V&V Reference Report
L2 ASCDS Version : 8.4.5

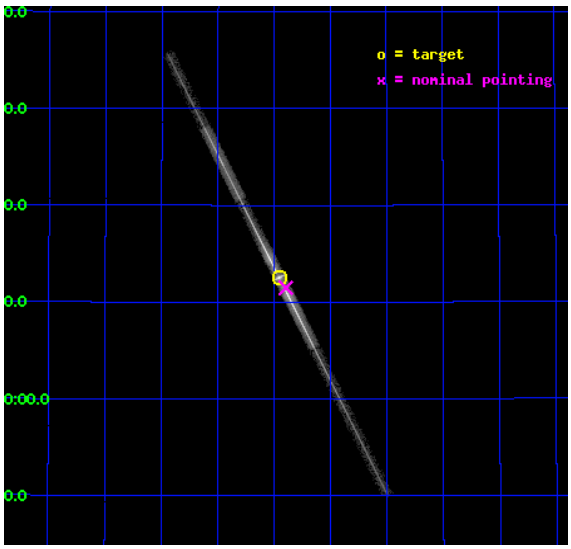
Observation 11607 - L2 Version 3
Chandra X-Ray Center

L2 Processing Date : Jun 18 2012

Contents

1 Front

seq_num	702193	Sequence number
obs_id	11607	Observation id
title	A Joint Chandra, Fermi, MAGIC, and VERITAS Broadband Study of One High-Energy Blazar in A Major Outburst	Proposal title
observer	Prof Alexander Konopelko	Principal investigator
object	Mrk 421	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.11375	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.09885521444	Nominal RA [deg]
dec_nom	38.191333147035	Nominal Dec [deg]
roll_nom	63.238119862379	Nominal Roll [deg]
revision	3	Processing version of data
ontime	5137.9999124408	Sum of GTIs [s]
livetime	4853.4491238105	Livetime [s]
ontime4	5137.9999124408	Sum of GTIs [s]
ontime5	5137.9980399013	Sum of GTIs [s]
ontime6	5137.956999898	Sum of GTIs [s]
ontime7	5137.9999124408	Sum of GTIs [s]
ontime8	5137.9159598947	Sum of GTIs [s]
ontime9	5137.8749198914	Sum of GTIs [s]
l2events	184392	Number of level 2 events

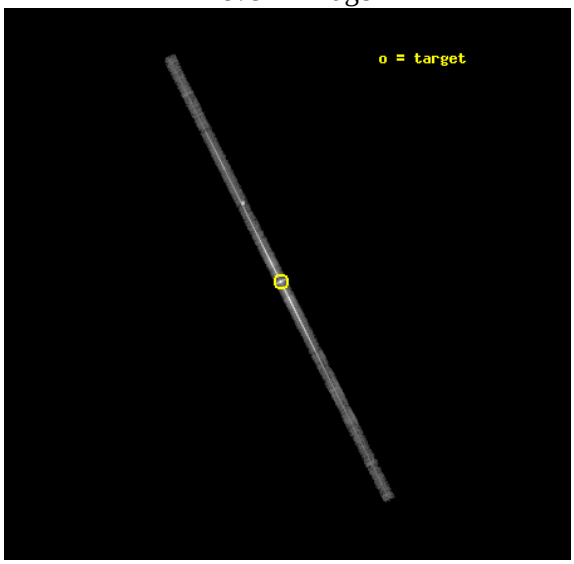


2 OBI

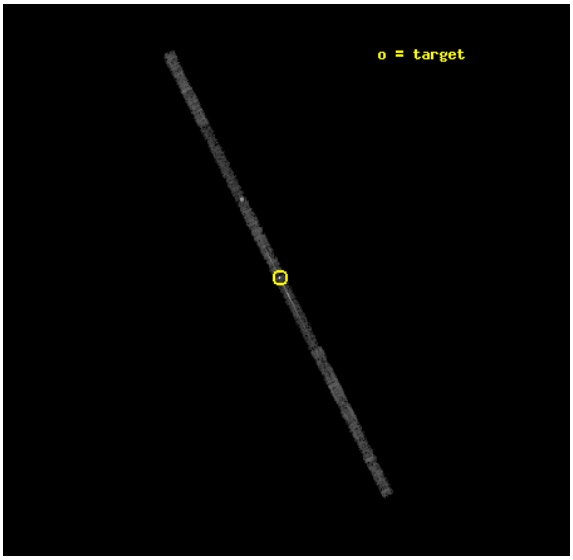
2.1 OBI

2.1.1 Images

Level 1 Image



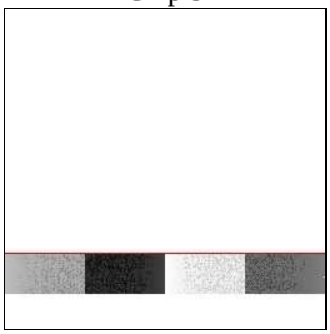
Level 1 Bad Events



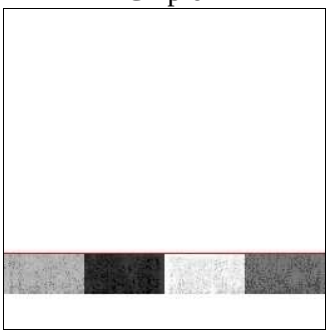
2.1.2 Bias

Chip 4

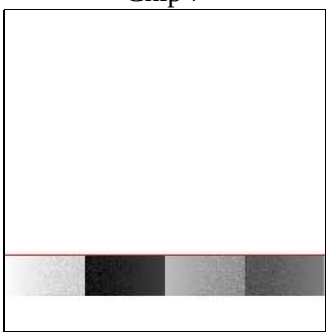
Chip 5



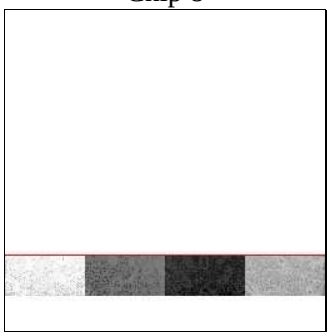
Chip 6



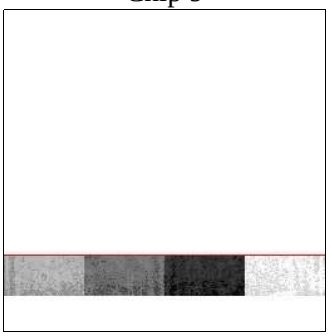
Chip 7



Chip 8



Chip 9



2.1.3 Parameters

obi_num	1	Obi number
ascdsver	8.4.5	Processing system revision
caldbver	4.4.10	
date	2012-06-17T04:44:36	Date and time of file creation
revision	2	Processing version of data

sched_exp_time	5000.000000	[s] Scheduled observation exposure time
ontime	5137.9999124408	Sum of GTIs [s]
ontime4	5137.9999124408	Sum of GTIs [s]
ontime5	5137.9980399013	Sum of GTIs [s]
ontime6	5137.956999898	Sum of GTIs [s]
ontime7	5137.9999124408	Sum of GTIs [s]
ontime8	5137.9159598947	Sum of GTIs [s]
ontime9	5137.8749198914	Sum of GTIs [s]
l1events	239248	Number of level 1 events

2.1.4 Events

	ccd 4	**ccd 5**	**ccd 6**	**ccd 7**	**ccd 8**	**ccd 9**
level 1 events	10506	24789	69527	110115	15368	8943
rejected events	7724	5290	7268	10069	7780	6300
rejected %	73%	21%	10%	9%	50%	70%

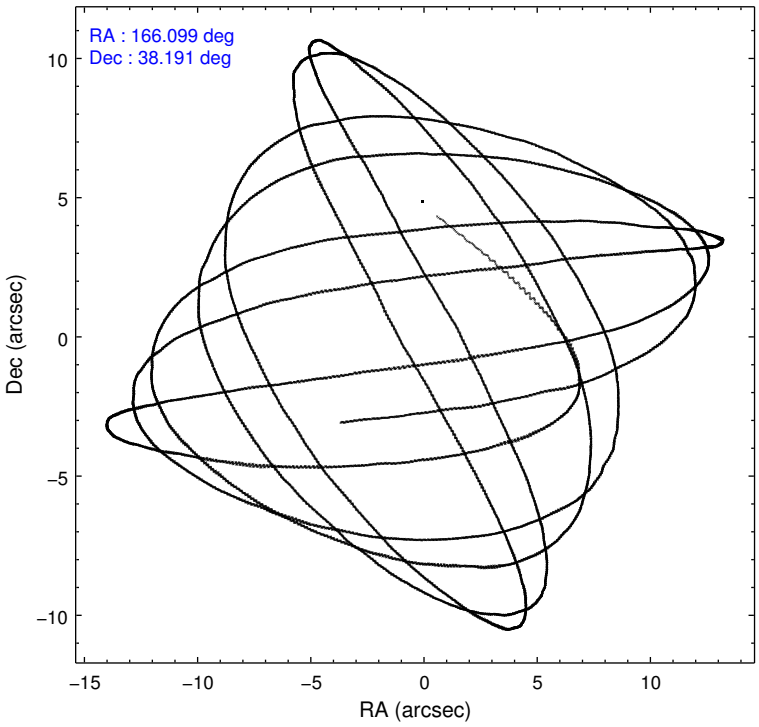
	ccd 4	**ccd 5**	**ccd 6**	**ccd 7**	**ccd 8**	**ccd 9**
grade 0 events	1919	7773	49636	26763	5006	1849
	18%	31%	71%	24%	32%	20%
grade 1 events	6	458	406	487	13	5
	0%	1%	0%	0%	0%	0%
grade 2 events	322	4013	6632	25777	1009	289
	3%	16%	9%	23%	6%	3%
grade 3 events	172	1506	2146	11652	423	191
	1%	6%	3%	10%	2%	2%
grade 4 events	162	2070	2143	11525	376	153
	1%	8%	3%	10%	2%	1%
grade 5 events	240	1736	499	2571	296	215
	2%	7%	0%	2%	1%	2%
grade 6 events	207	4138	1706	24347	777	162
	1%	16%	2%	22%	5%	1%
grade 7 events	7478	3095	6359	6993	7468	6079
	71%	12%	9%	6%	48%	67%

