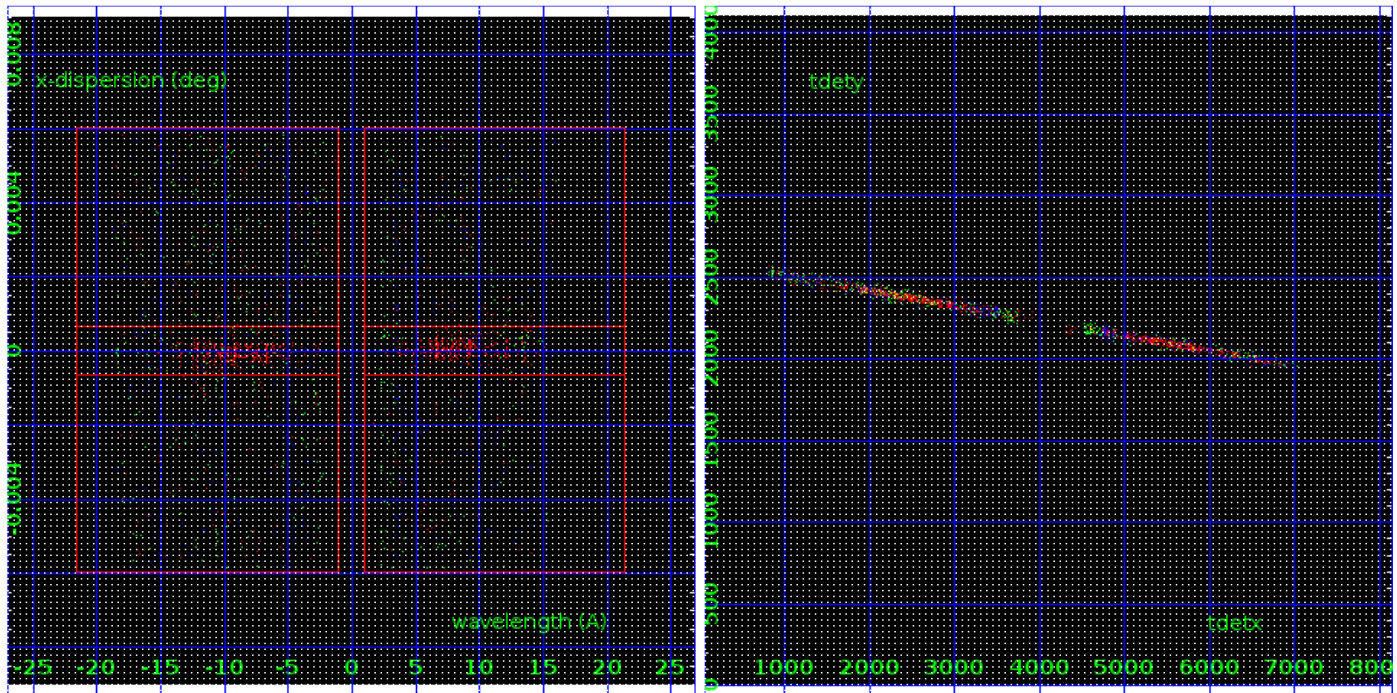
## 3.1 HEG Arm



HEG Order Sort 123

HEG Zero Order

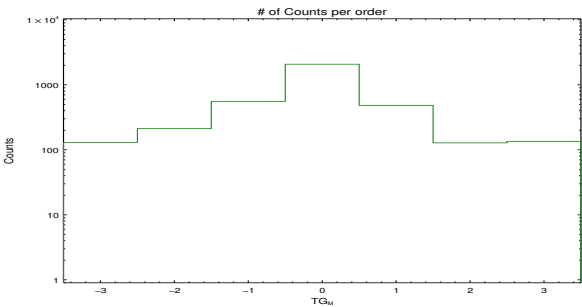
