

V&V Reference Report

L2 ASCDS Version : 8.4.5

Observation 3417 - L2 Version 4
Chandra X-Ray Center

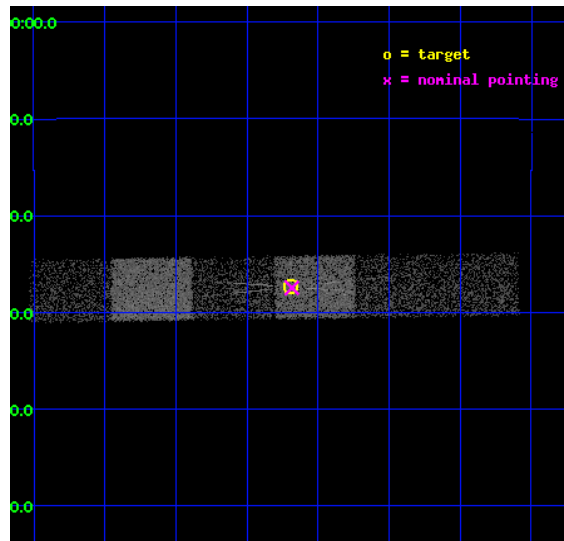
L2 Processing Date : Nov 13 2012

Contents

| | | |
|----------|-------------------------------|-----------|
| 1 | Front | 2 |
| 2 | OBI Primary | 3 |
| 2.1 | OBI | 3 |
| 2.1.1 | Images | 3 |
| 2.1.2 | Bias | 3 |
| 2.1.3 | Parameters | 4 |
| 2.1.4 | Events | 4 |
| 2.2 | Compared Parameters | 5 |
| 2.3 | Aspect | 6 |
| 2.4 | Star Slots | 9 |
| 2.4.1 | Slot 3 | 9 |
| 2.4.2 | Slot 4 | 10 |
| 2.4.3 | Slot 5 | 11 |
| 2.4.4 | Slot 6 | 12 |
| 2.4.5 | Slot 7 | 13 |
| 2.5 | FID Slots | 14 |
| 2.5.1 | Slot 0 | 14 |
| 2.5.2 | Slot 1 | 15 |
| 2.5.3 | Slot 2 | 16 |
| 3 | OBI Secondary | 17 |
| 3.1 | OBI | 17 |
| 3.1.1 | Images | 17 |
| 3.1.2 | Bias | 17 |
| 3.1.3 | Parameters | 18 |
| 3.1.4 | Events | 18 |
| 4 | Gratings | 19 |
| 4.1 | HEG Arm | 19 |
| 4.2 | MEG Arm | 21 |
| A | Summary | 23 |
| A.1 | Status | 23 |
| A.2 | Comments | 23 |

1 Front

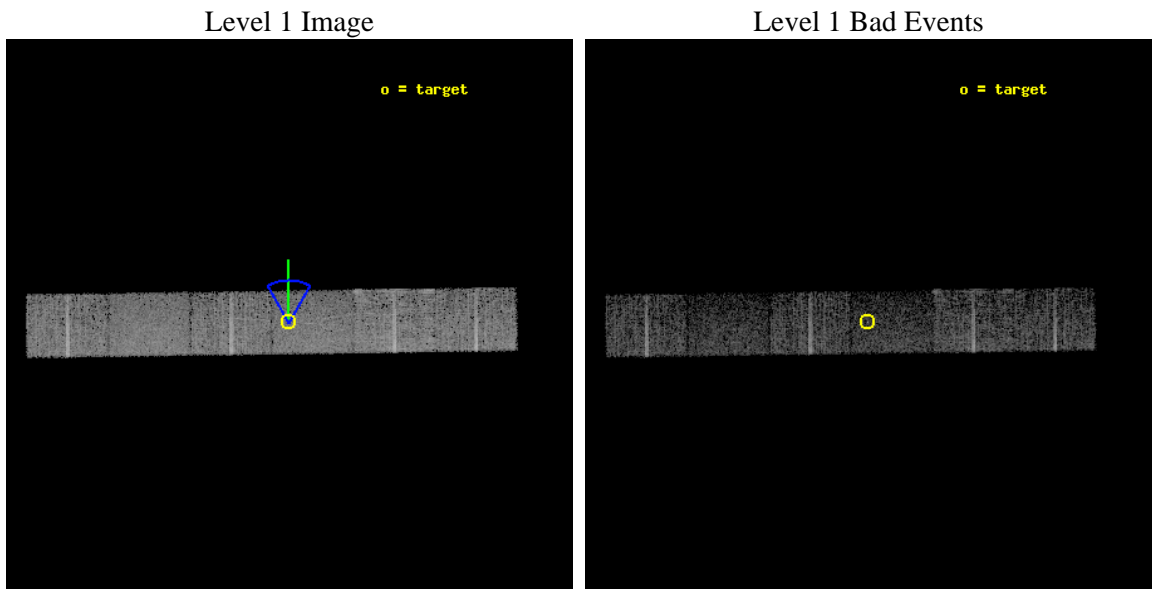
| | | |
|----------|---|--|
| seq_num | 700582 | Sequence number |
| obs_id | 3417 | Observation id |
| title | PROBING UNIFICATION WITH ACIS-HETG OBSERVATION OF COMPTON-THIN SEYFERT 2 NGC 2110 | Proposal title |
| observer | Prof. Julia Lee | Principal investigator |
| object | NGC2110 | Source name |
| dtcycle | 0 | |
| cycle | P | events are from which exps? P[primary] S[econdar] |
| ra_targ | 88.0475 | Observer's specified target RA [deg] |
| dec_targ | -7.456111 | Observer's specified target Dec [deg] |
| ra_nom | 88.046030846991 | Nominal RA [deg] |
| dec_nom | -7.4577829870746 | Nominal Dec [deg] |
| roll_nom | 359.15643505497 | Nominal Roll [deg] |
| revision | 4 | Processing version of data |
| ontime | 8405.8161029816 | Sum of GTIs [s] |
| livetime | 2038.4778021453 | Livetime [s] |
| ontime4 | 8405.8161029816 | Sum of GTIs [s] |
| ontime5 | 8405.8161029816 | Sum of GTIs [s] |
| ontime6 | 8405.8161029816 | Sum of GTIs [s] |
| ontime7 | 8405.8161029816 | Sum of GTIs [s] |
| ontime8 | 8405.8161029816 | Sum of GTIs [s] |
| ontime9 | 8405.8161029816 | Sum of GTIs [s] |
| l2events | 23622 | Number of level 2 events |



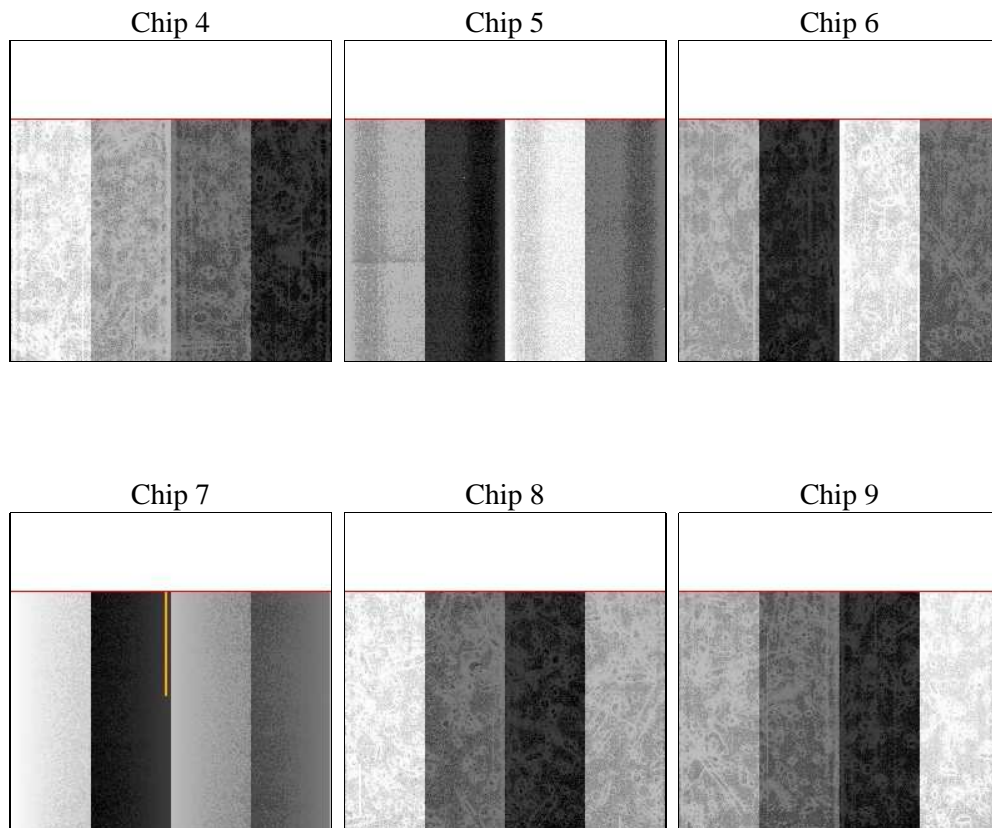
2 OBI Primary

2.1 OBI

2.1.1 Images



2.1.2 Bias



2.1.3 Parameters

| | | | | | |
|----------|---------------------|--------------------------------|----------------|-----------------|---|
| obi_num | 0 | Obi number | sched_exp_time | 33137.886000 | [s] Scheduled observation exposure time |
| ascdsver | 8.4.5 | Processing system revision | ontime | 8405.8161029816 | Sum of GTIs [s] |
| caldbver | 4.5.2 | | ontime4 | 8405.8161029816 | Sum of GTIs [s] |
| date | 2012-09-29T14:51:19 | Date and time of file creation | ontime5 | 8405.8161029816 | Sum of GTIs [s] |
| revision | 4 | Processing version of data | ontime6 | 8405.8161029816 | Sum of GTIs [s] |
| | | | ontime7 | 8405.8161029816 | Sum of GTIs [s] |
| | | | ontime8 | 8405.8161029816 | Sum of GTIs [s] |
| | | | ontime9 | 8405.8161029816 | Sum of GTIs [s] |
| | | | l1events | 146625 | Number of level 1 events |

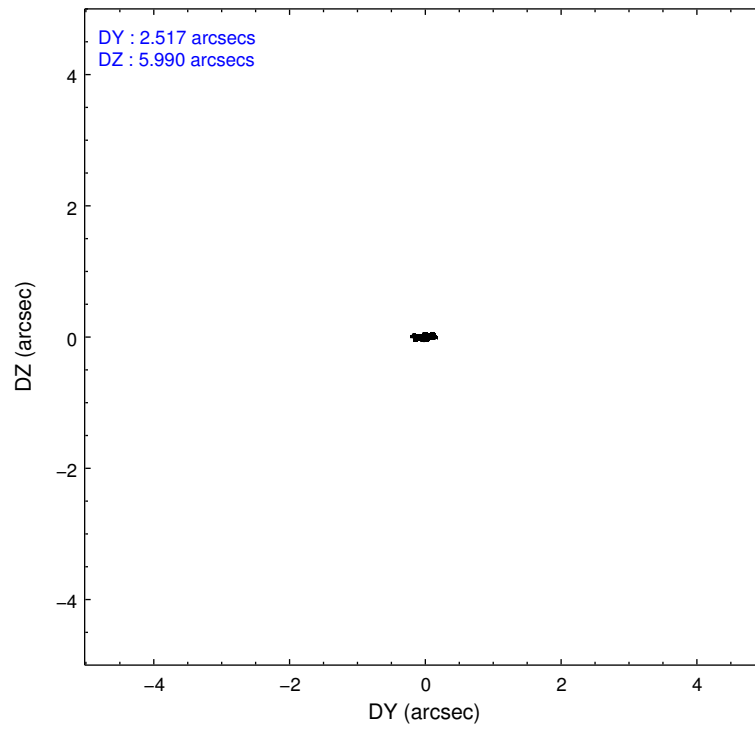
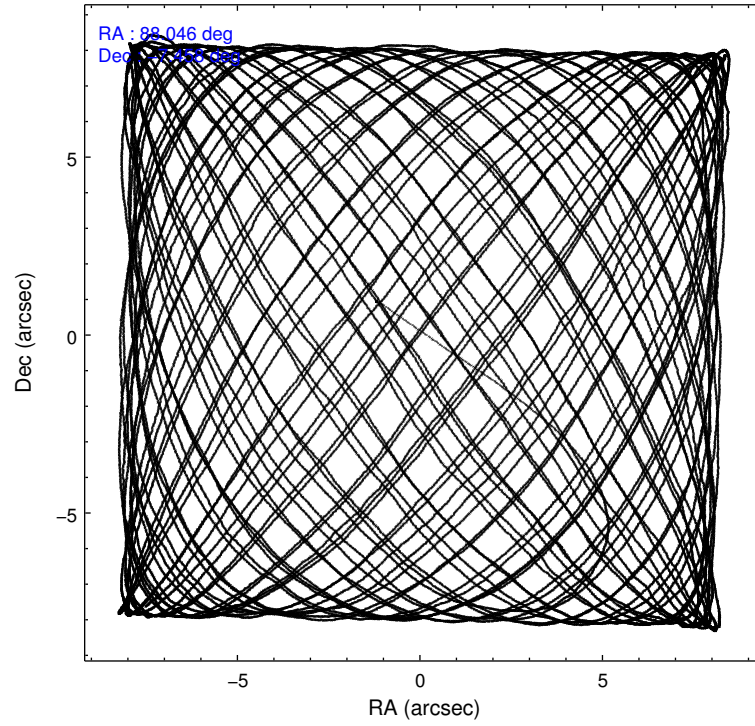
2.1.4 Events