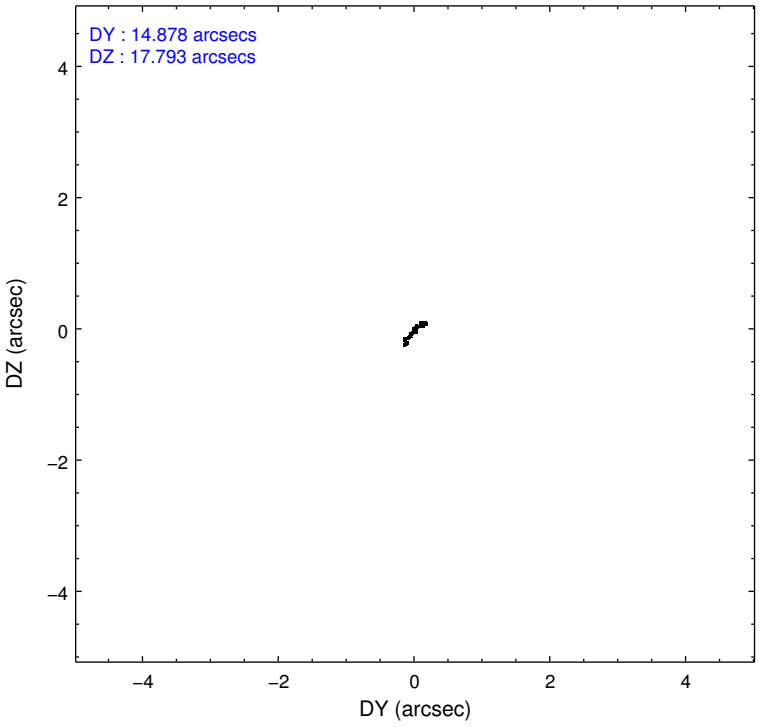
2.2 Compared Parameters

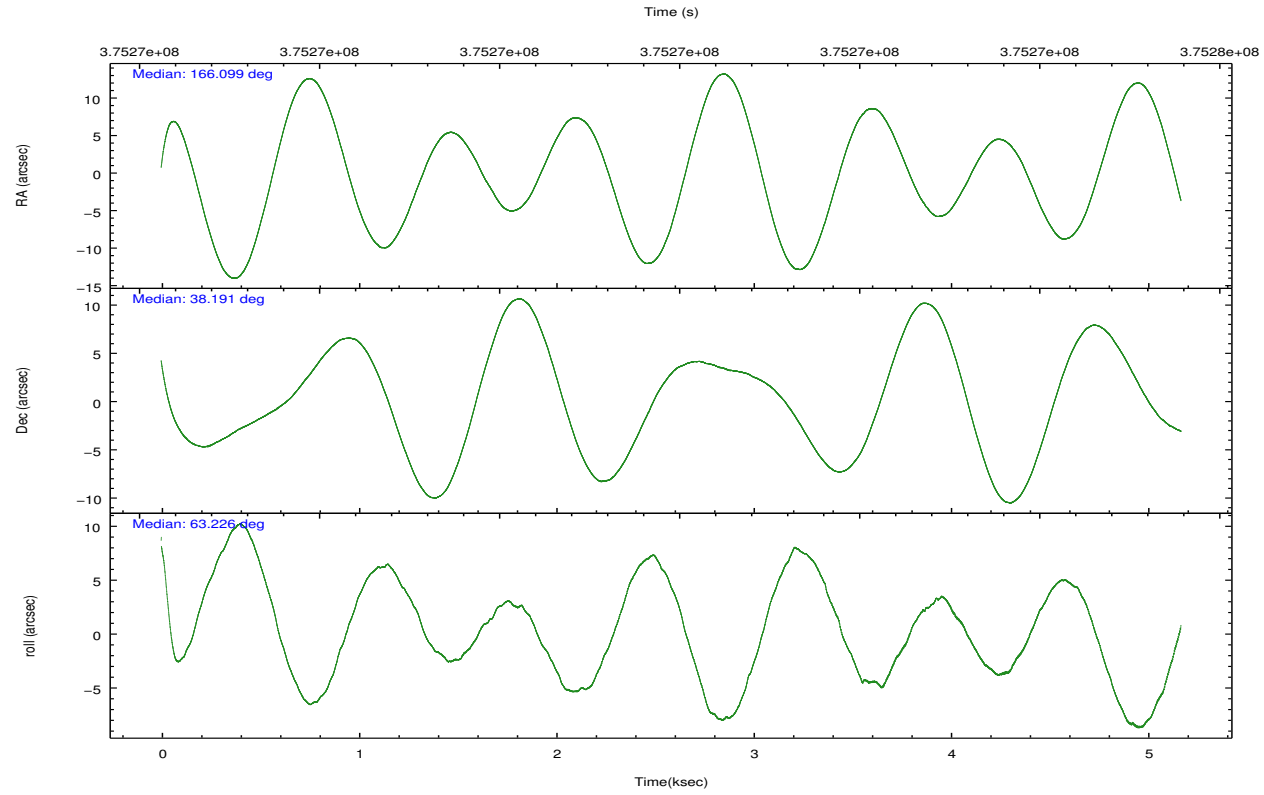
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-456789	ACIS-456789
Grating	LETG	LETG
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	166.101259	166.098855214439
[deg] Pointing Dec	38.164073	38.1913331470352
[deg] Pointing Roll	63.079989	63.23811986237915
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[mm] SIM defocus	0	0.001444936568705701
[mm] SIM translation stage pos	-182.132523	-182.1370004450064
[mm] SIM translation stage offset	-8	-7.995522138001405
[s] Observation start time (MET)	375269538.184000	375268709.16391
Observation start date	2009-11-22T09:31:12	2009-11-22T09:18:29
[s] Observation end time (MET)	375274538.184000	375275313.23924
Observation end date	2009-11-22T10:54:32	2009-11-22T11:08:33
Read mode	TIMED	TIMED

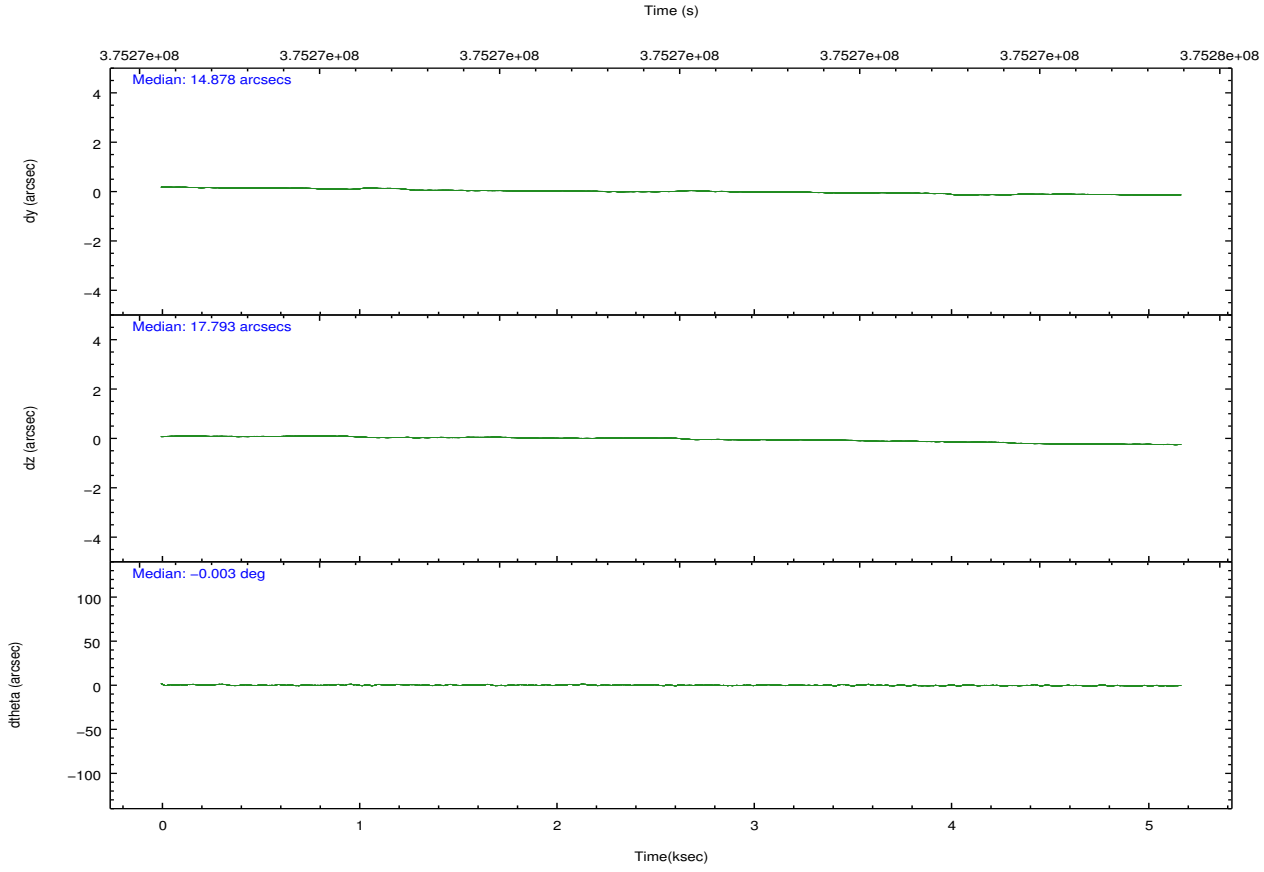
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	CUSTOM	1/8
Subarray start row	113	113
Subarray row count	128	128
Alternating exposures requested	N	N
[s] Primary exposure time	0.000000	0.7

2.3 Aspect


RA : 166.099 deg
Dec : 38.191 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−15
−10
−5
0
5
10


DY : 14.878 arcsecs
DZ : 17.793 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7528e+08
Median: 166.099 deg
RA (arcsec)
Median: 38.191 deg
Dec (arcsec)
Median: 63.226 deg
roll (arcsec)
Time(ksec)