HEG Order Sort ALL

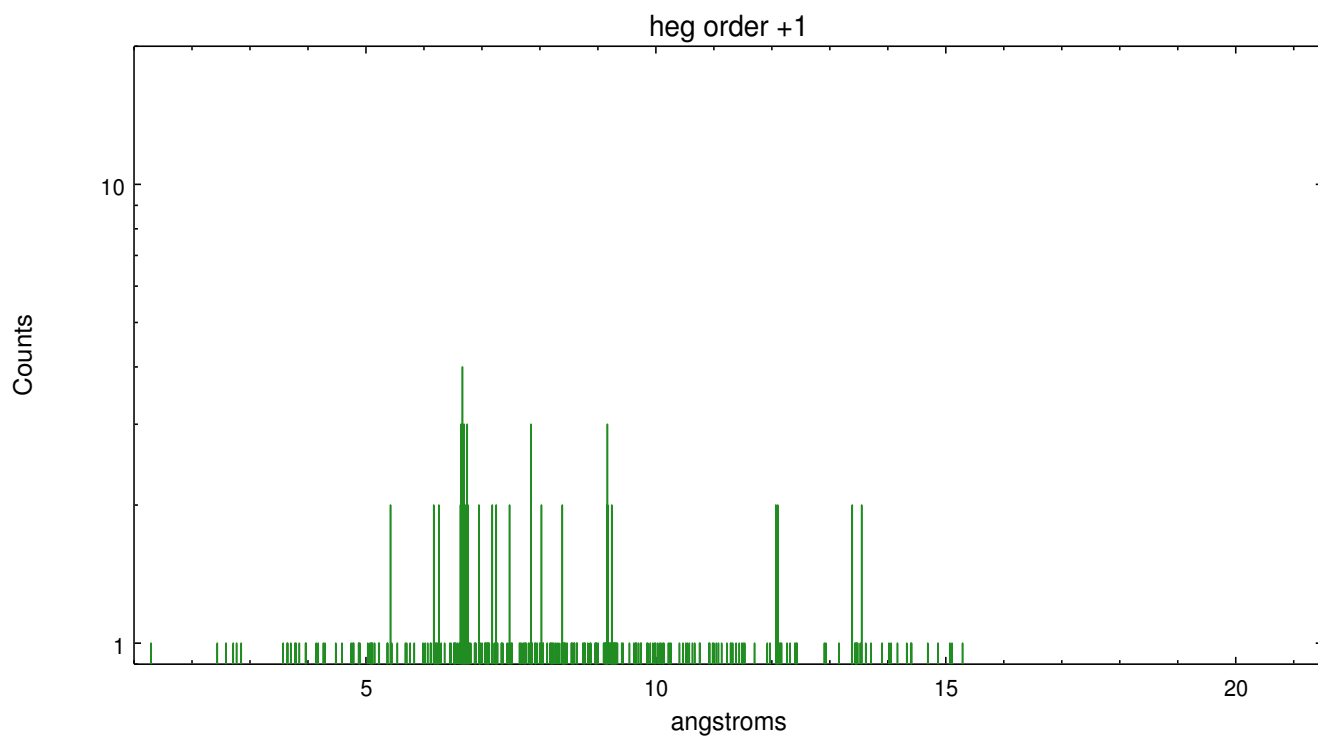
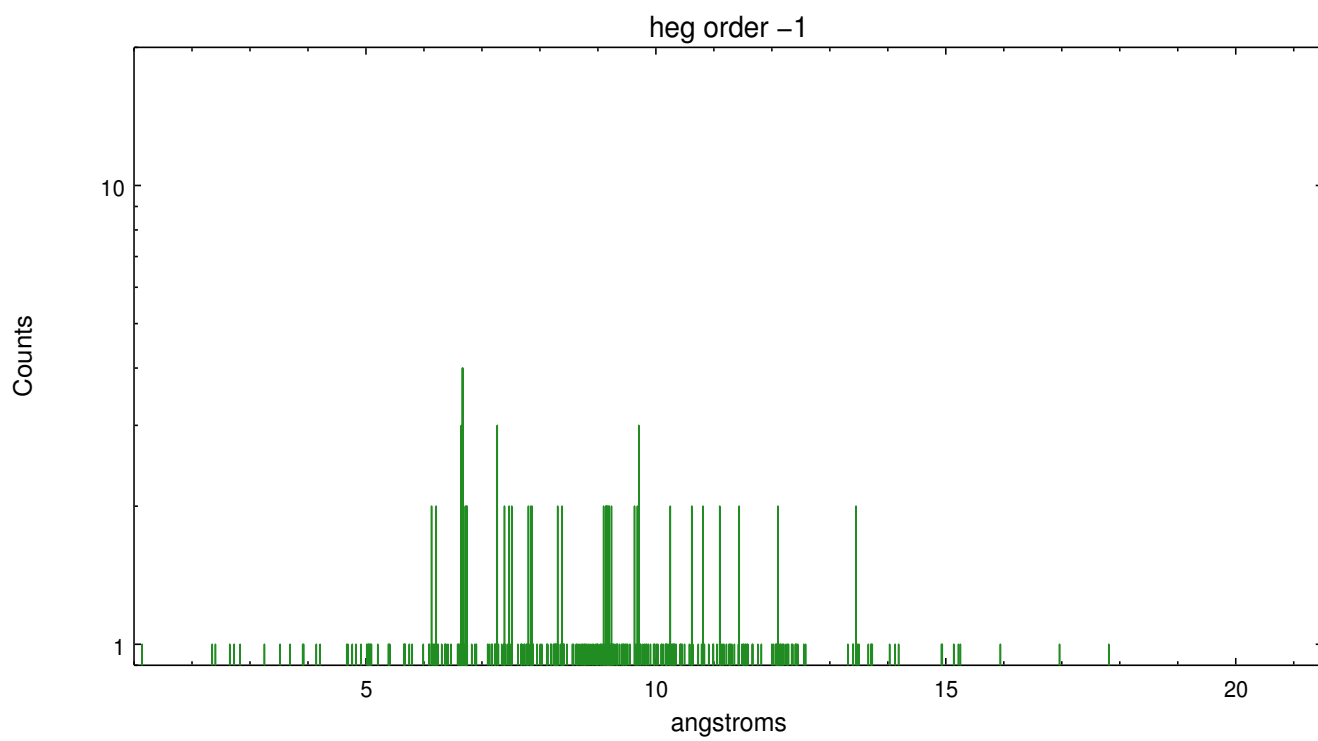