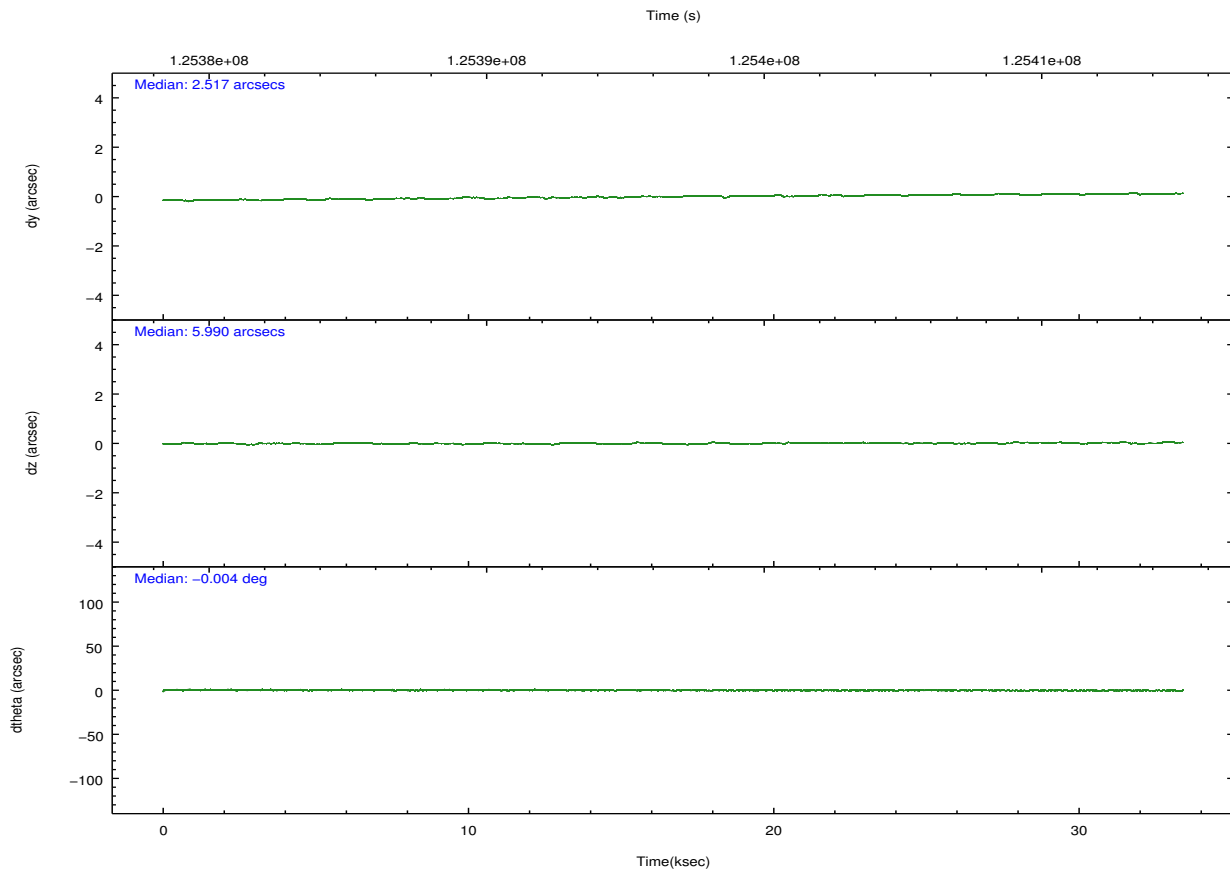
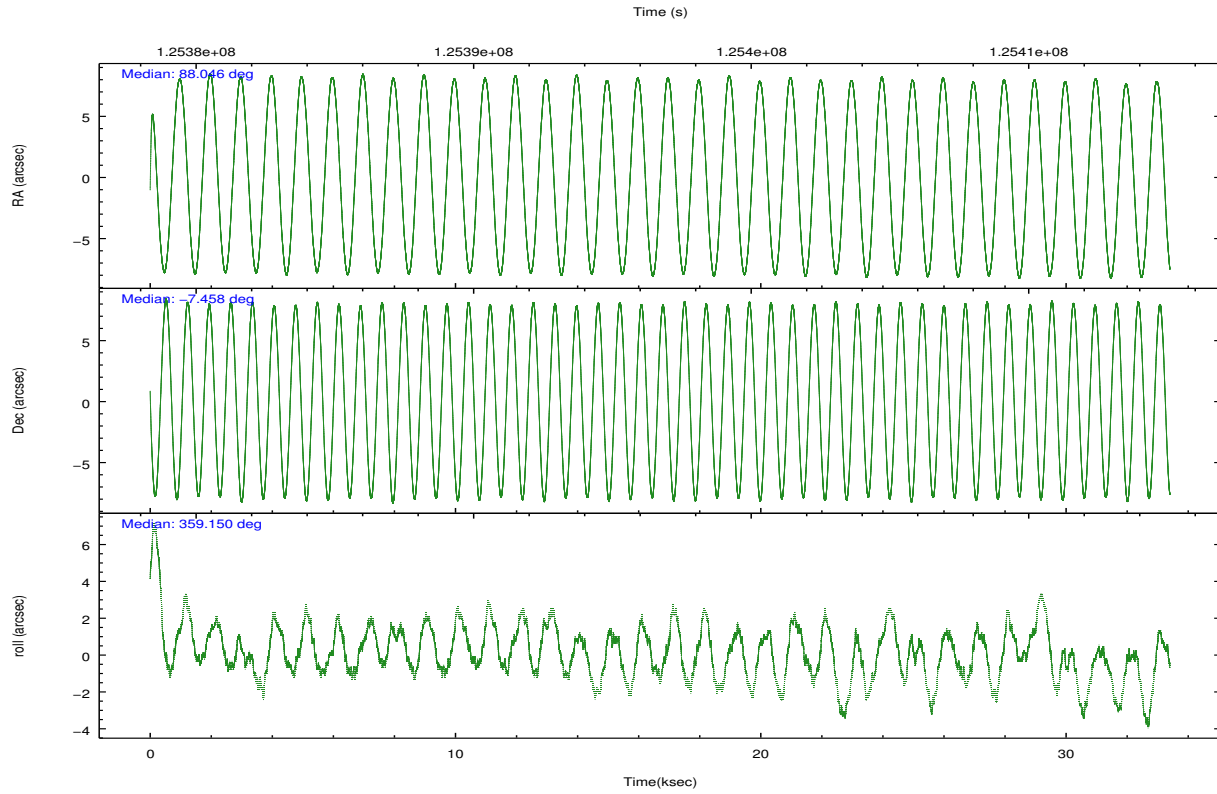
| | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 | | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 |
|-----------------|-------|-------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|-------|-------|
| level 1 events | 24346 | 22962 | 24254 | 23047 | 29210 | 22806 | grade 0 events | 646 | 522 | 889 | 899 | 1166 | 628 |
| rejected events | 22341 | 14145 | 21959 | 14654 | 24789 | 20820 | | 2% | 2% | 3% | 3% | 3% | 2% |
| rejected % | 91% | 61% | 90% | 63% | 84% | 91% | grade 1 events | 8 | 28 | 3 | 21 | 9 | 10 |
| | | | | | | | | 0% | 0% | 0% | 0% | 0% | 0% |
| | | | | | | | grade 2 events | 465 | 2438 | 456 | 1806 | 975 | 398 |
| | | | | | | | | 1% | 10% | 1% | 7% | 3% | 1% |
| | | | | | | | grade 3 events | 285 | 507 | 259 | 815 | 529 | 285 |
| | | | | | | | | 1% | 2% | 1% | 3% | 1% | 1% |
| | | | | | | | grade 4 events | 242 | 510 | 275 | 840 | 484 | 269 |
| | | | | | | | | 0% | 2% | 1% | 3% | 1% | 1% |
| | | | | | | | grade 5 events | 690 | 1785 | 694 | 1903 | 924 | 689 |
| | | | | | | | | 2% | 7% | 2% | 8% | 3% | 3% |
| | | | | | | | grade 6 events | 367 | 4846 | 416 | 4035 | 1268 | 414 |
| | | | | | | | | 1% | 21% | 1% | 17% | 4% | 1% |
| | | | | | | | grade 7 events | 21643 | 12326 | 21262 | 12728 | 23855 | 20113 |
| | | | | | | | | 88% | 53% | 87% | 55% | 81% | 88% |

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 | 88.022184 | 88.0460308469907 | Subarray requested | CUSTOM | CUSTOM |
| [deg] Pointing Dec | -7.471345 | -7.457782987074641 | Subarray start row | 1 | 1 |
| [deg] Pointing Roll | 358.996706 | 359.1564350549729 | Subarray row count | 774 | 774 |
| [deg] Roll angle | 0.000000 | 0.000000 | Alternating exposures requested | Y | Y |
| [deg] Roll tolerance | 30.000000 | 30.000000 | [s] Primary exposure time | 0.800000 | 0.8 |
| Roll constraint allows 180D rotation | N | N | [s] Secondary exposure time | 0.000000 | 3.2 |
| [mm] SIM focus pos | -0.684267 | -0.6828225247311905 | Duty cycle | 3 | 3 |
| [mm] SIM defocus | 0 | 0.001444936568705701 | | | |
| [mm] SIM translation stage pos | -187.132523 | -187.1228876879999 | | | |
| [mm] SIM translation stage offset | -3 | -3.009634895007935 | | | |
| [s] Observation start time (MET) | 125380279.184000 | 125379280.09019 | | | |
| Observation start date | 2001-12-22T03:50:15 | 2001-12-22T03:34:40 | | | |
| [s] Observation end time (MET) | 125413417.184000 | 125413731.36657 | | | |
| Observation end date | 2001-12-22T13:02:33 | 2001-12-22T13:08:51 | | | |
| Read mode | TIMED | TIMED | | | |