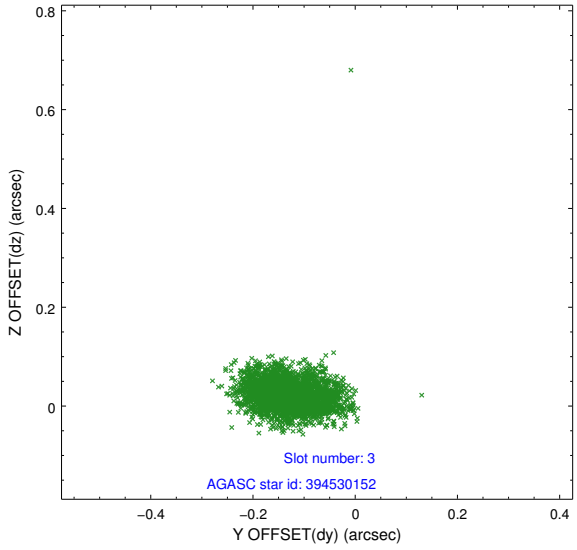

Time (s)
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7527e+08
3.7528e+08
Median: 14.878 arcsecs
dy (arcsec)
Median: 17.793 arcsecs
dz (arcsec)
Median: −0.003 deg
dtheta (arcsec)
Time(ksec)

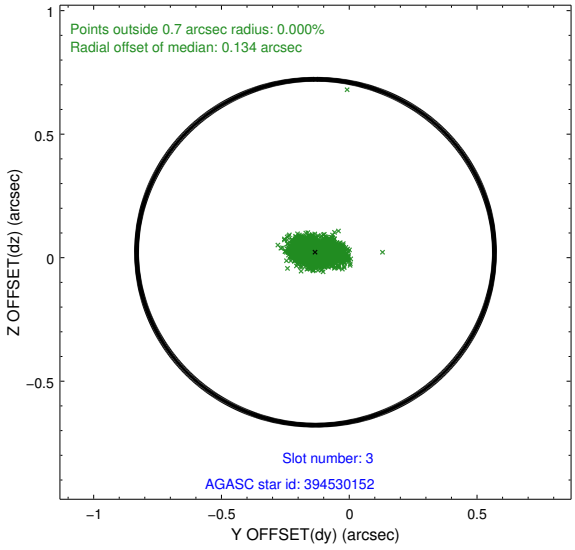
Slot Statistics

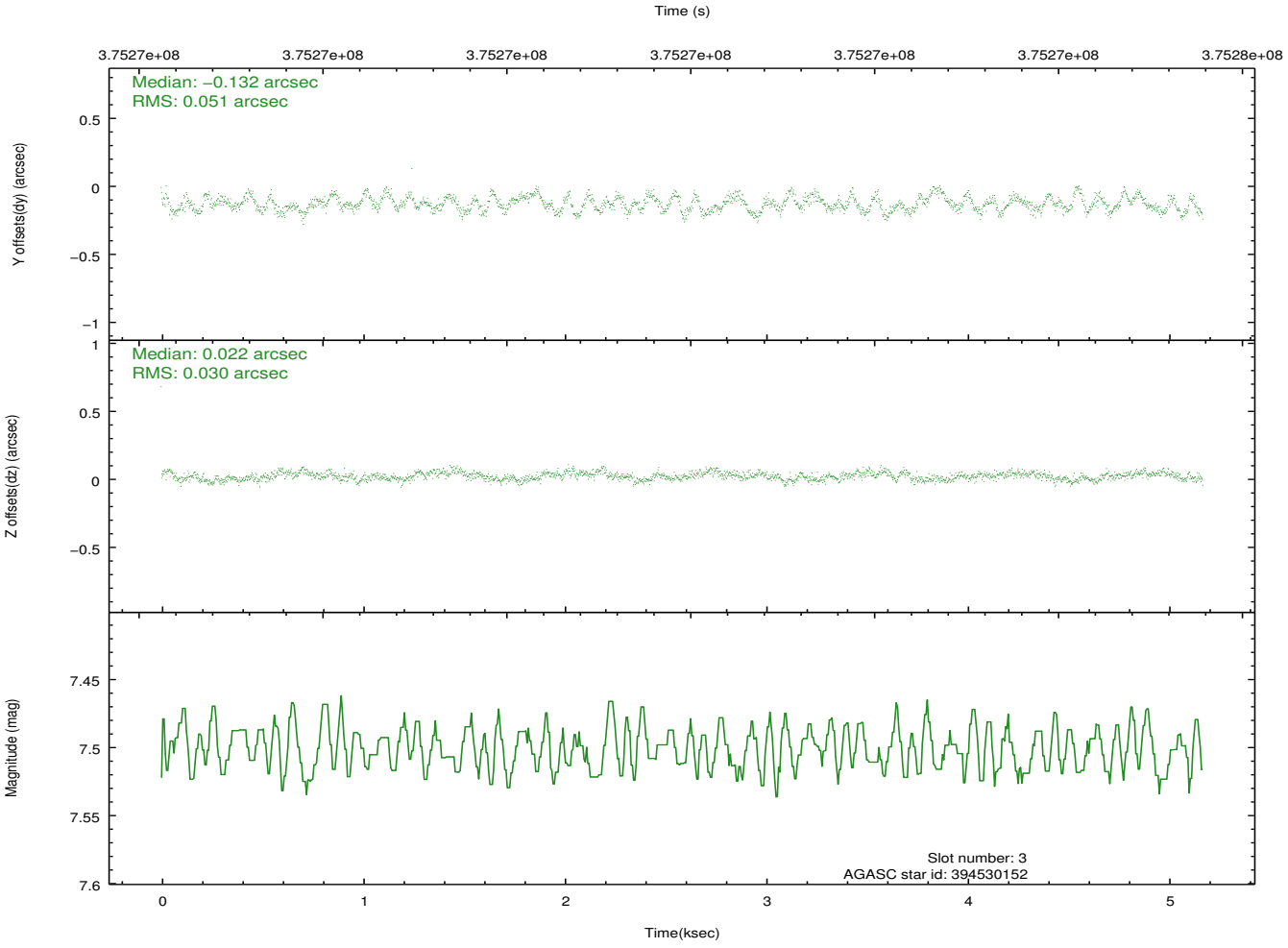
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-2	6.85	1261	-0.148	-0.119	0.006	0.010	0.000000	0.000000	-767.46	-1904.02
1	FID	ACIS-S-4	6.92	1261	0.127	0.079	0.007	0.011	0.000000	0.000000	2145.59	3.24
2	FID	ACIS-S-6	7.16	1261	-0.007	0.048	0.008	0.013	0.000000	0.000000	396.22	641.98
3	GUIDE	394530152	7.50	2522	-0.132	0.022	0.062	0.100	166.075805	38.868252	2227.91	1211.76
4	GUIDE	394533848	8.73	2522	0.259	0.001	0.067	0.109	166.382906	38.276007	721.24	-522.99
5	GUIDE	394546712	6.61	2523	0.134	0.021	0.065	0.112	166.451462	38.394357	1188.45	-504.32
6	GUIDE	394546720	6.40	2523	-0.132	0.265	0.086	0.153	166.130115	38.241361	285.58	53.23
7	GUIDE	394527560	7.66	2521	-0.144	-0.313	0.052	0.087	165.970713	38.960939	2392.52	1624.92