Spot Image HEG

Full Detector HEG

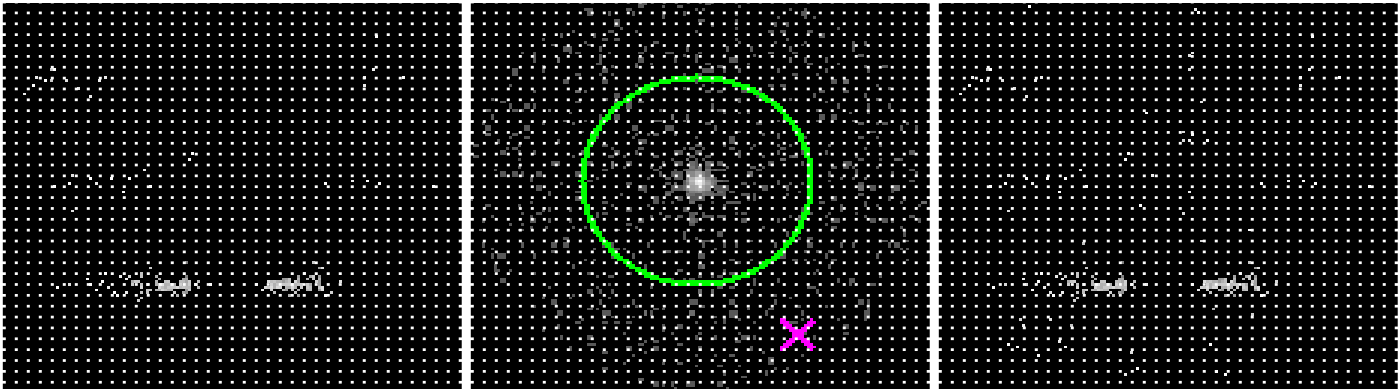
|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order<br>1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 130         | 212         | 556         | 2075       | 482        | 128        | 135        |