2.3 Aspect



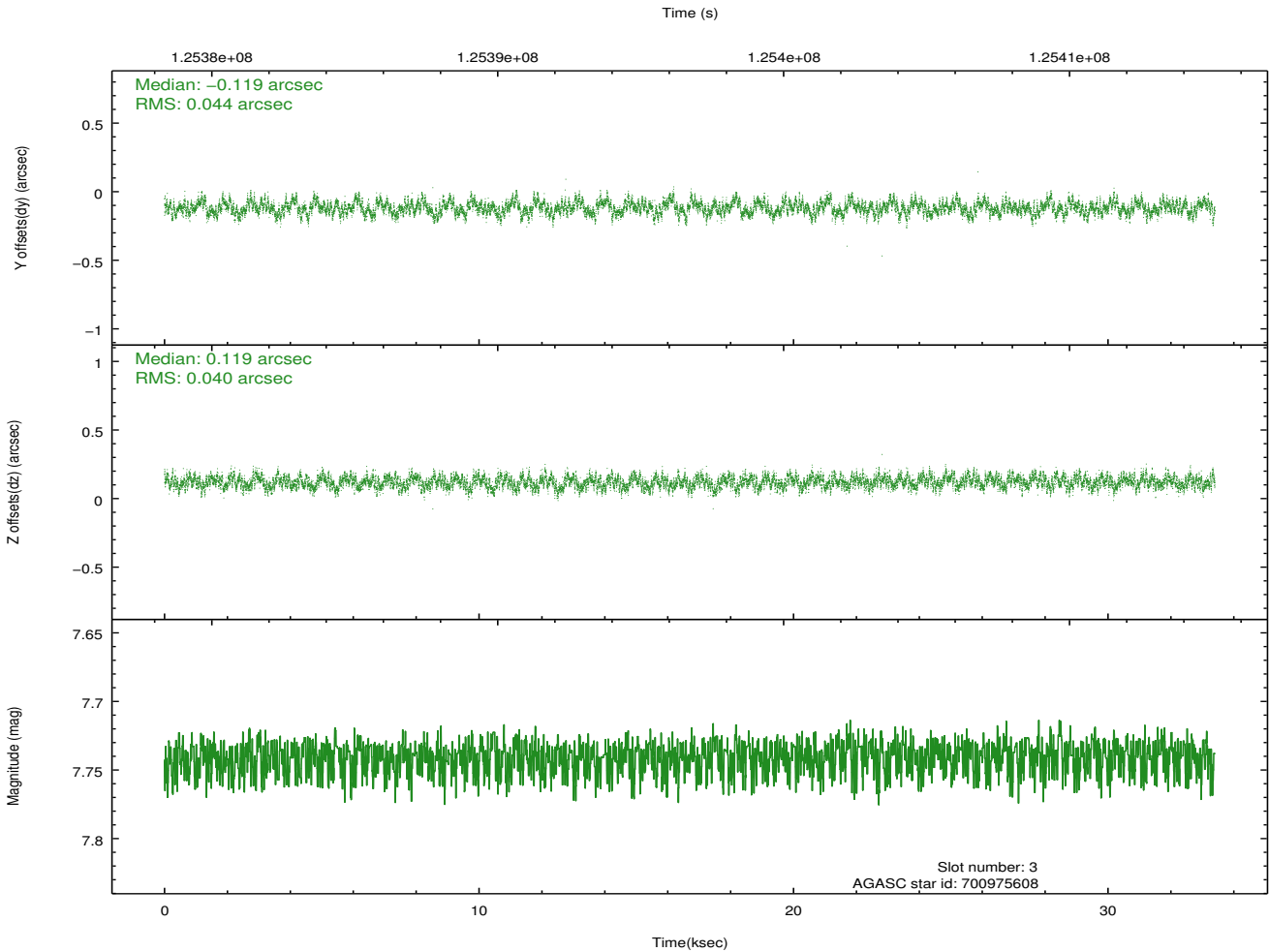
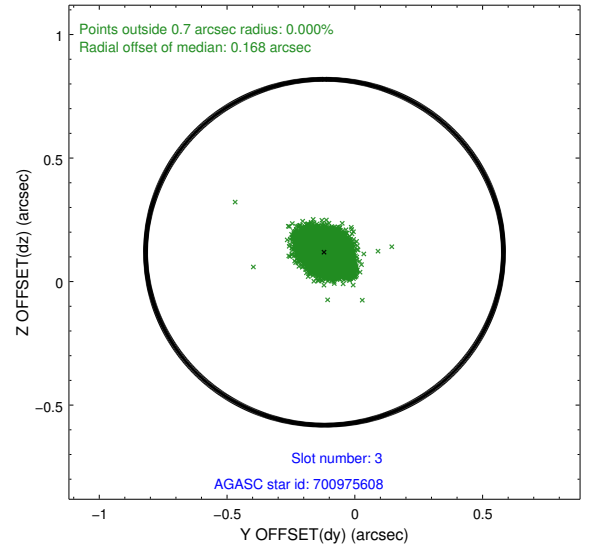
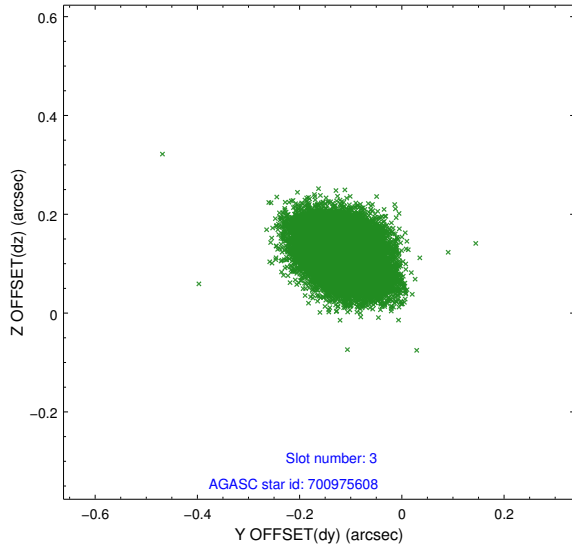


Slot Statistics

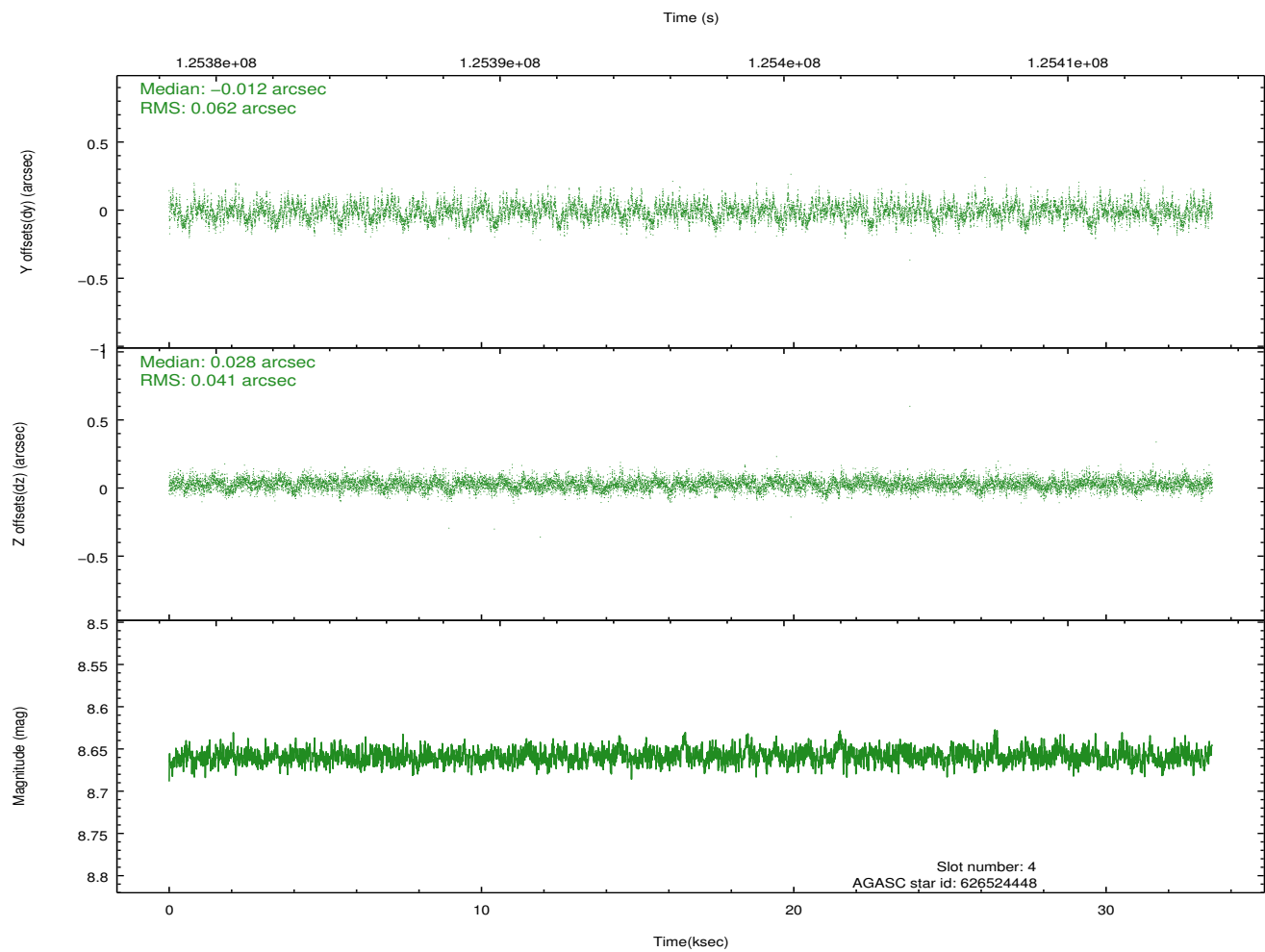
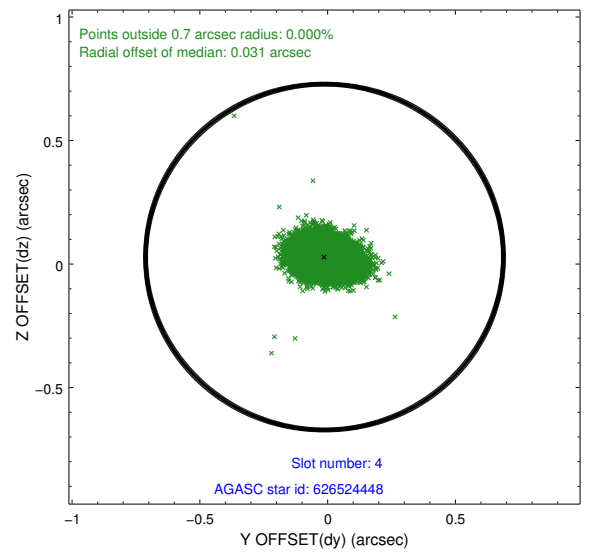
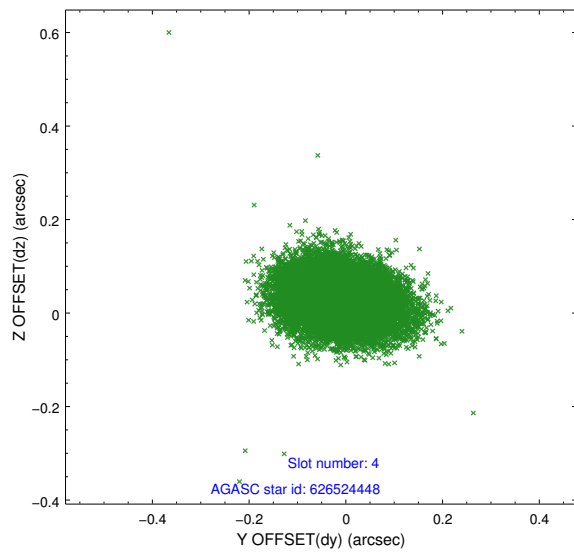
| slot | status | id | mag | n_pts | med_dy | med_dz | dr1 | dr2 | ra | dec | mean_y | mean_z |
|------|--------|-----------|------|-------|--------|--------|-------|-------|-----------|-----------|----------|----------|
| 0 | FID | ACIS-S-2 | 7.10 | 8145 | -0.031 | -0.068 | 0.007 | 0.011 | 0.000000 | 0.000000 | -754.97 | -1789.33 |
| 1 | FID | ACIS-S-4 | 7.20 | 8143 | 0.002 | 0.033 | 0.006 | 0.010 | 0.000000 | 0.000000 | 2158.33 | 119.18 |
| 2 | FID | ACIS-S-5 | 7.23 | 8144 | -0.002 | 0.043 | 0.007 | 0.012 | 0.000000 | 0.000000 | -1807.71 | 112.93 |
| 3 | GUIDE | 700975608 | 7.74 | 16290 | -0.119 | 0.119 | 0.063 | 0.103 | 88.344260 | -8.111712 | 1188.30 | -2285.38 |
| 4 | GUIDE | 626524448 | 8.66 | 16291 | -0.012 | 0.028 | 0.078 | 0.130 | 87.380980 | -6.987266 | -2321.34 | 1700.04 |
| 5 | GUIDE | 700844704 | 8.71 | 16291 | 0.094 | -0.036 | 0.080 | 0.130 | 87.931803 | -7.921073 | -293.72 | -1624.73 |
| 6 | GUIDE | 626527888 | 9.39 | 16218 | 0.005 | -0.116 | 0.103 | 0.169 | 87.940640 | -6.806336 | -333.67 | 2387.99 |
| 7 | GUIDE | 626656280 | 9.52 | 16272 | 0.025 | 0.002 | 0.111 | 0.183 | 88.685870 | -7.378153 | 2363.28 | 375.24 |