2.4 Star Slots

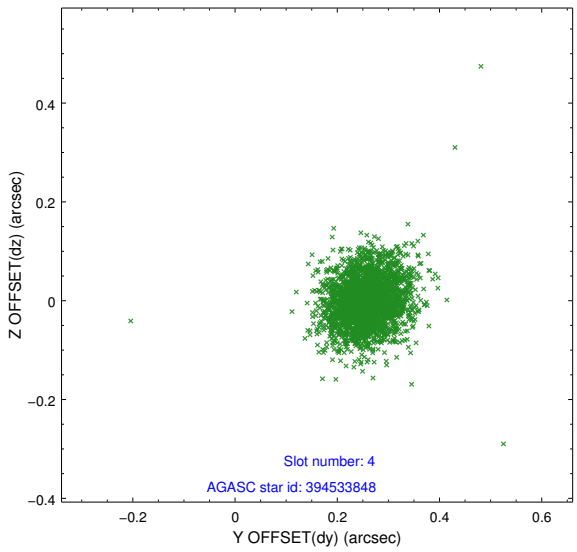
2.4.1 Slot 3

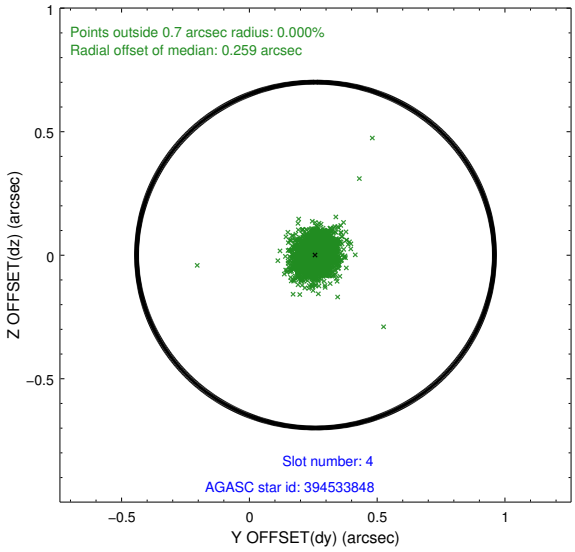


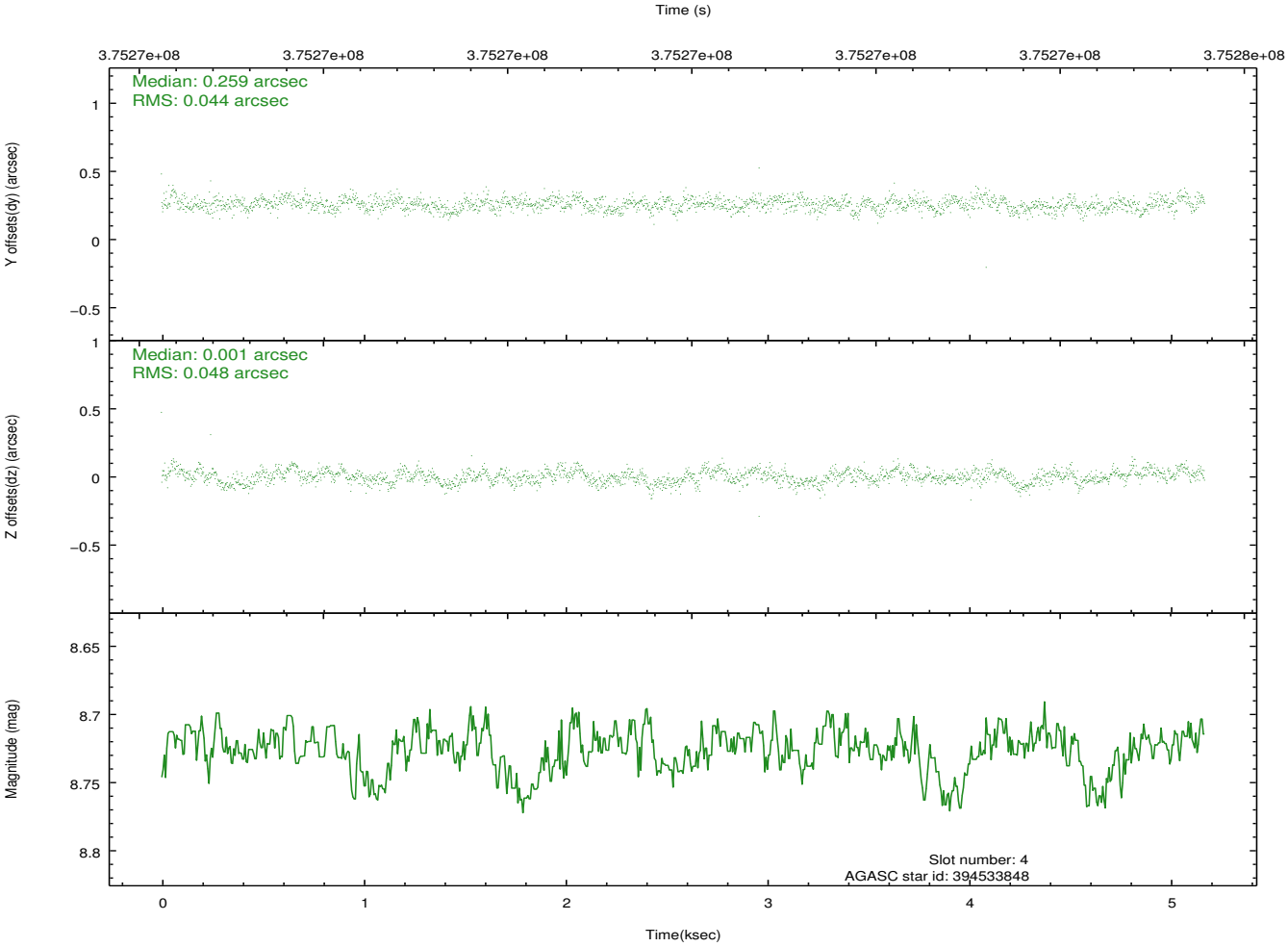




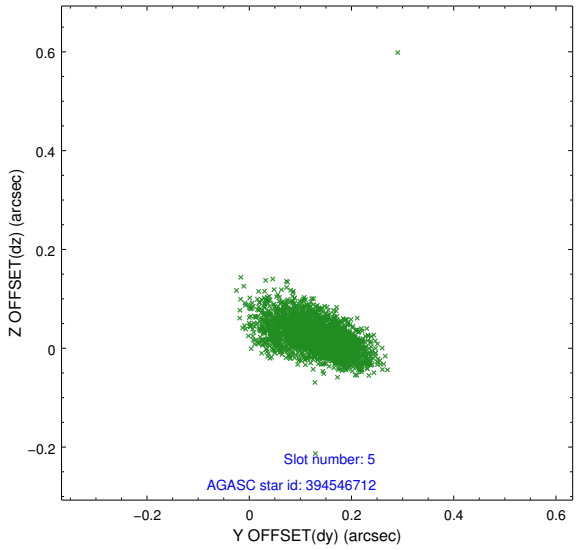
2.4.2 Slot 4

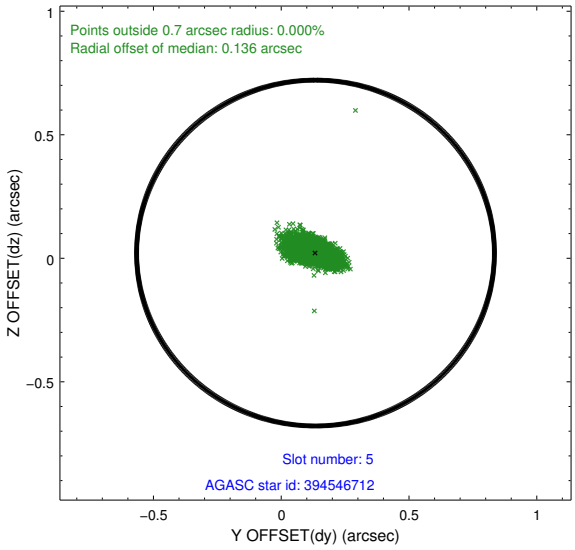

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 394533848

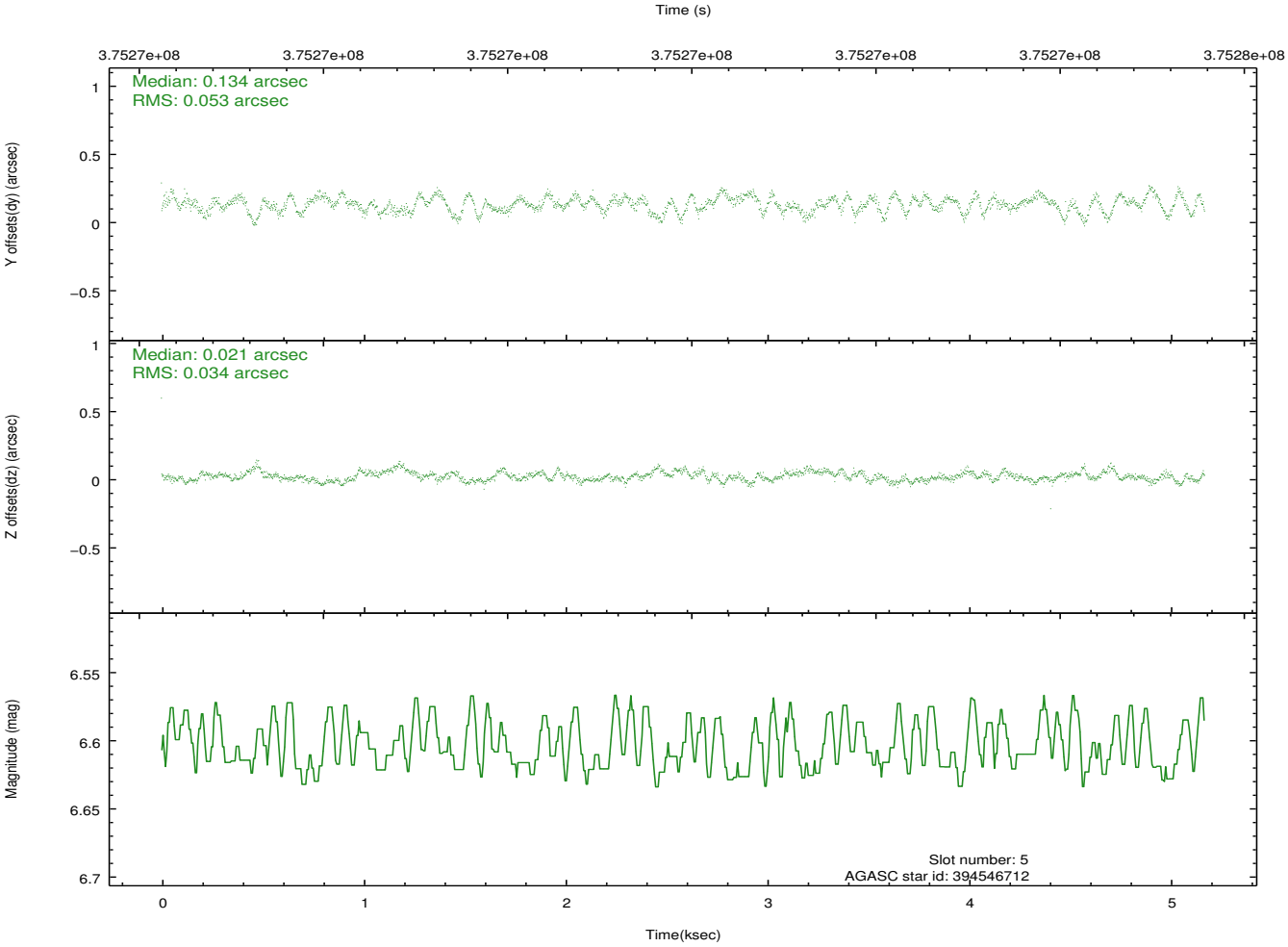

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.259 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 394533848


Time (s)
Median: 0.259 arcsec
RMS: 0.044 arcsec
Y offsets(dy) (arcsec)
Median: 0.001 arcsec
RMS: 0.048 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 394533848
Time(ksec)