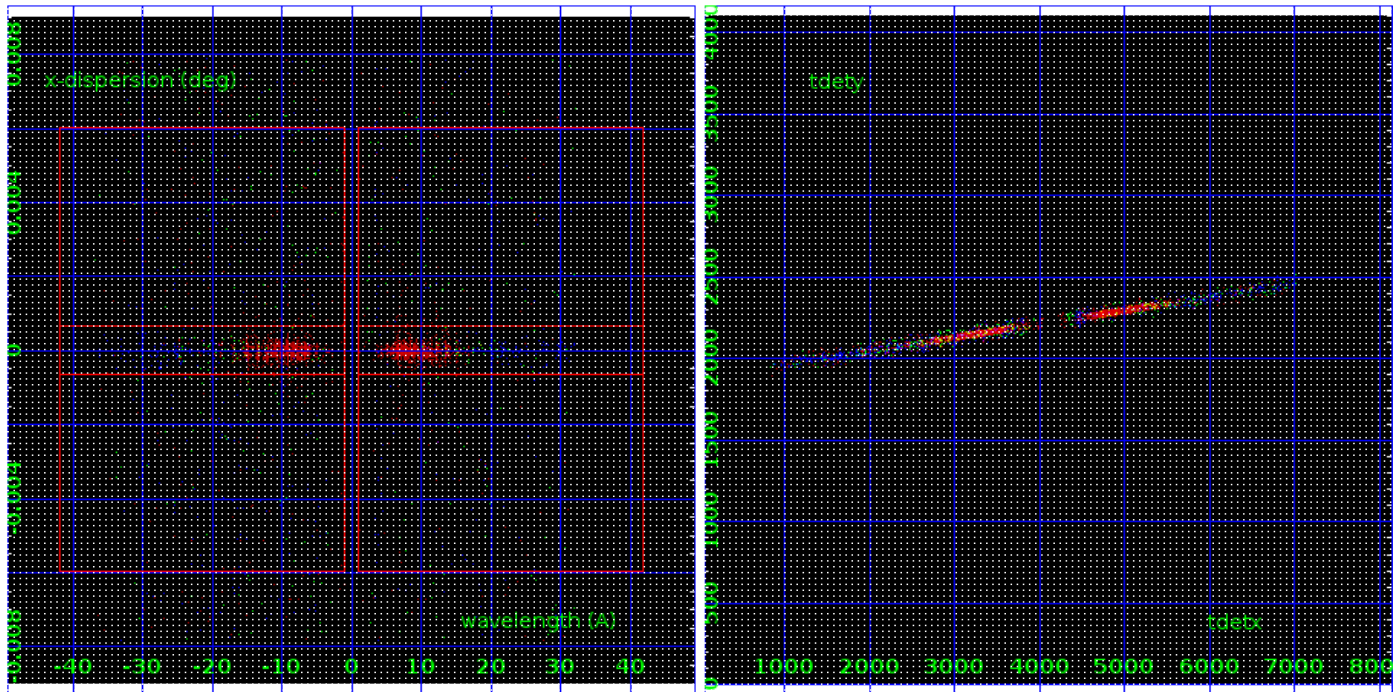
3.2 MEG Arm



MEG Order Sort 123

MEG Zero Order

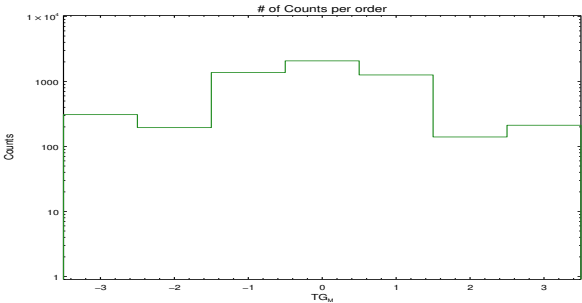
MEG Order Sort ALL

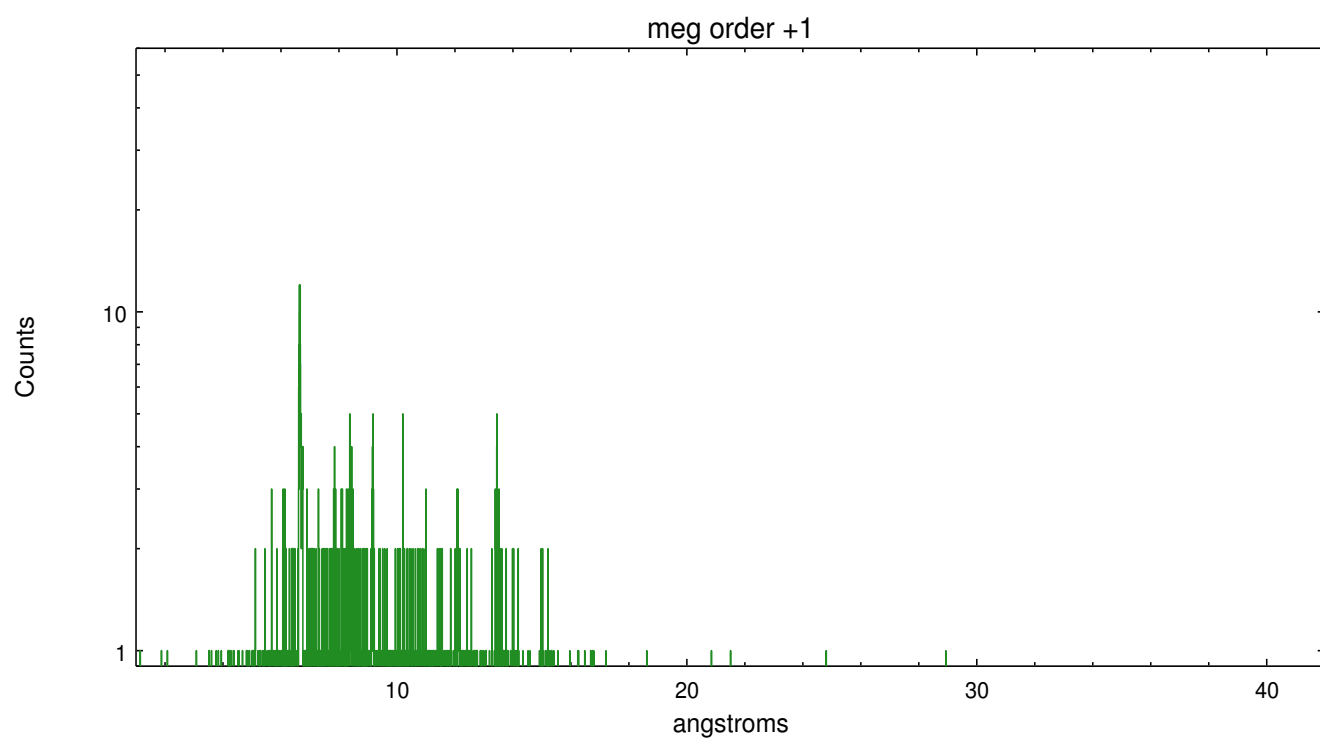
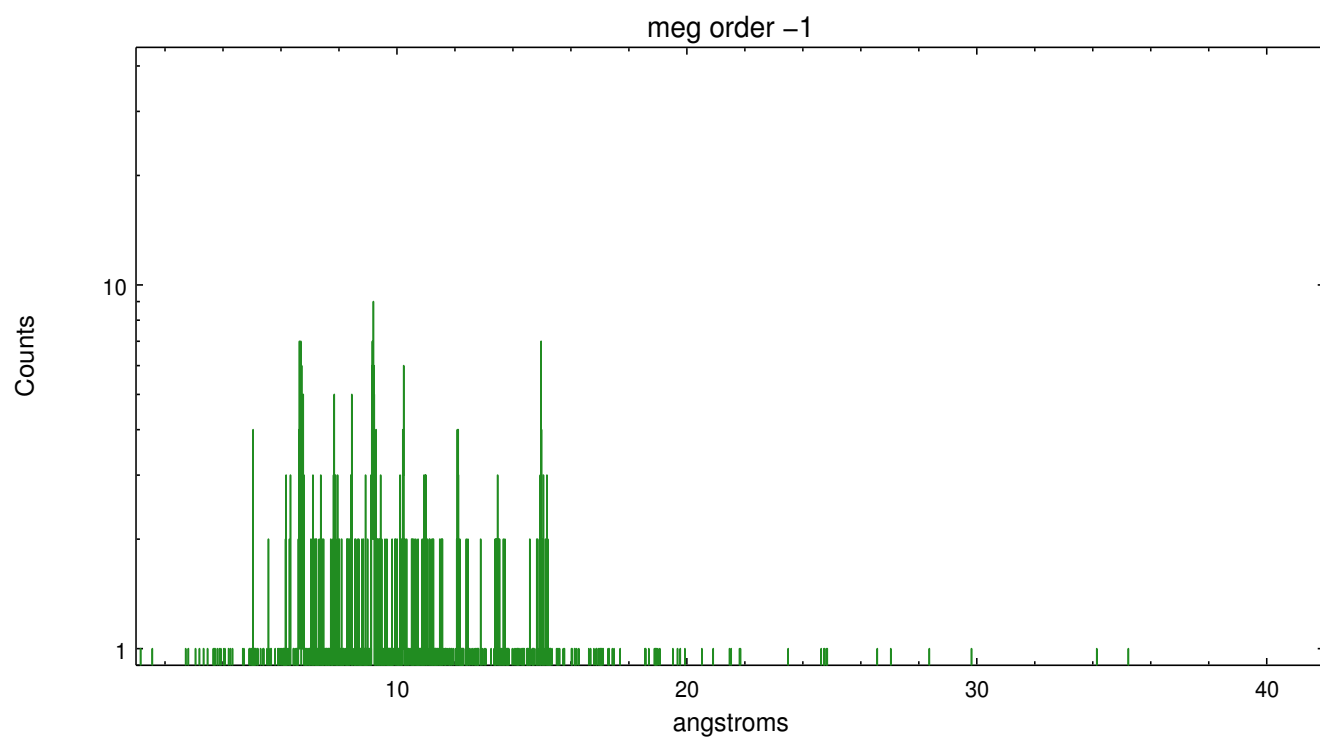


Spot Image MEG

Full Detector MEG

|        | order | order | order | order | order | order | order |
|--------|-------|-------|-------|-------|-------|-------|-------|
|        | -3    | -2    | -1    | 0     | 1     | 2     | 3     |
| Events | 309   | 195   | 1371  | 2075  | 1260  | 140   | 212   |





## A Summary

### A.1 Status

|                            |                    |
|----------------------------|--------------------|
| V&V Scientist              | David Huenemoerder |
| V&V Date (YYYY-MM-DD)      | 2018.07.07         |
| V&V Edition                | 1                  |
| V&V Disposition and Status | OK                 |
| V&V Charge Time            | 18.326400273085    |

### A.2 Comments