2.4 Star Slots

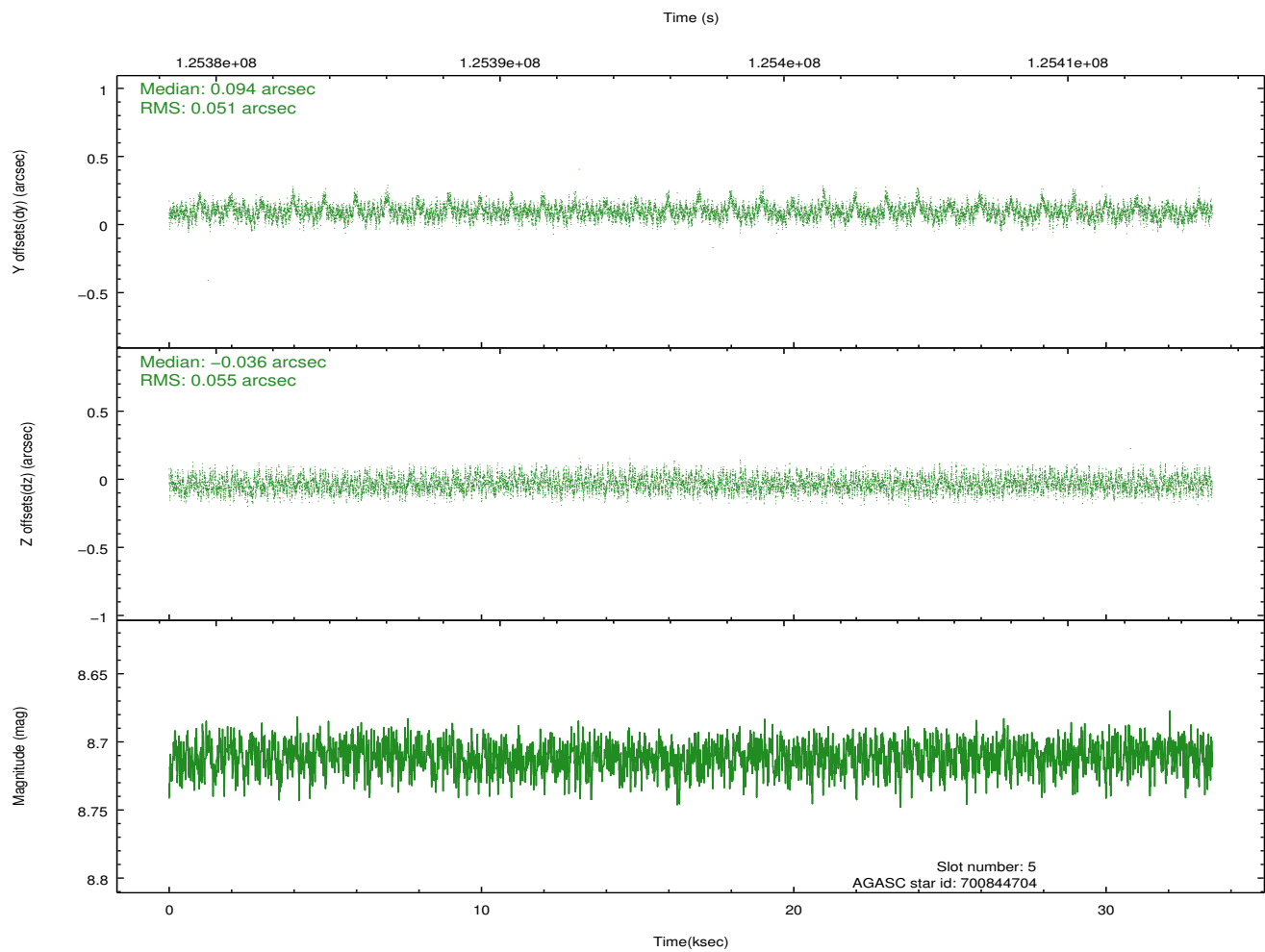
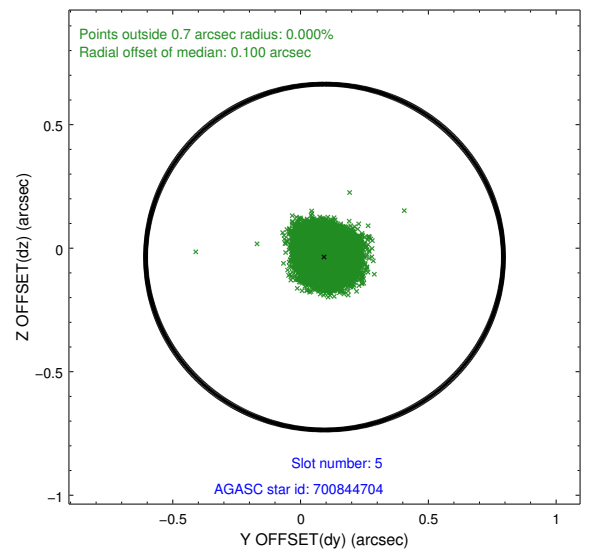
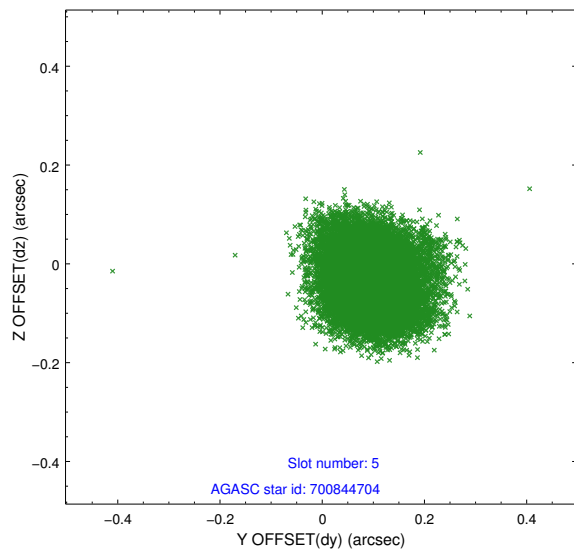
2.4.1 Slot 3



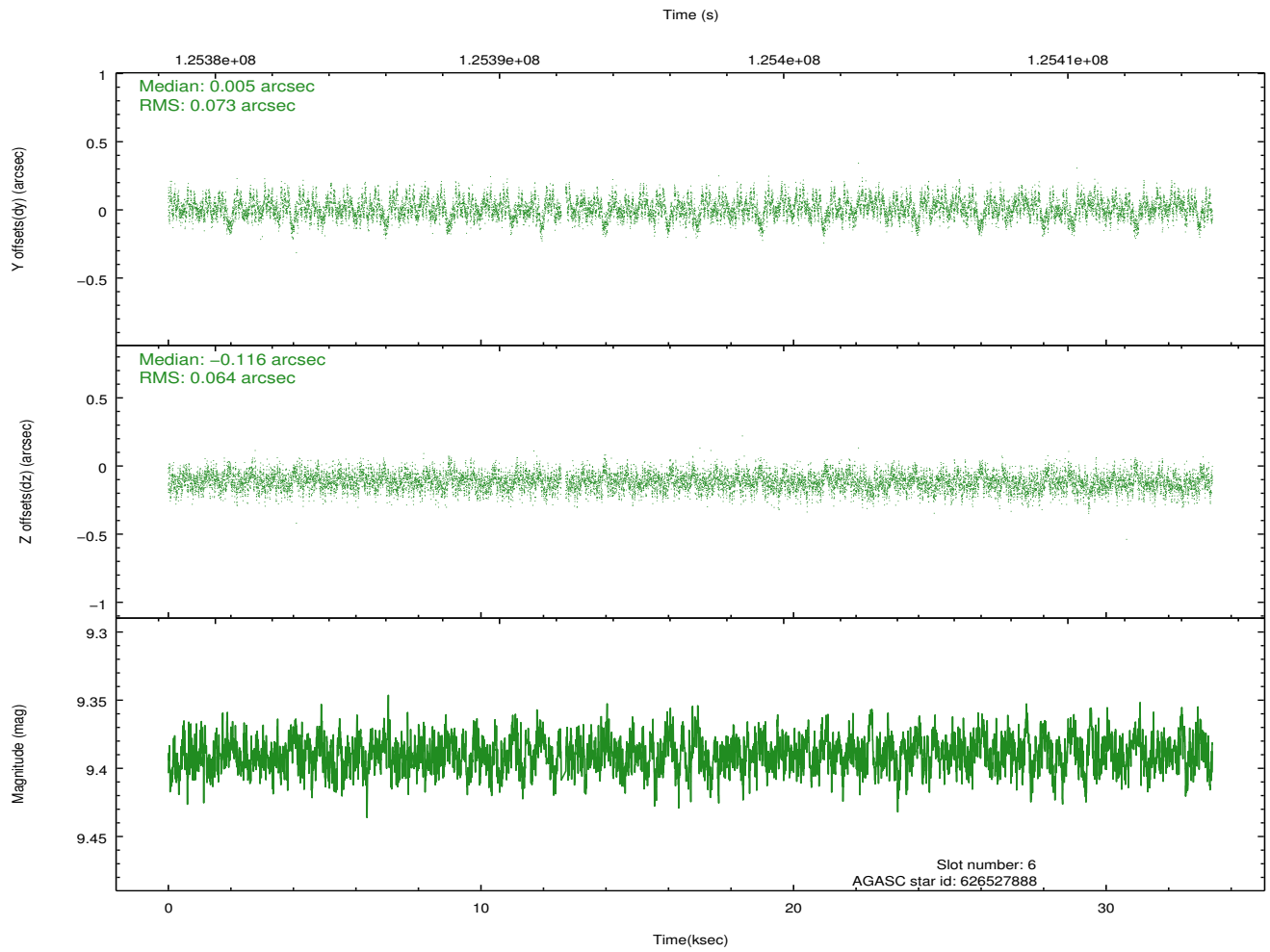
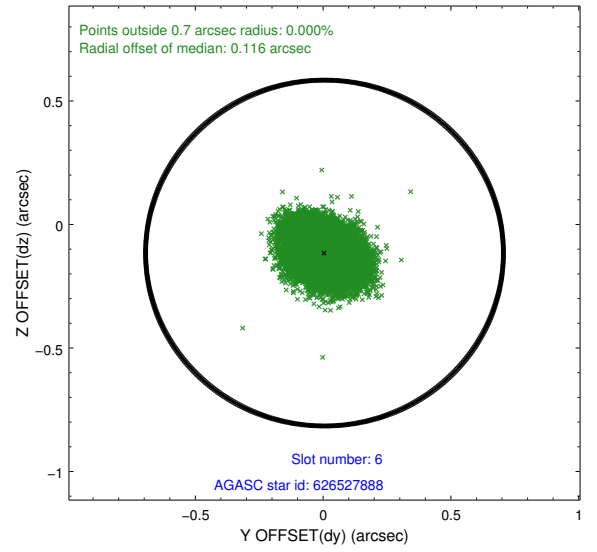
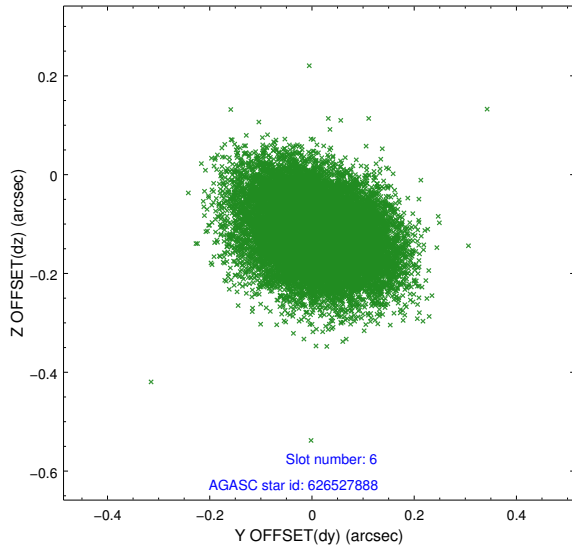
2.4.2 Slot 4