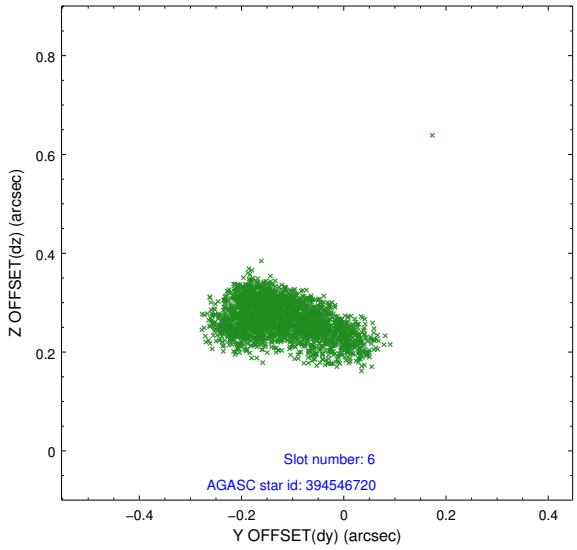
2.4.3 Slot 5

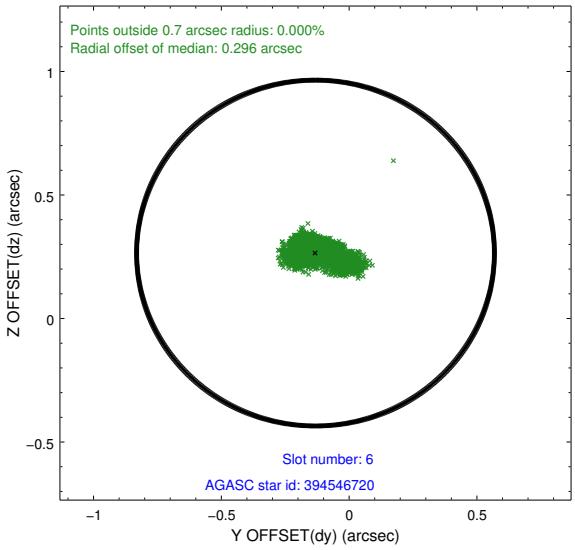

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 394546712

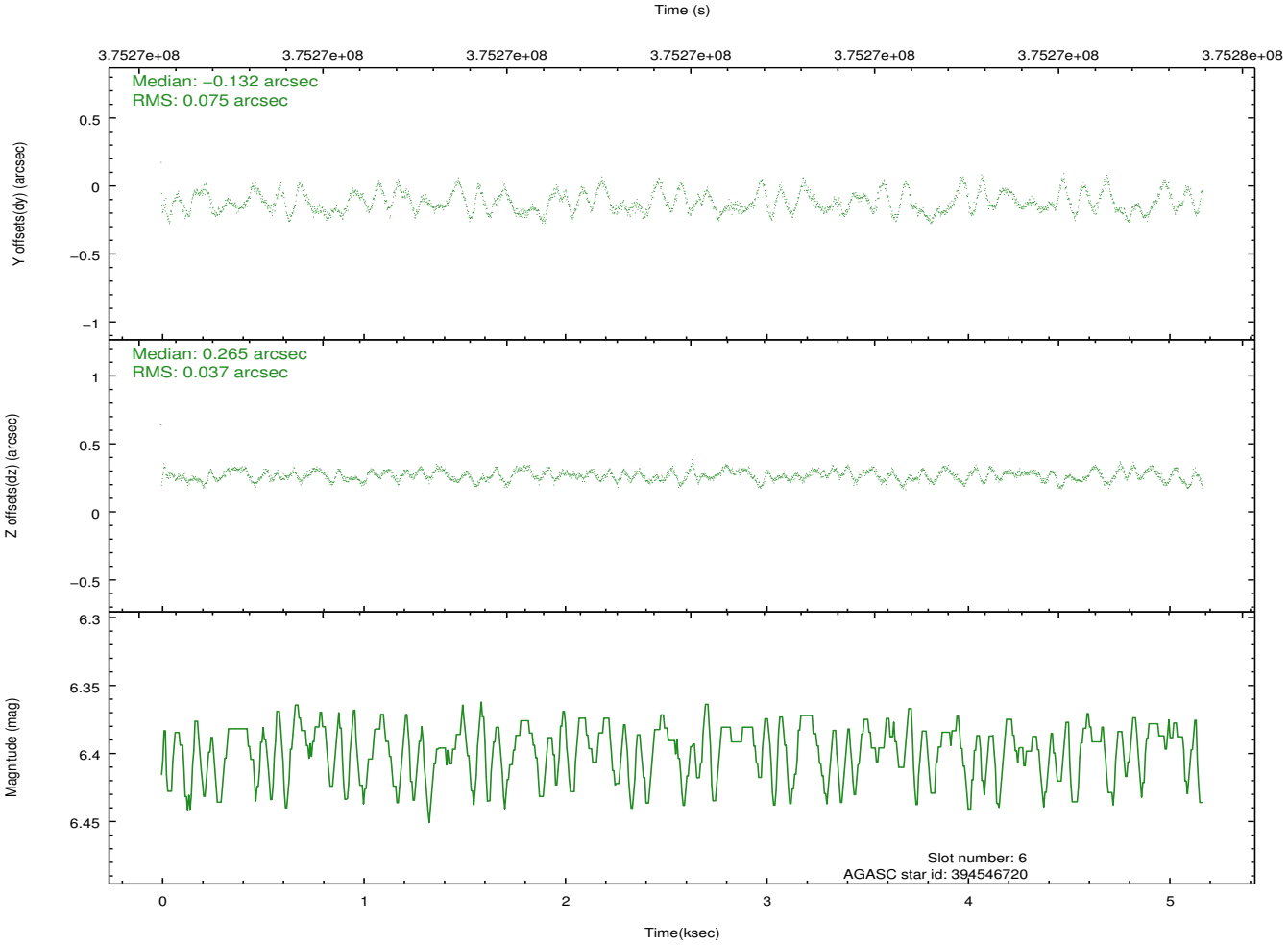

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.136 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 394546712


Time (s)
Median: 0.134 arcsec
RMS: 0.053 arcsec
Y offsets(dy) (arcsec)
Median: 0.021 arcsec
RMS: 0.034 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 394546712
Time(ksec)

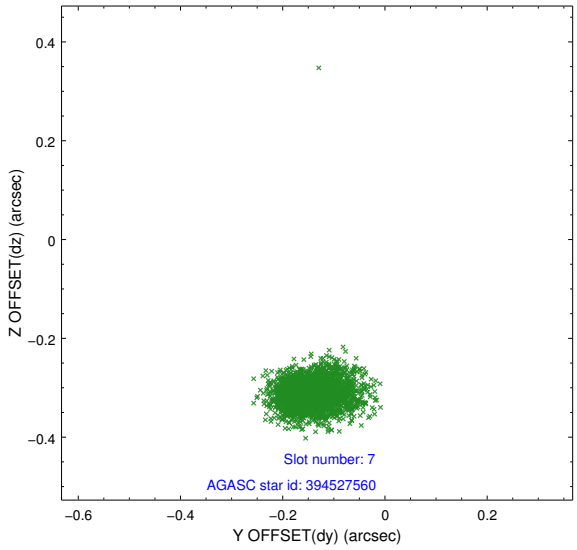
2.4.4 Slot 6

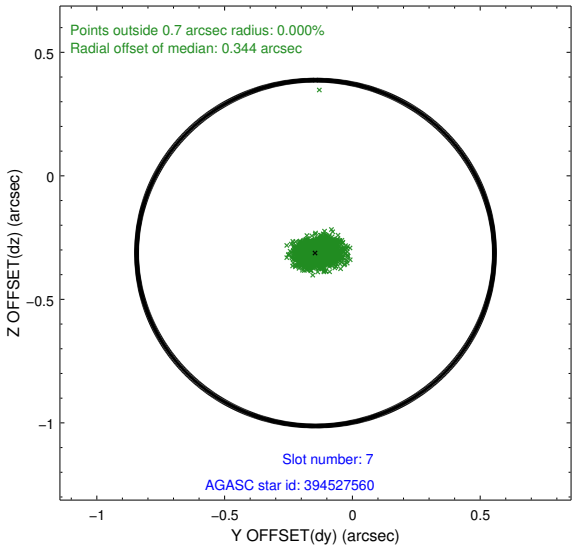

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 394546720

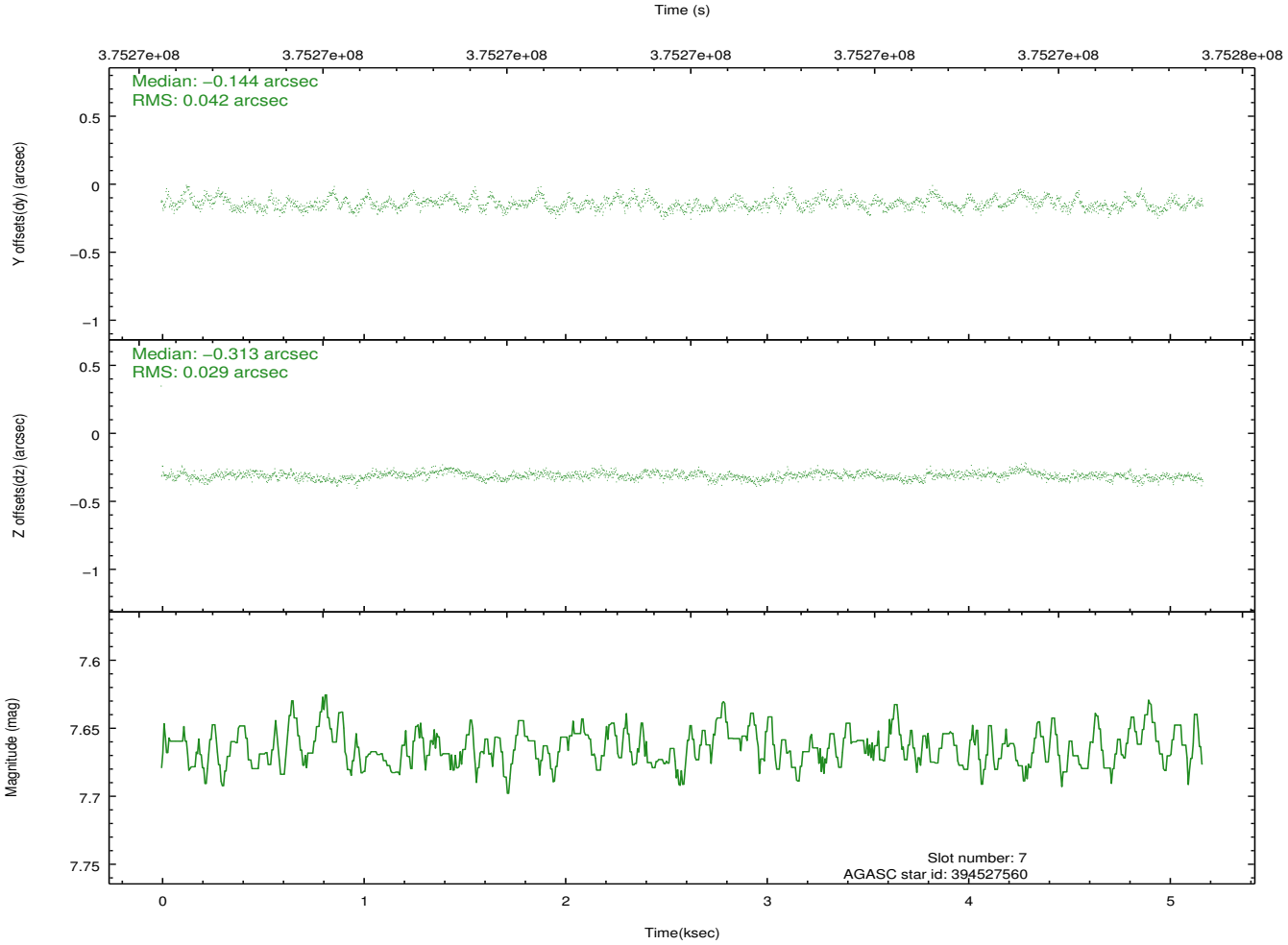

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.296 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 394546720


Time (s)
Median: −0.132 arcsec
RMS: 0.075 arcsec
Y offsets(dy) (arcsec)
Median: 0.265 arcsec
RMS: 0.037 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 394546720
Time(ksec)

2.4.5 Slot 7

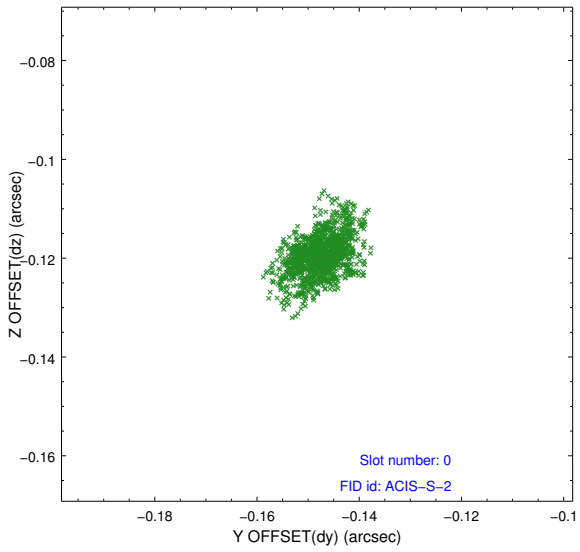

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 394527560

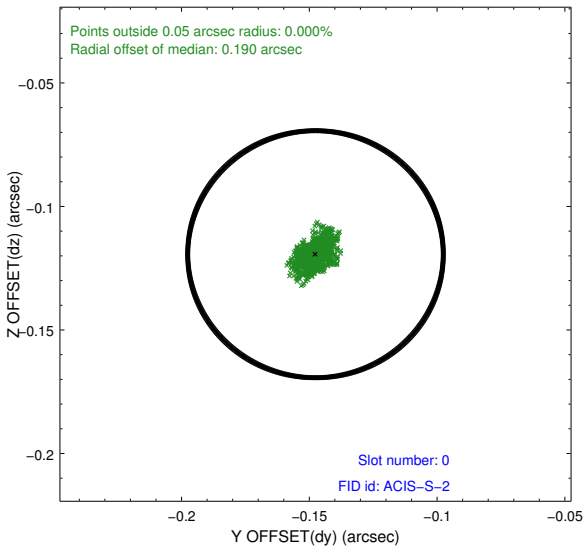

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.344 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 394527560

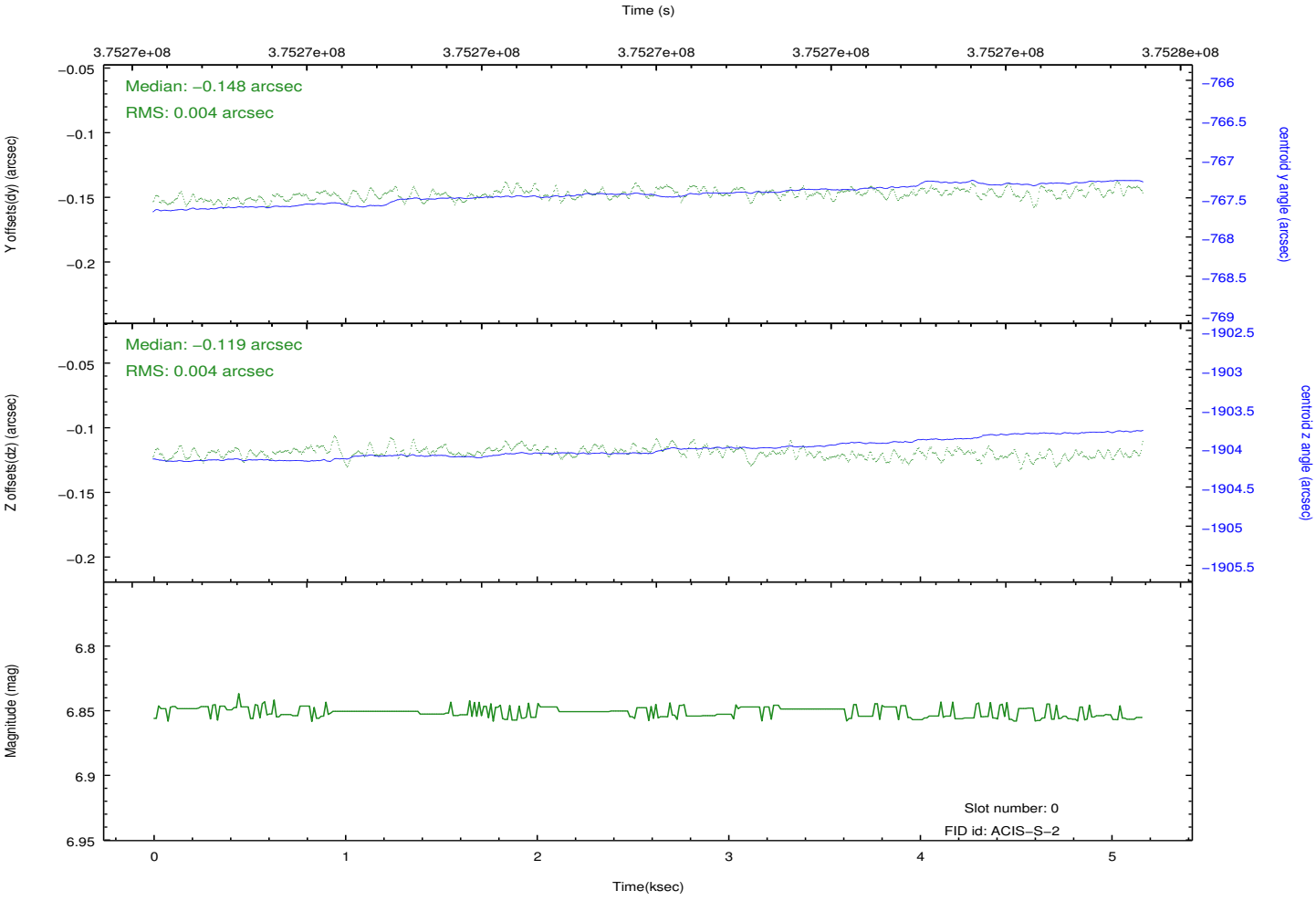

Time (s)
Median: −0.144 arcsec
RMS: 0.042 arcsec
Y offsets(dy) (arcsec)
Median: −0.313 arcsec
RMS: 0.029 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 394527560
Time(ksec)