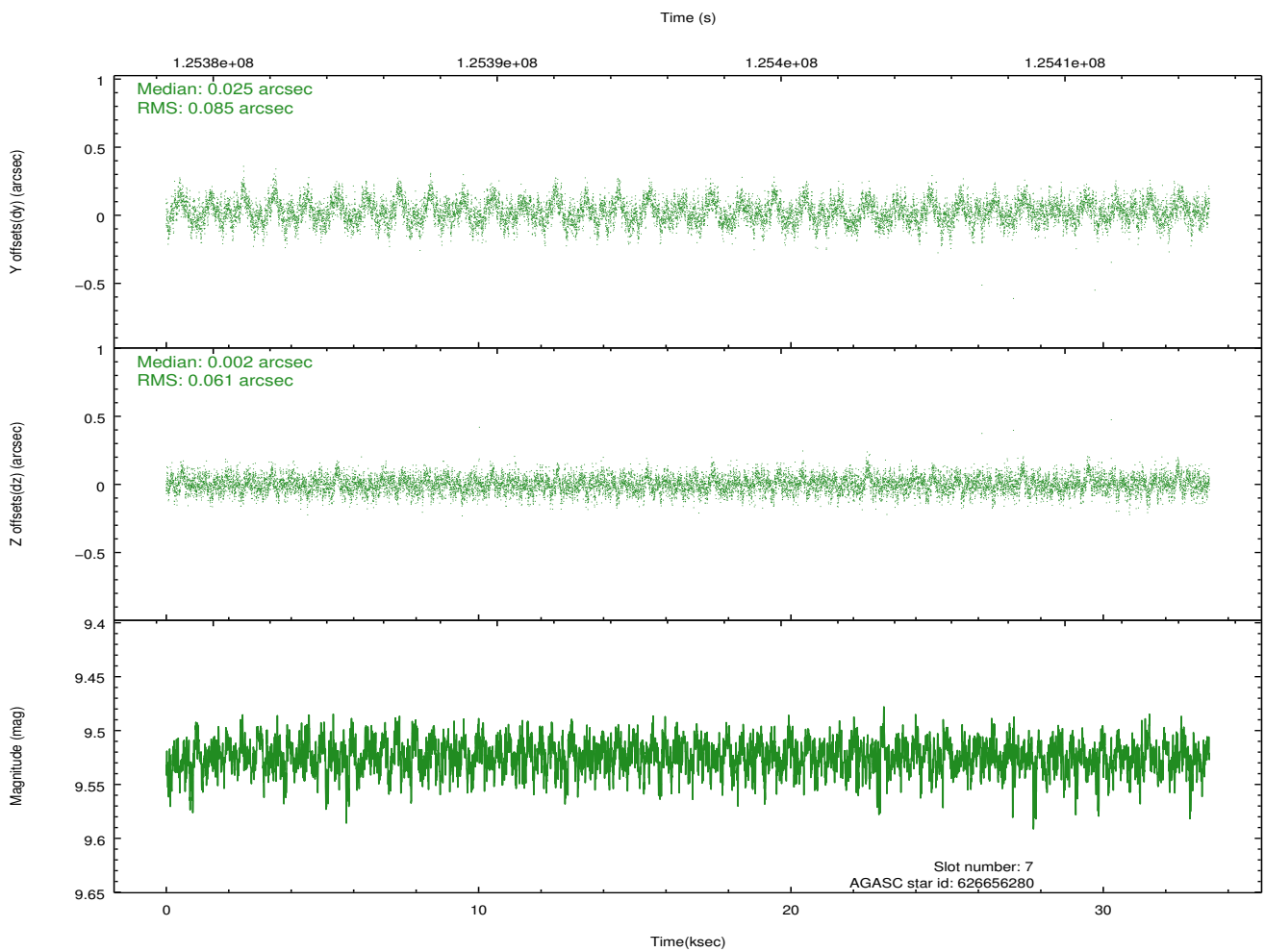
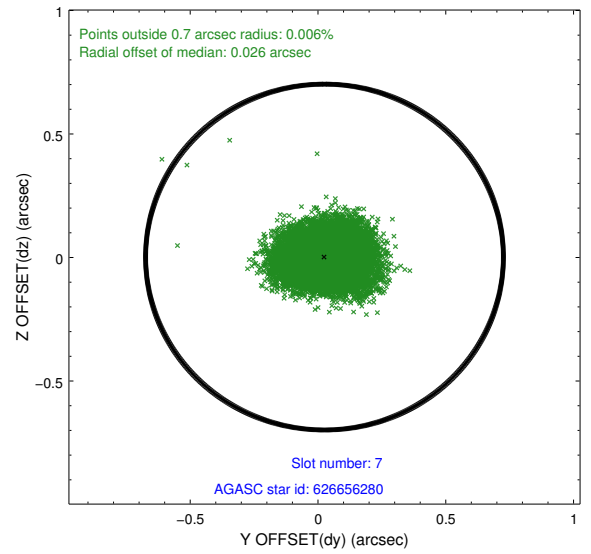
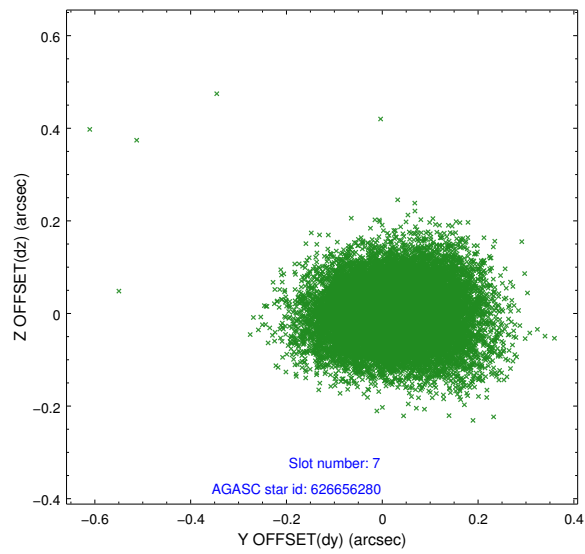
2.4.3 Slot 5