2.5 FID Slots

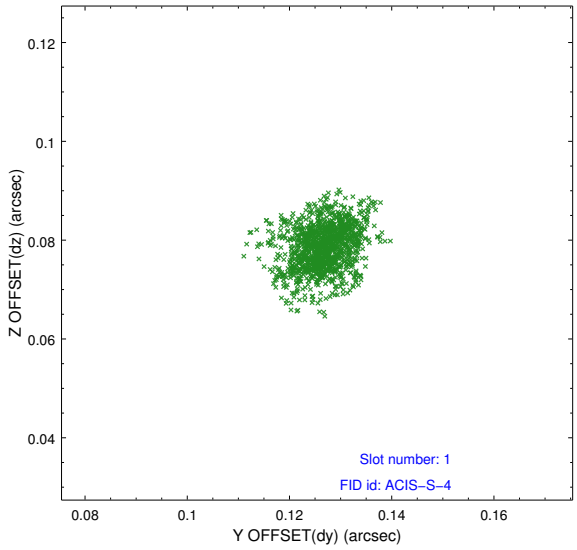
2.5.1 Slot 0

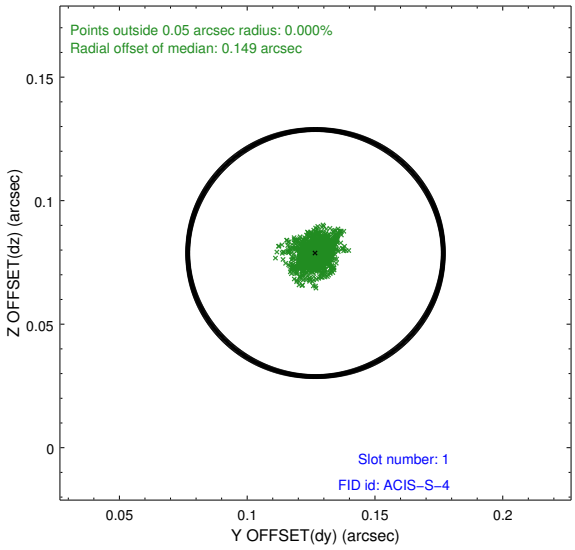


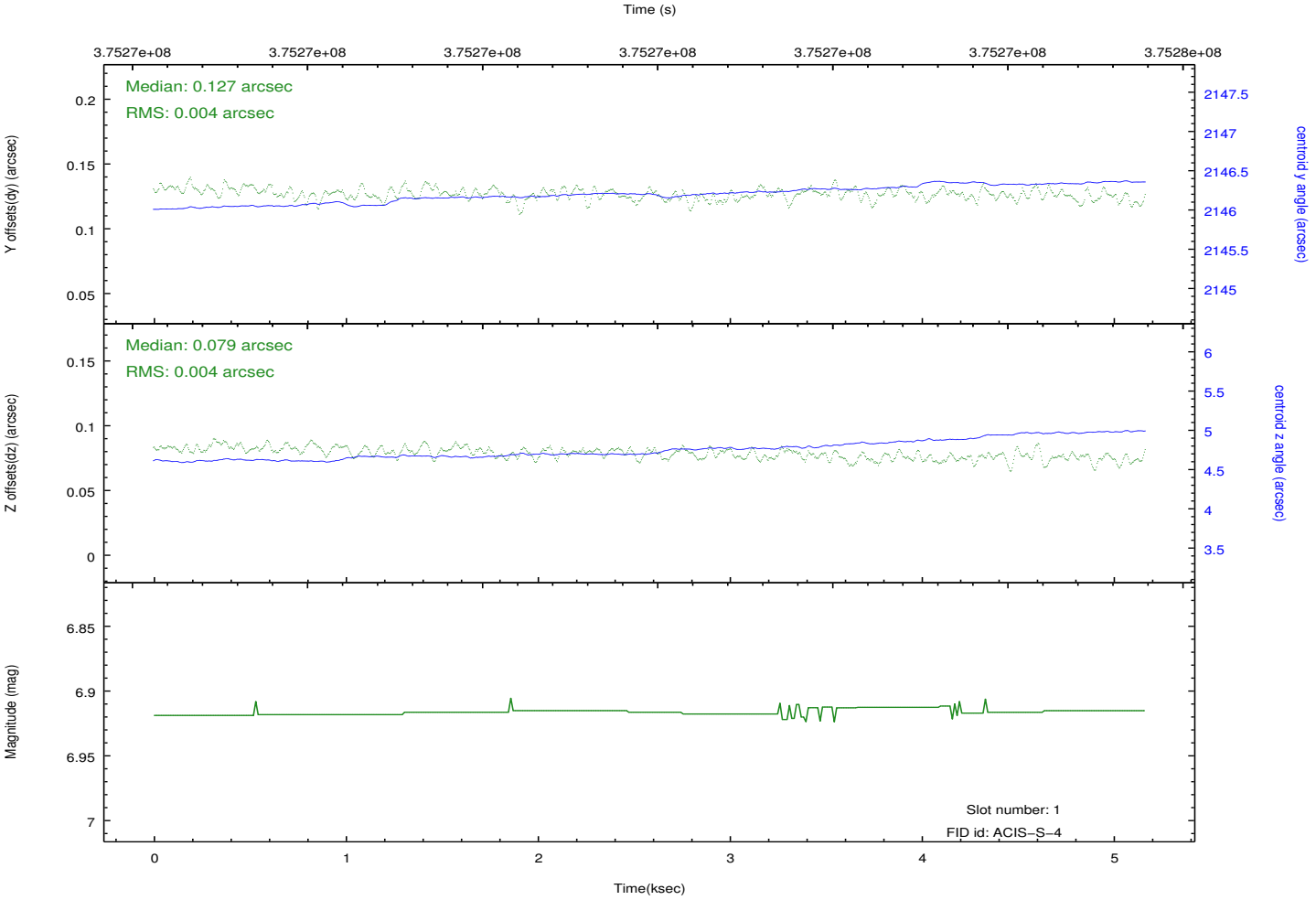




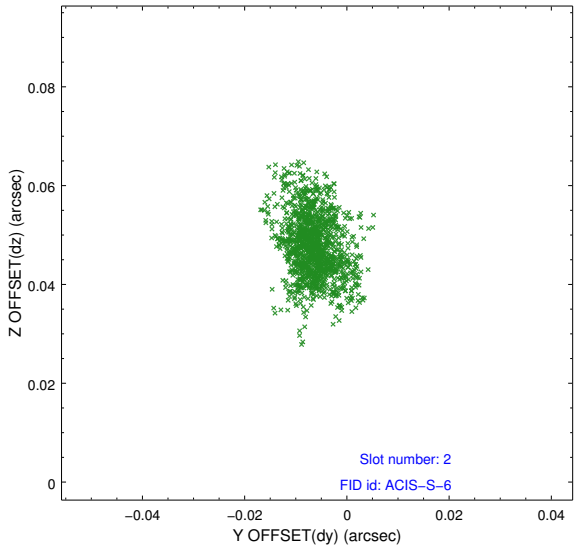
2.5.2 Slot 1

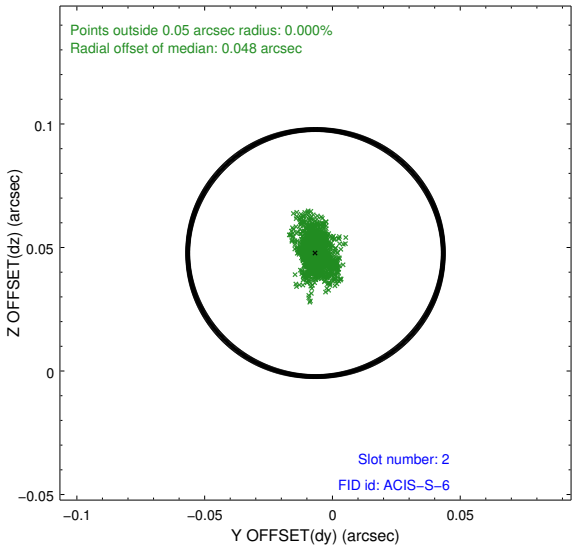

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

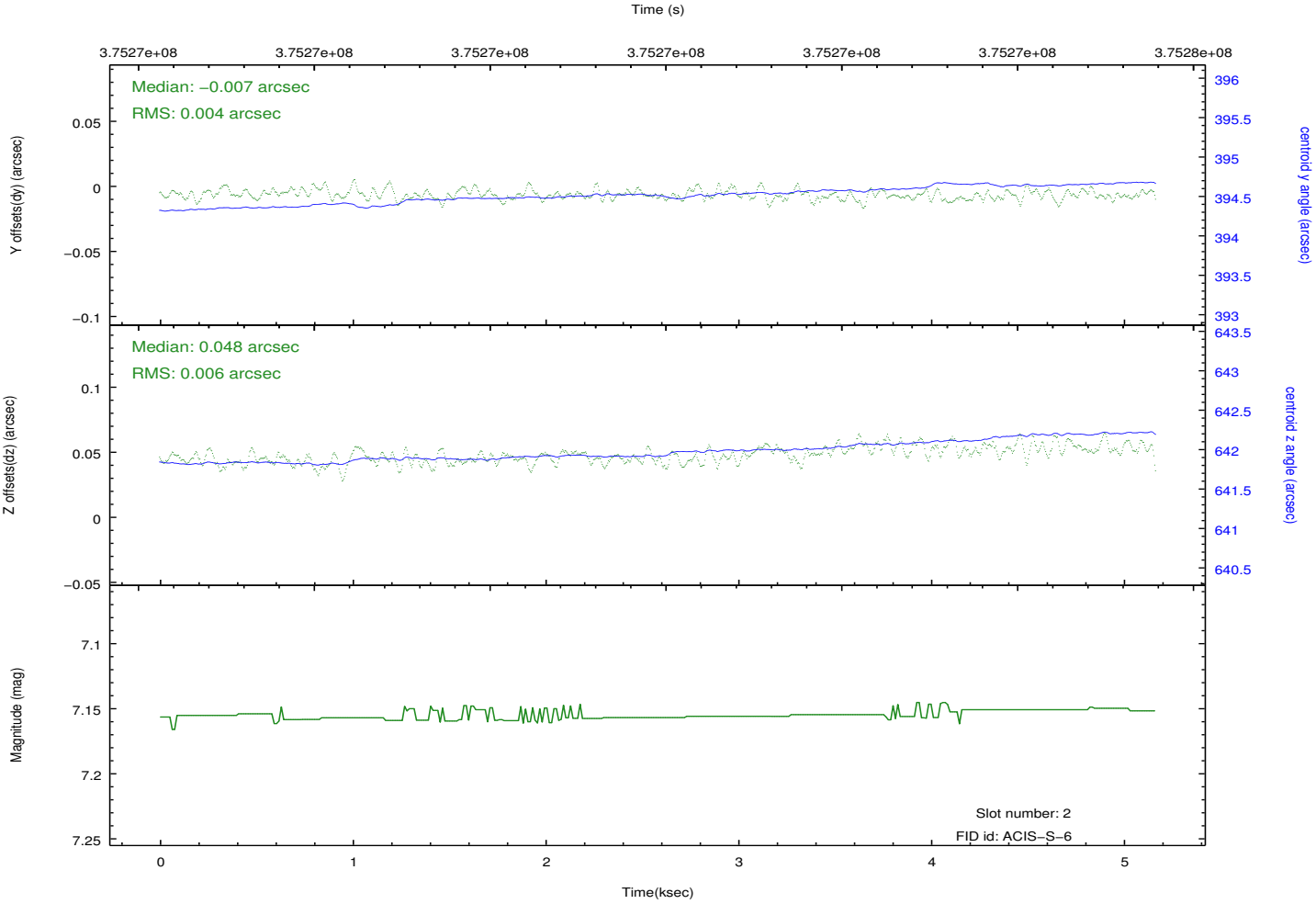

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.149 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.127 arcsec
RMS: 0.004 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.079 arcsec
RMS: 0.004 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 1
FID id: ACIS−S−4
Time(ksec)

2.5.3 Slot 2


Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6

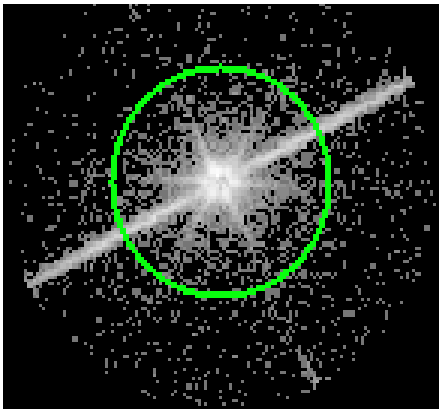

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.048 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6


Time (s)
Median: −0.007 arcsec
RMS: 0.004 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.048 arcsec
RMS: 0.006 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−6
Time(ksec)