2.4.4 Slot 6

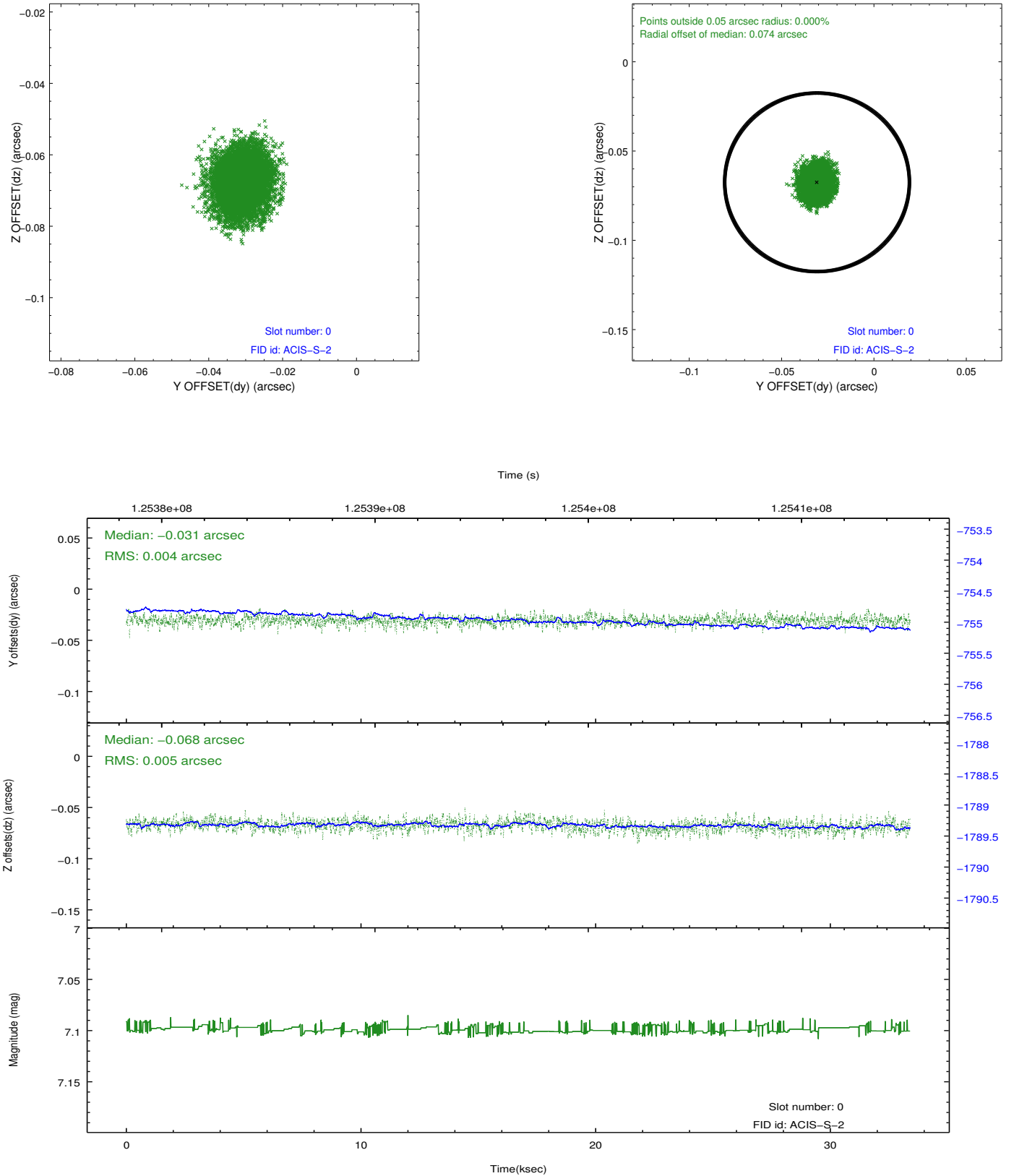


2.4.5 Slot 7

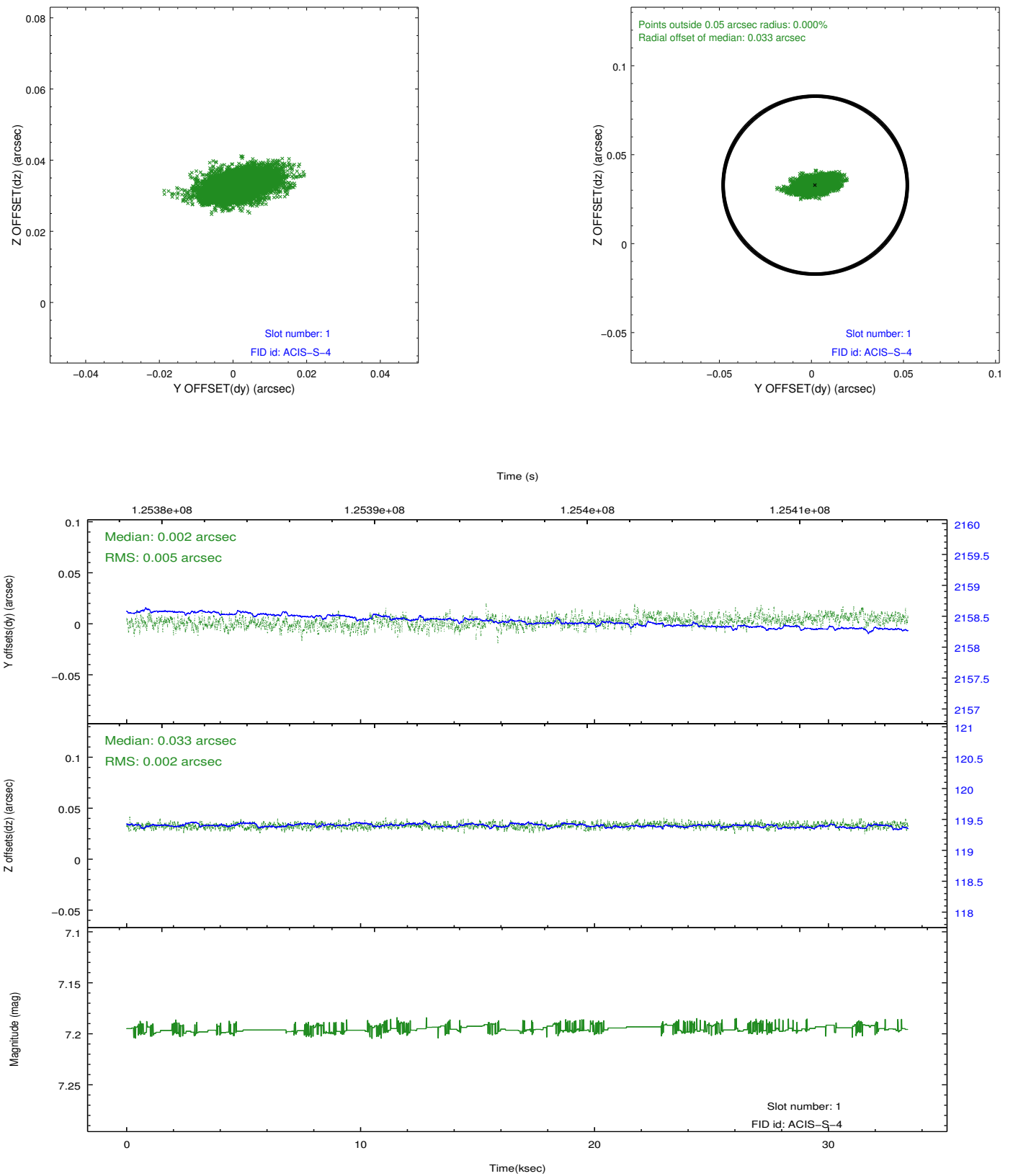


2.5 FID Slots

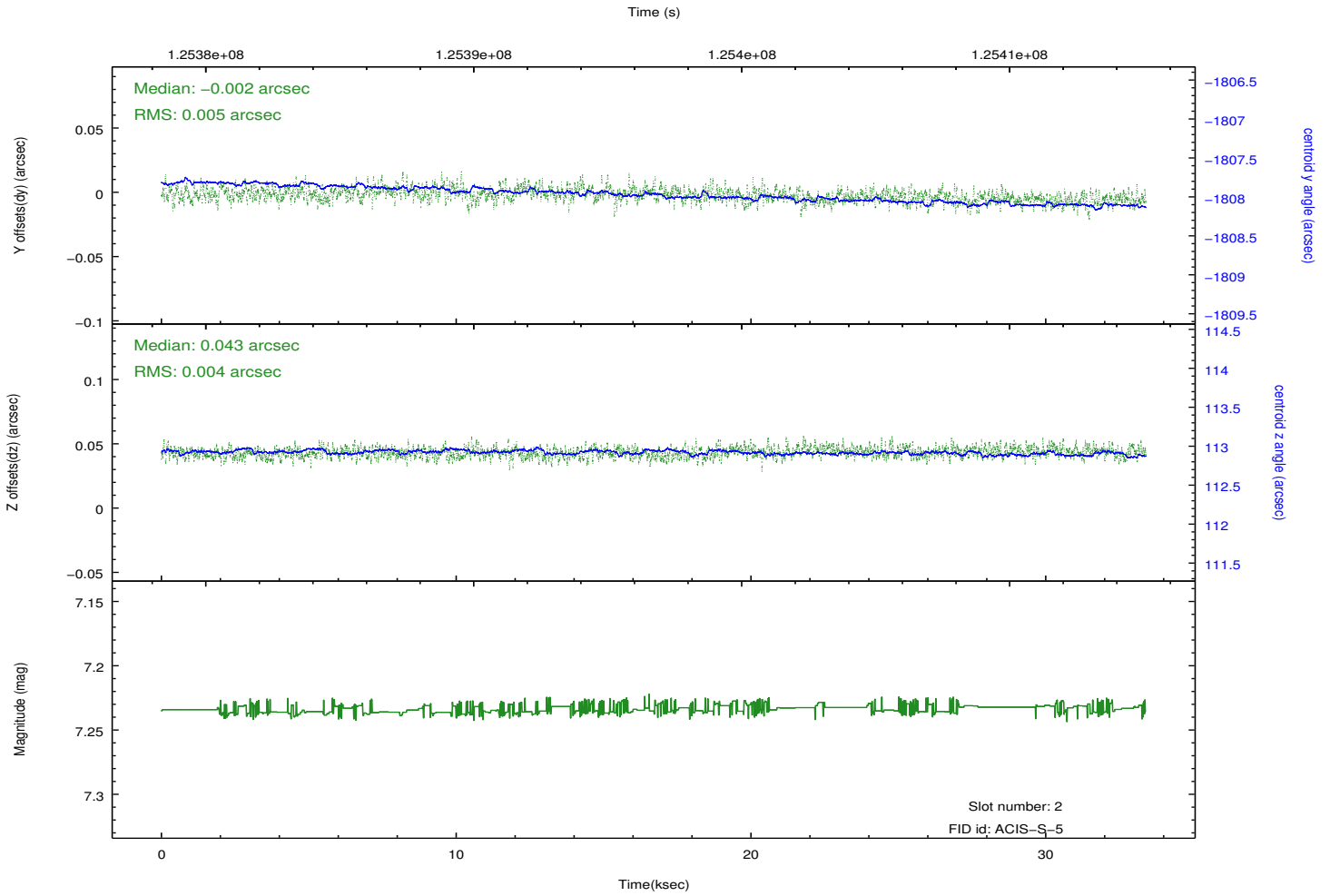
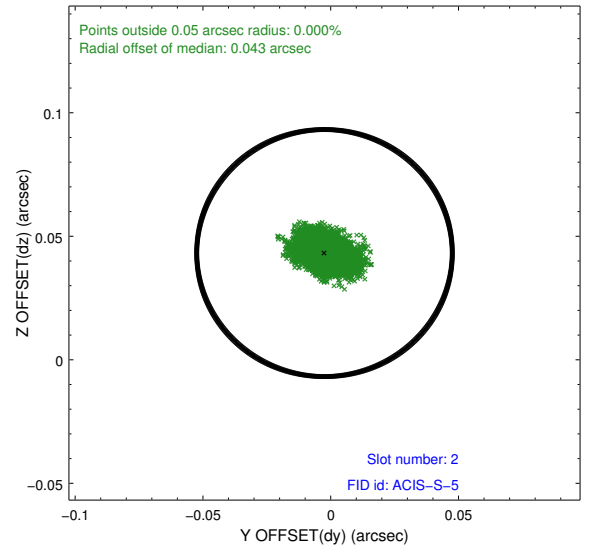
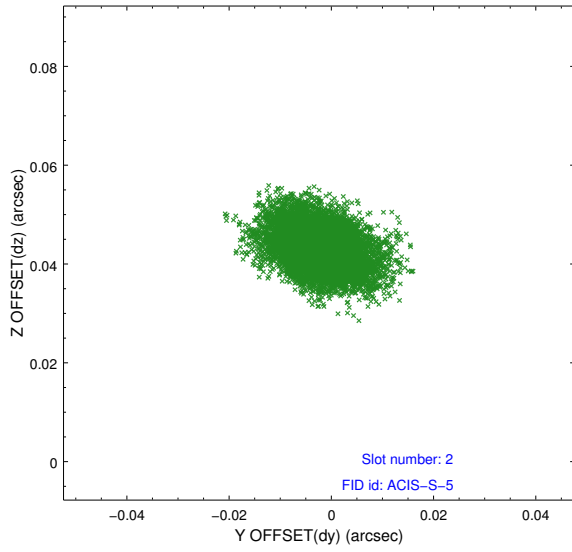
2.5.1 Slot 0



2.5.2 Slot 1



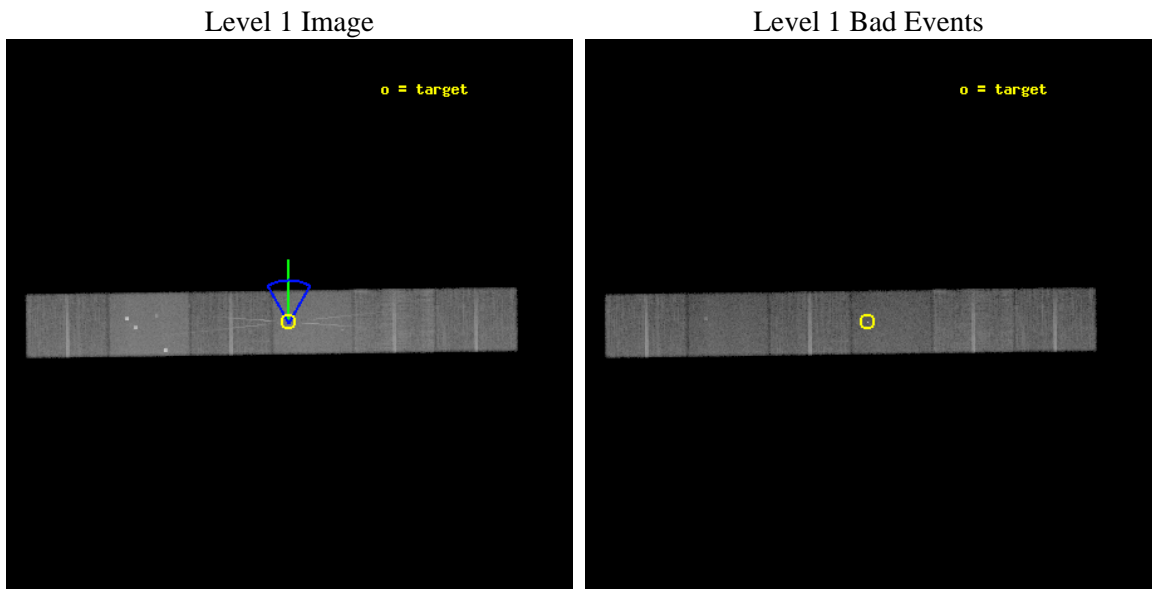
2.5.3 Slot 2



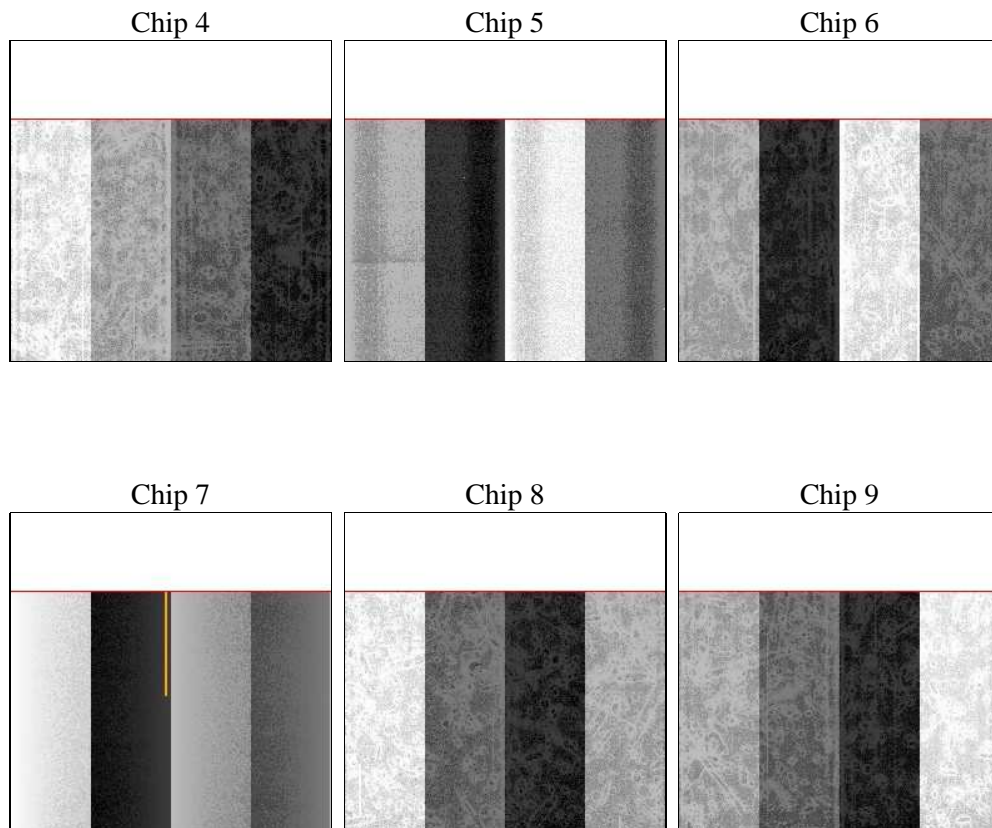
3 OBI Secondary

3.1 OBI

3.1.1 Images



3.1.2 Bias



3.1.3 Parameters

| | | | | | |
|----------|---------------------|--------------------------------|----------------|-----------------|---|
| obi_num | 0 | Obi number | sched_exp_time | 33137.886000 | [s] Scheduled observation exposure time |
| ascdsver | 8.4.5 | Processing system revision | ontime | 24780.970064223 | Sum of GTIs [s] |
| caldbver | 4.5.2 | | ontime4 | 24780.9697254 | Sum of GTIs [s] |
| date | 2012-09-29T14:57:19 | Date and time of file creation | ontime5 | 24780.970213264 | Sum of GTIs [s] |
| revision | 4 | Processing version of data | ontime6 | 24780.969586 | Sum of GTIs [s] |
| | | | ontime7 | 24780.970064223 | Sum of GTIs [s] |
| | | | ontime8 | 24780.970163092 | Sum of GTIs [s] |
| | | | ontime9 | 24780.969894871 | Sum of GTIs [s] |
| | | | l1events | 843929 | Number of level 1 events |

3.1.4 Events

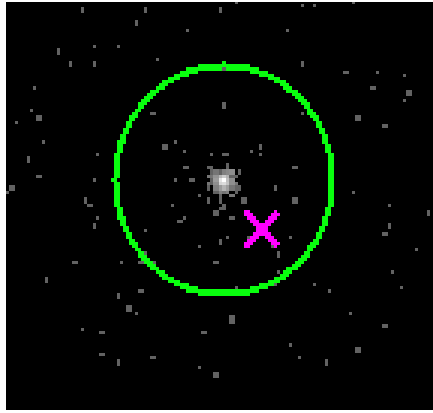
| | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 | | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 |
|-----------------|--------|--------|--------|--------|--------|--------|----------------|--------|-------|-------|-------|--------|-------|
| level 1 events | 123228 | 178962 | 118272 | 163627 | 147110 | 112730 | grade 0 events | 5778 | 18726 | 8731 | 7841 | 10322 | 5725 |
| rejected events | 108820 | 87935 | 100064 | 87689 | 114855 | 98704 | | 4% | 10% | 7% | 4% | 7% | 5% |
| rejected % | 88% | 49% | 84% | 53% | 78% | 87% | grade 1 events | 48 | 569 | 76 | 251 | 84 | 51 |
| | | | | | | | | 0% | 0% | 0% | 0% | 0% | 0% |
| | | | | | | | grade 2 events | 3404 | 24977 | 3370 | 15410 | 6846 | 2751 |
| | | | | | | | | 2% | 13% | 2% | 9% | 4% | 2% |
| | | | | | | | grade 3 events | 1430 | 3663 | 1565 | 7162 | 3369 | 1454 |
| | | | | | | | | 1% | 2% | 1% | 4% | 2% | 1% |
| | | | | | | | grade 4 events | 1325 | 3700 | 1553 | 7081 | 3248 | 1389 |
| | | | | | | | | 1% | 2% | 1% | 4% | 2% | 1% |
| | | | | | | | grade 5 events | 4240 | 13081 | 4983 | 15233 | 6379 | 5097 |
| | | | | | | | | 3% | 7% | 4% | 9% | 4% | 4% |
| | | | | | | | grade 6 events | 2475 | 40000 | 2992 | 38462 | 8482 | 2710 |
| | | | | | | | | 2% | 22% | 2% | 23% | 5% | 2% |
| | | | | | | | grade 7 events | 104528 | 74246 | 95002 | 72187 | 108380 | 93553 |
| | | | | | | | | 84% | 41% | 80% | 44% | 73% | 82% |

4 Gratings

4.1 HEG Arm



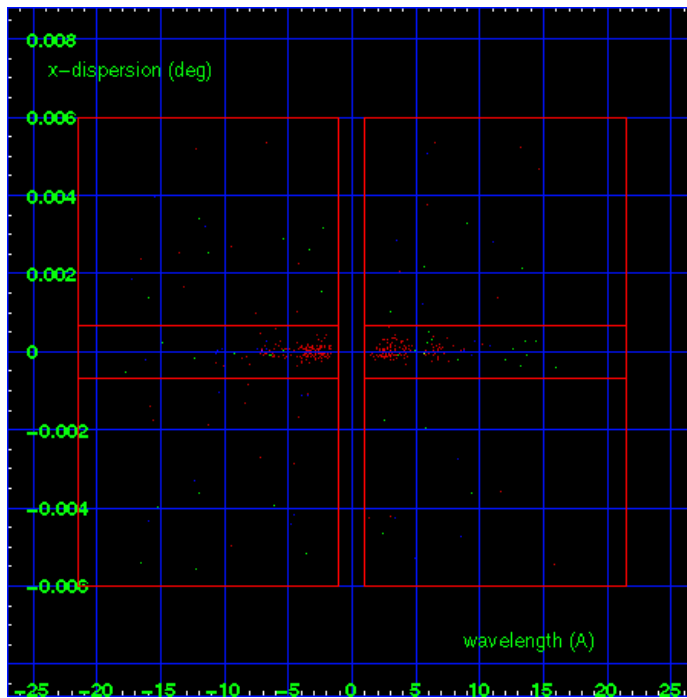
HEG Order Sort 123



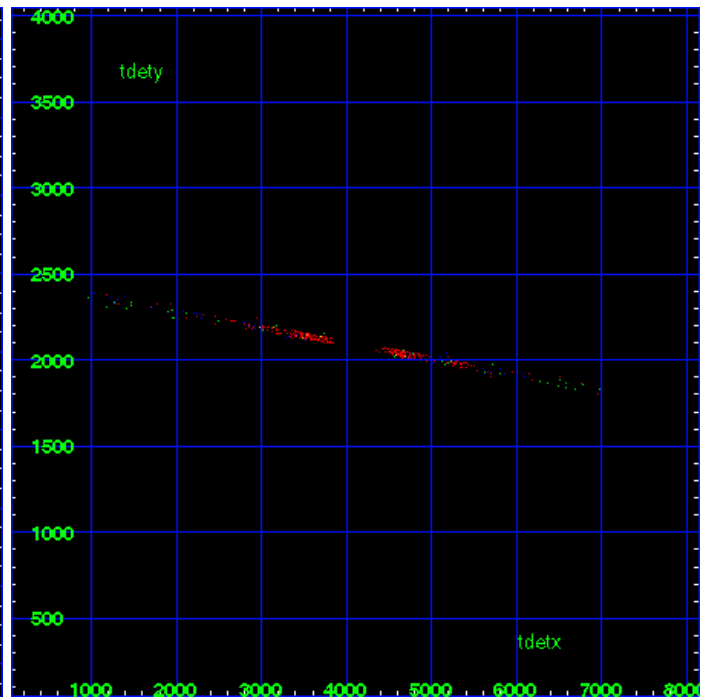
HEG Zero Order



HEG Order Sort ALL

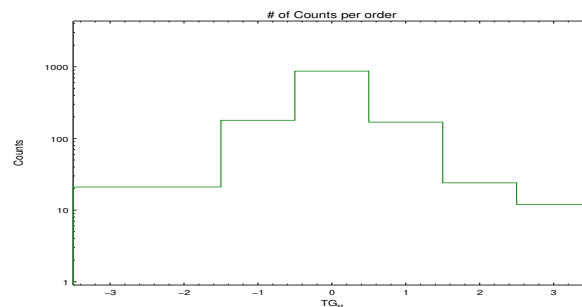


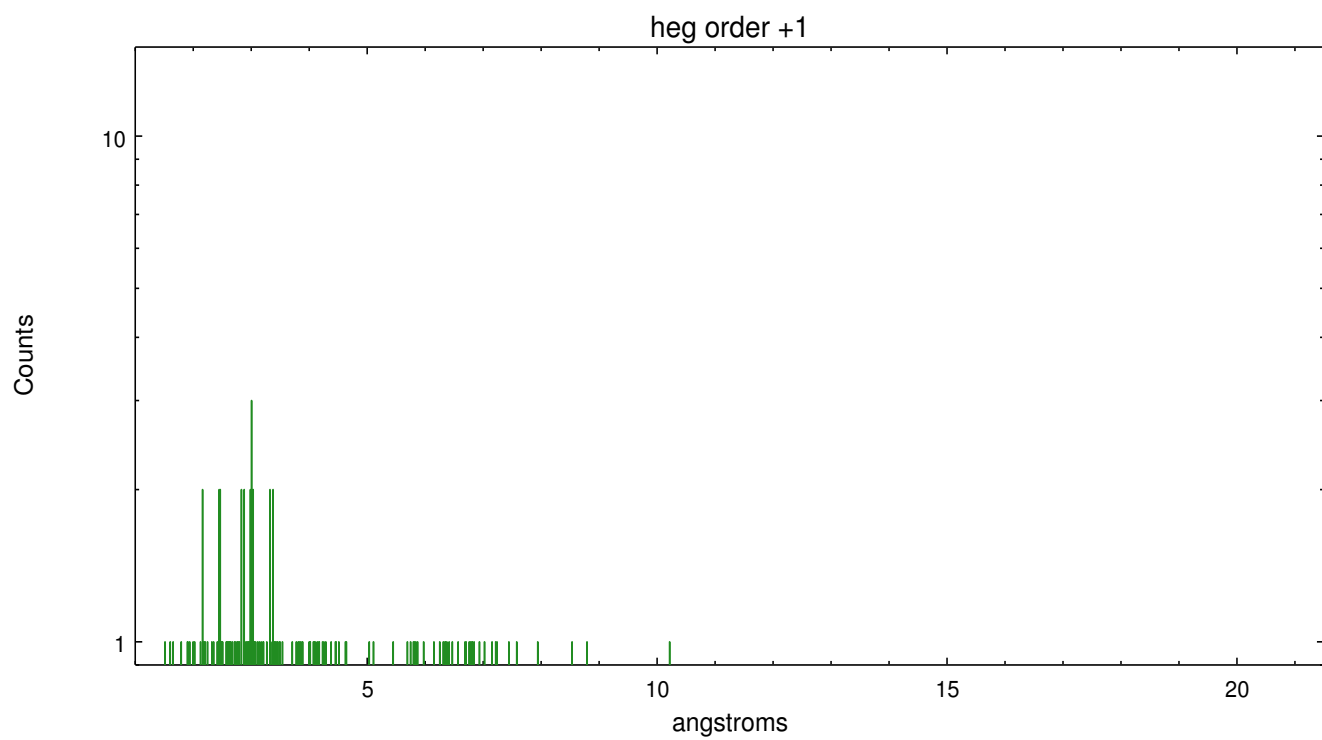
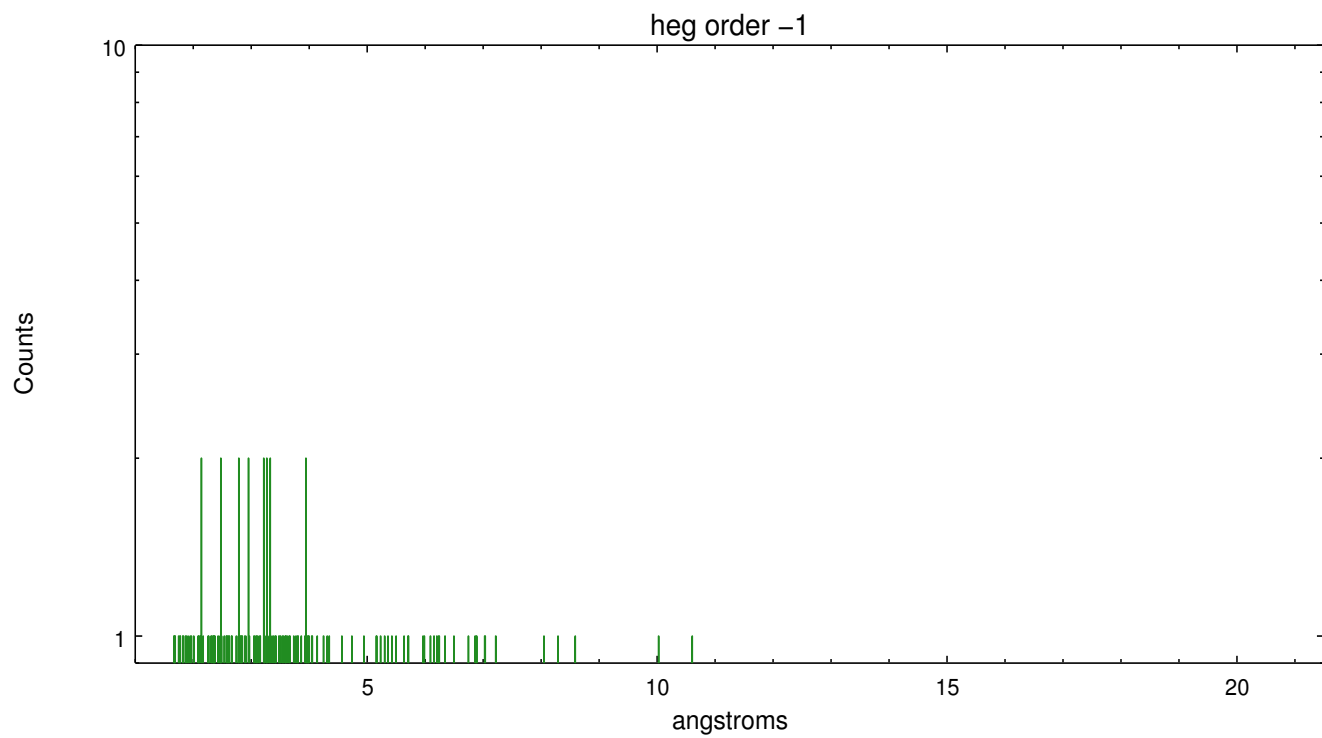
Spot Image HEG