3 Gratings

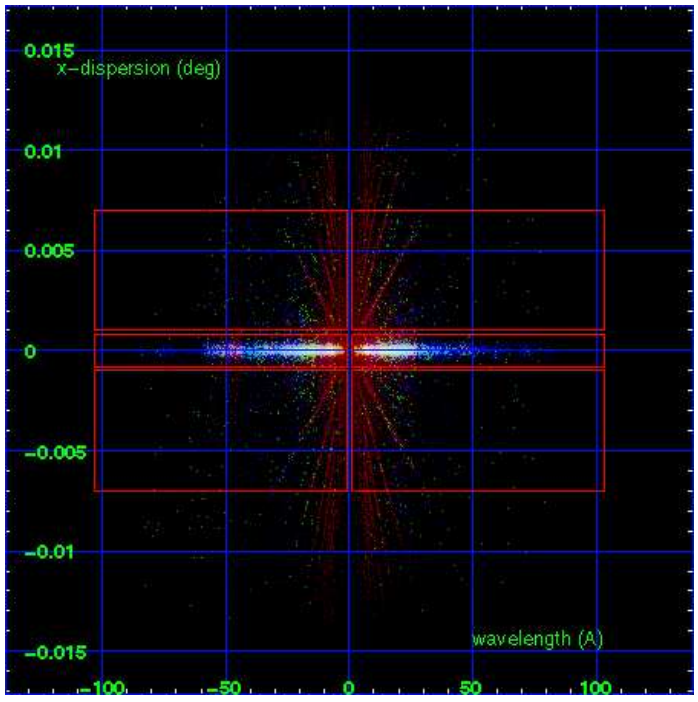
3.1 LETG Arm

LETG Order Sort 123

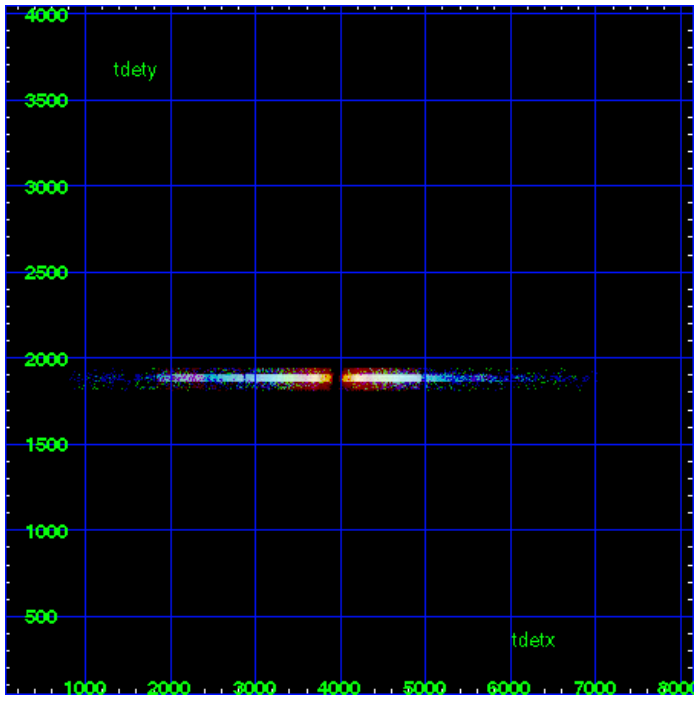


LETG Zero Order

LETG Order Sort ALL

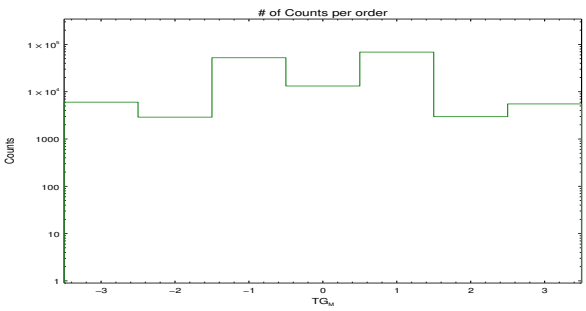


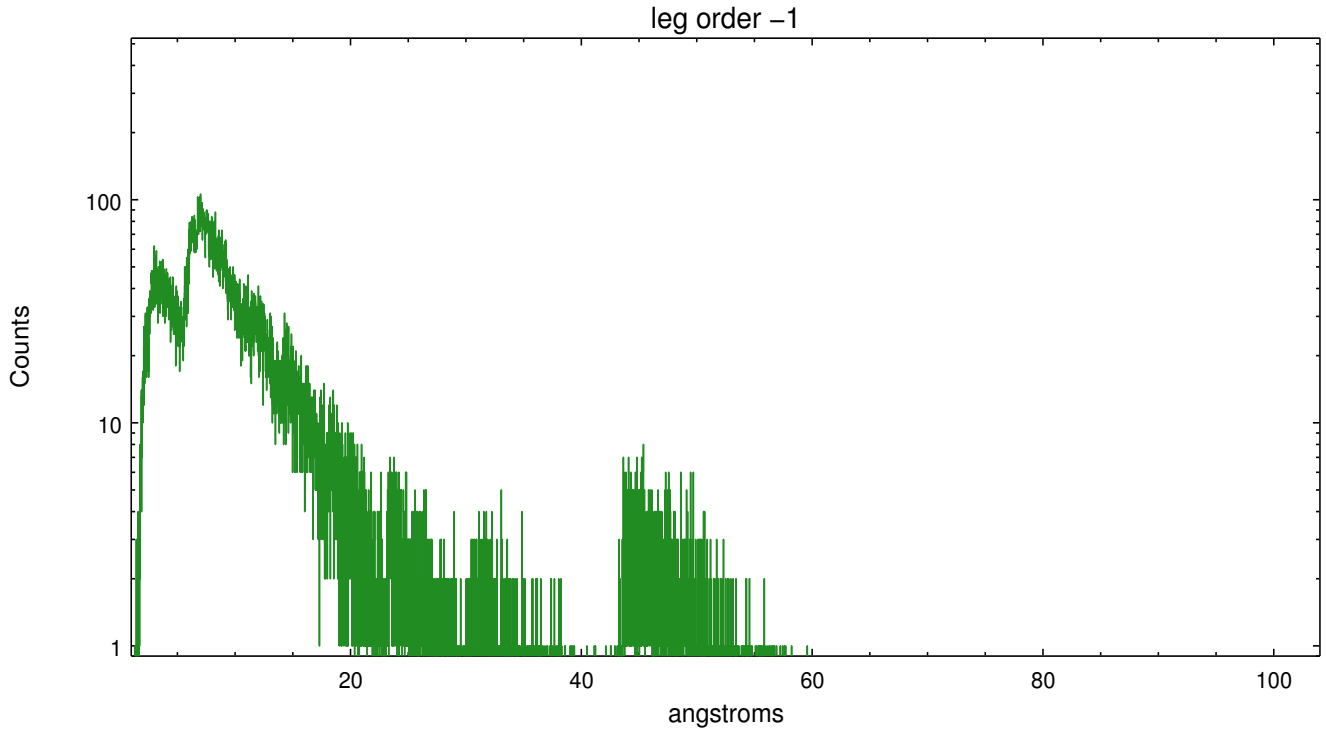
Spot Image LETG

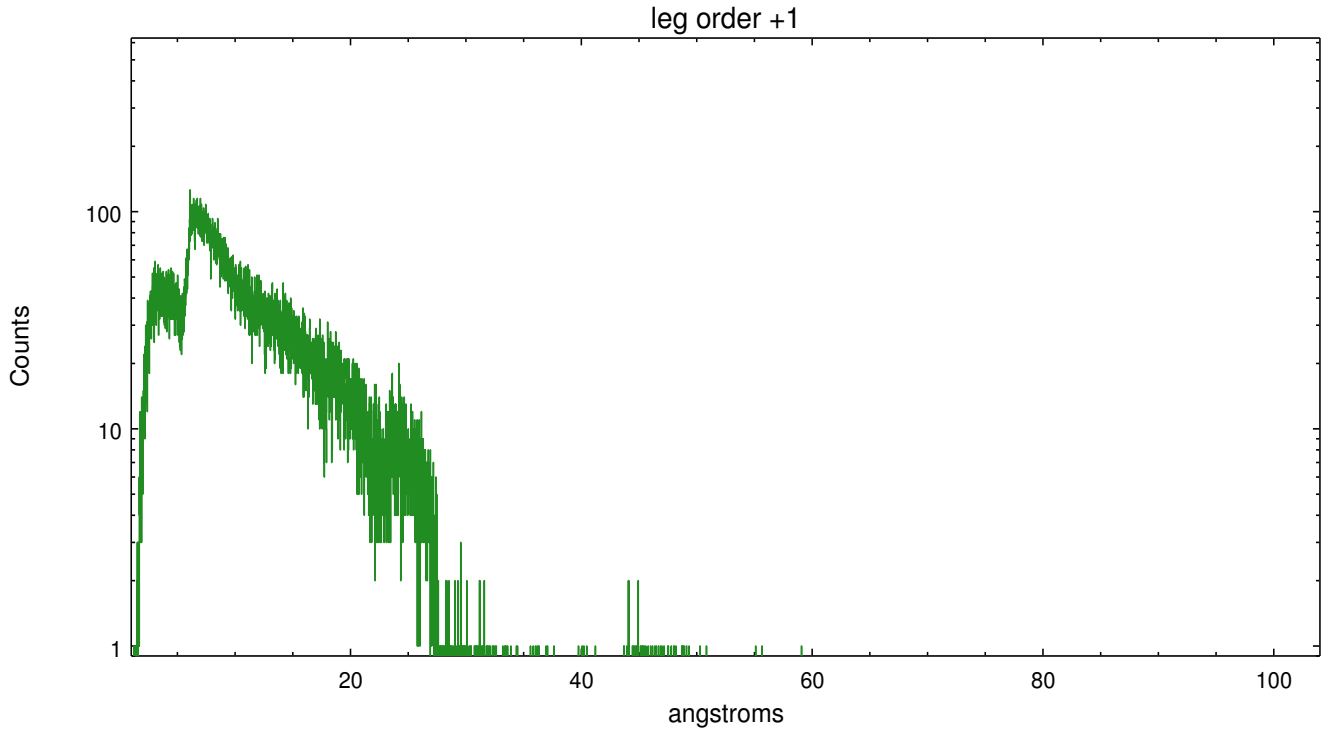


Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	6013	2899	52306	13206	68829	2969	5520




leg order −1
Counts
100
10
1
20
40
60
80
100
angstroms


leg order +1
Counts
100
10
1
20
40
60
80
100
angstroms

A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2012.06.26
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	5.1379999124408

A.2 Comments

Zeroth order piled up. Standard data processing software did not correctly locate the zeroth order due to pileup. Manual intervention was used to input the correct sky coordinates (x=4010.13, y=4225.07) into the *src1a.fits file table. These corrected coordinates were determined using a software tool developed by CXC called findzero, which is expected to be released in CIAO (currently in ISIS). The tool calculates the point of intersection of the readout streak and the meg arm (preferred position), or the readout streak and the heg arm. The zeroth order source position determined by the standard pipeline processing using the tool tgdetect was not used in this processing. The newly determined zeroth order coordinates have been placed in the *src1a.fits file, replacing the coordinates determined by tgdetect. Note that these corrected coordinates of the zeroth order cannot be reproduced by running tgdetect on the data. == Both zeroth order and portion of spectral arms piled up.
===
Gain and CTI correction are not well calibrated on CCD_ID 5 (ACIS-S1). Default order sorting can clip some regions, particularly longward of 30A (first order). User-specified custom processing parameters may be required in tg_resolve_events (osipfile=none, osort_lo, osort_hi ~0.5) though this can allow more zeroth order background at short wavelengths.