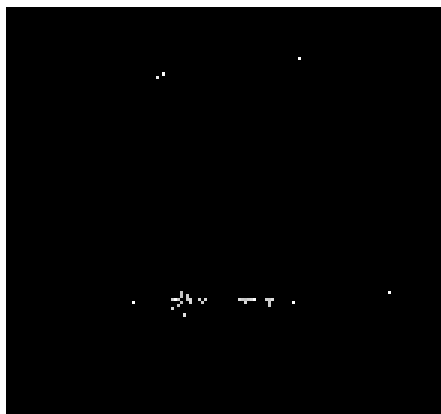
Full Detector HEG

| | order -3 | order -2 | order -1 | order 0 | order 1 | order 2 | order 3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 21 | 21 | 179 | 869 | 169 | 24 | 12 |

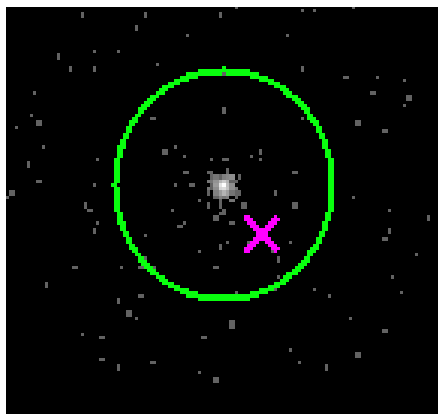




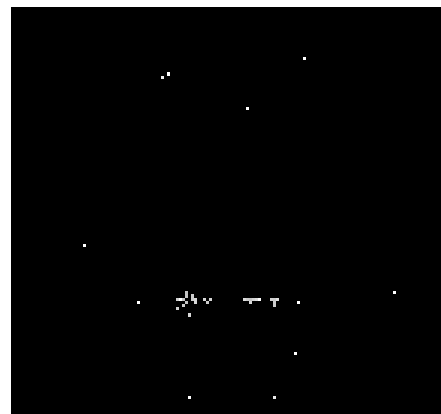
4.2 MEG Arm



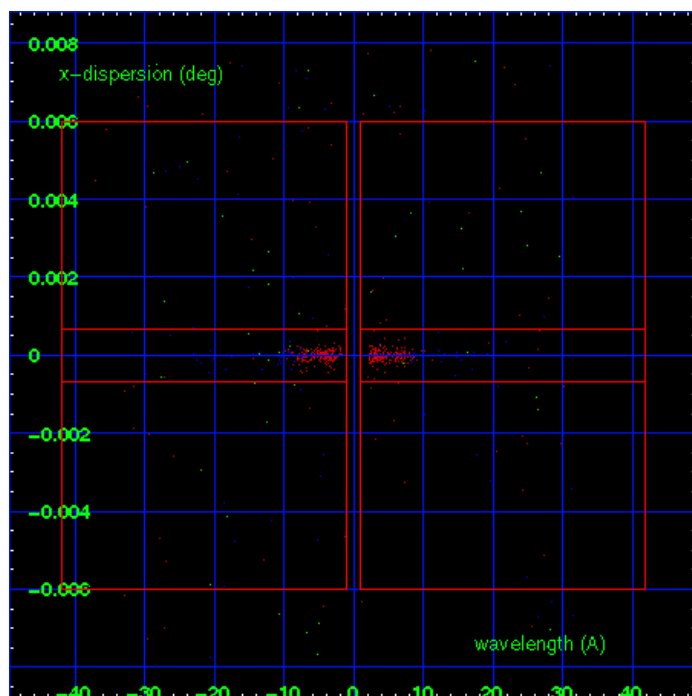
MEG Order Sort 123



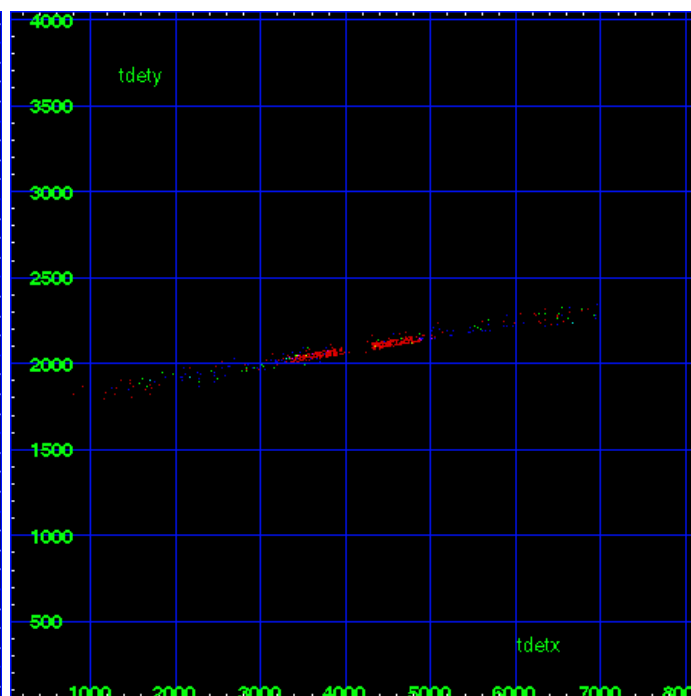
MEG Zero Order



MEG Order Sort ALL

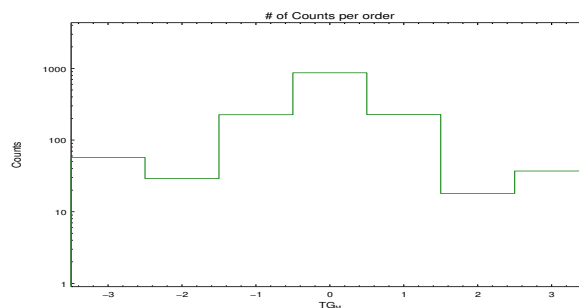


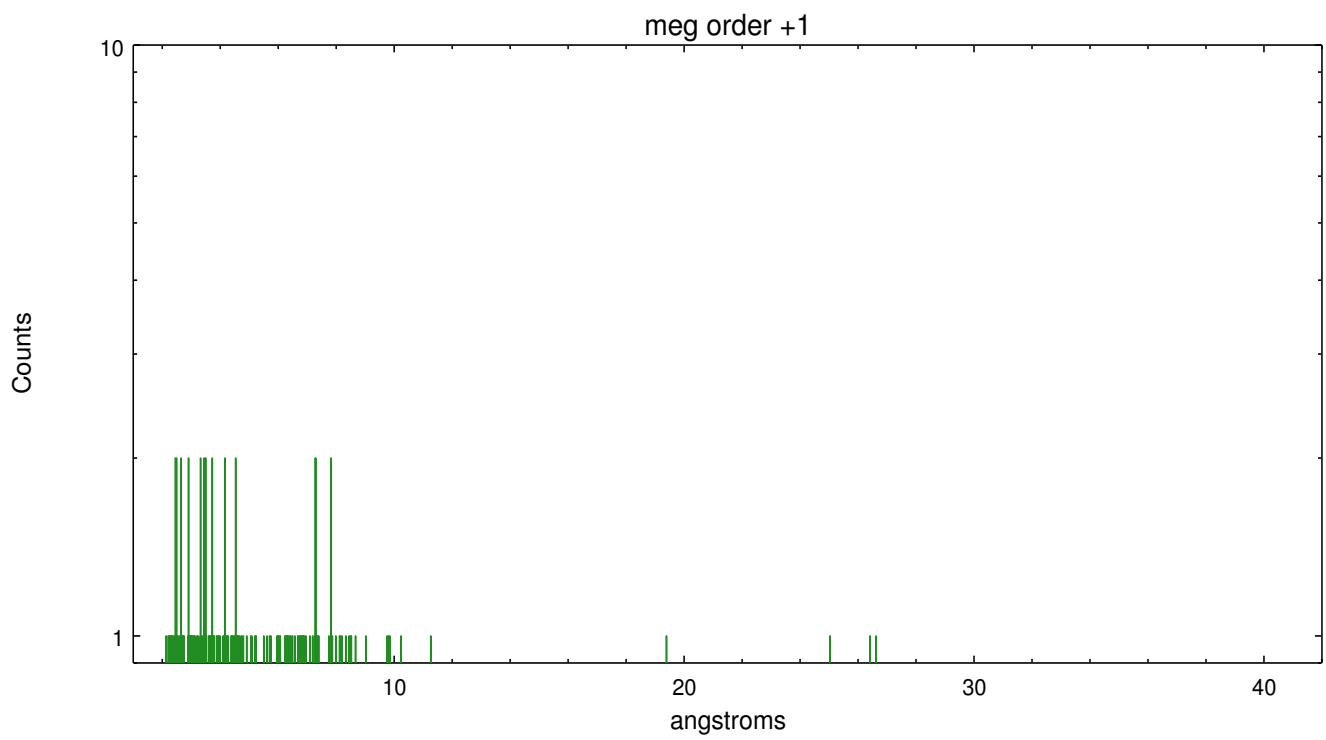
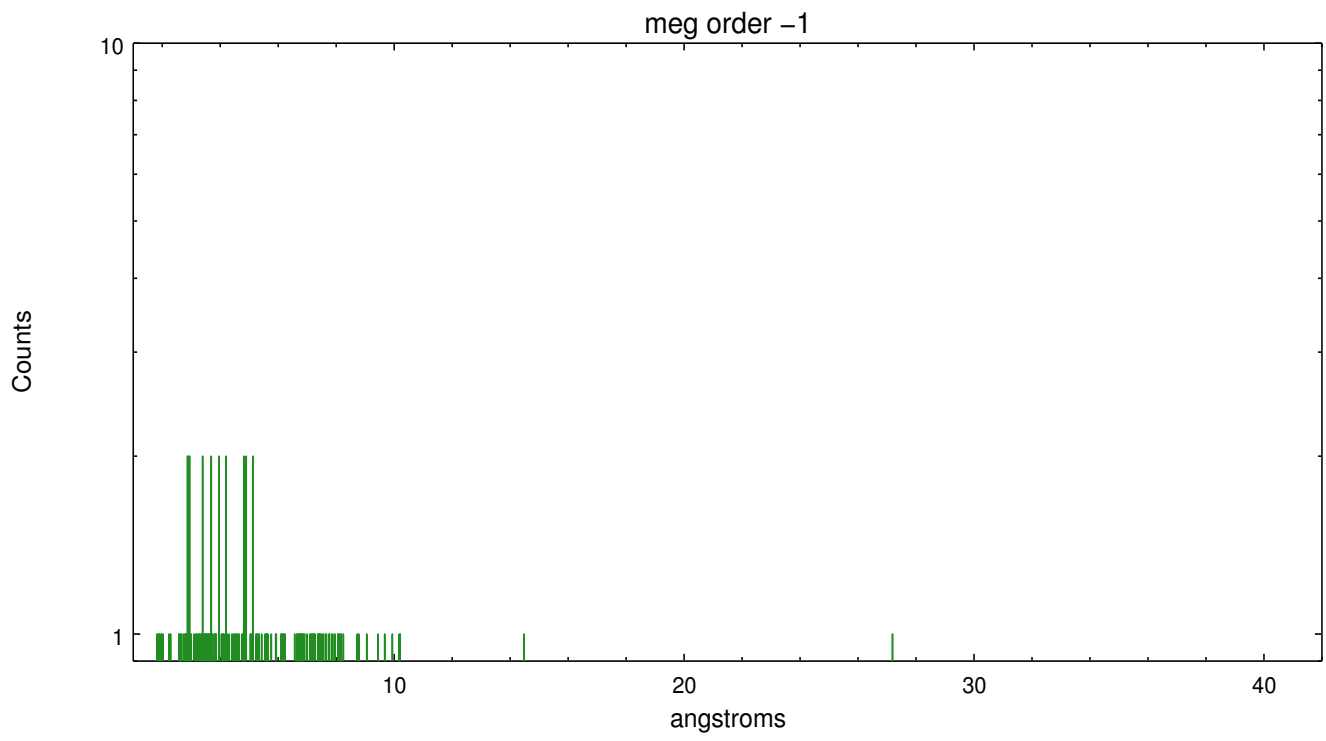
Spot Image MEG



Full Detector MEG

| | order -3 | order -2 | order -1 | order 0 | order 1 | order 2 | order 3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 57 | 29 | 226 | 869 | 227 | 18 | 37 |





A Summary

A.1 Status

| | |
|----------------------------|-------------|
| V&V Scientist | Joy Nichols |
| V&V Date (YYYY-MM-DD) | 2012.12.17 |
| V&V Edition | 1 |
| V&V Disposition and Status | OK |
| V&V Charge Time | 33.189 |

A.2 Comments

This is an interleaved-mode observation. The primary exposure (e1) is shorter than the secondary exposure (e2). Therefore the longer exposure was used to determine the zeroth order position, then that position was applied to both exposures. The zeroth order position used is $x=4086.5$, $y=4107.55$, the result obtained using the tool `tgdetect` on the e2 exposure.