V&V Reference Report
L2 ASCDS Version : 8.4.3

Observation 13096 - L2 Version 2
Chandra X-Ray Center

L2 Processing Date : Feb 8 2012

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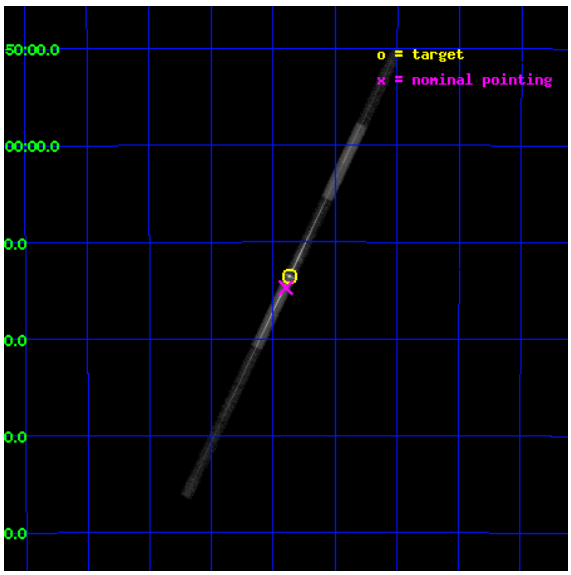
1 Front

seq_num	790226	Sequence number
obs_id	13096	Observation id
title	AO-12 Calibration Observations of Mkn421	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	PKS 2155-304	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	329.716667	Observer's specified target RA [deg]
dec_targ	-30.225556	Observer's specified target Dec [deg]
ra_nom	329.7243699651	Nominal RA [deg]
dec_nom	-30.245514617454	Nominal Dec [deg]
roll_nom	115.58342834603	Nominal Roll [deg]
revision	2	Processing version of data
ontime	28064.399522007	Sum of GTIs [s]
livetime	26510.147448727	Livetime [s]
ontime4	28064.399522007	Sum of GTIs [s]
ontime5	28064.399522007	Sum of GTIs [s]
ontime6	28064.399522007	Sum of GTIs [s]
ontime7	28064.399522007	Sum of GTIs [s]
ontime8	28064.399522007	Sum of GTIs [s]
ontime9	28064.399522007	Sum of GTIs [s]
l2events	138520	Number of level 2 events

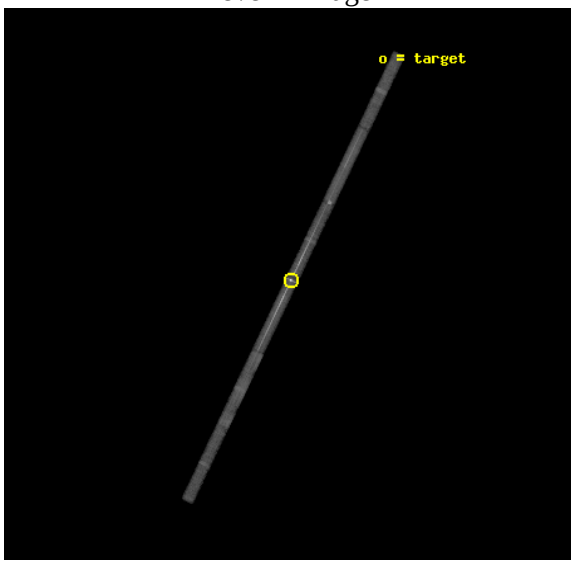


2 OBI

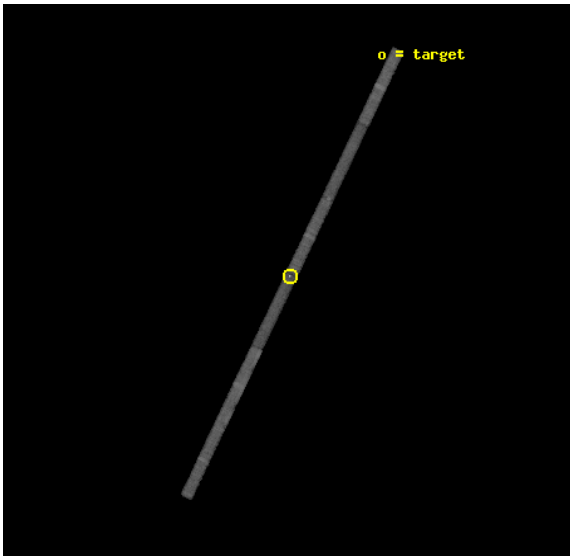
2.1 OBI

2.1.1 Images

Level 1 Image



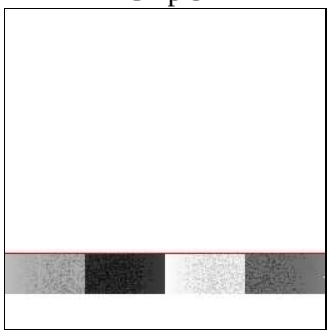
Level 1 Bad Events



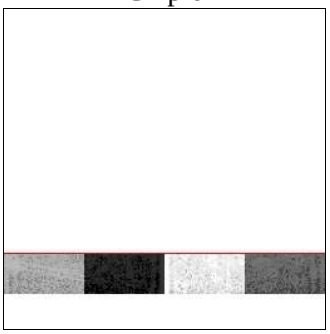
2.1.2 Bias

Chip 4

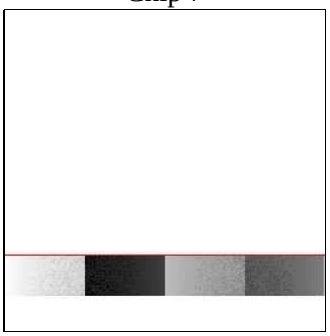
Chip 5



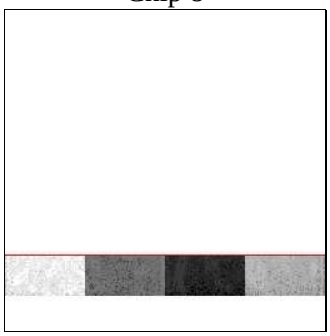
Chip 6



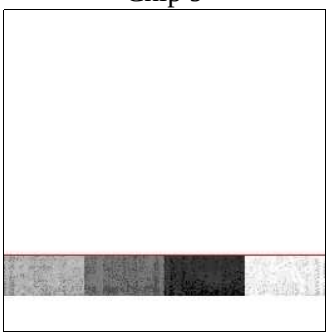
Chip 7



Chip 8



Chip 9



2.1.3 Parameters

obi_num	0	Obi number
ascdsver	8.4.3	Processing system revision
caldbver	4.4.7	
date	2012-02-08T23:29:38	Date and time of file creation
revision	2	Processing version of data

sched_exp_time	28000.000000	[s] Scheduled observation exposure time
ontime	28064.399522007	Sum of GTIs [s]
ontime4	28064.399522007	Sum of GTIs [s]
ontime5	28064.399522007	Sum of GTIs [s]
ontime6	28064.399522007	Sum of GTIs [s]
ontime7	28064.399522007	Sum of GTIs [s]
ontime8	28064.399522007	Sum of GTIs [s]
ontime9	28064.399522007	Sum of GTIs [s]
l1events	304698	Number of level 1 events

2.1.4 Events

	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	33860	46305	51959	101555	43368	27651
rejected events	29309	18456	25360	23589	31609	23517
rejected %	86%	39%	48%	23%	72%	85%

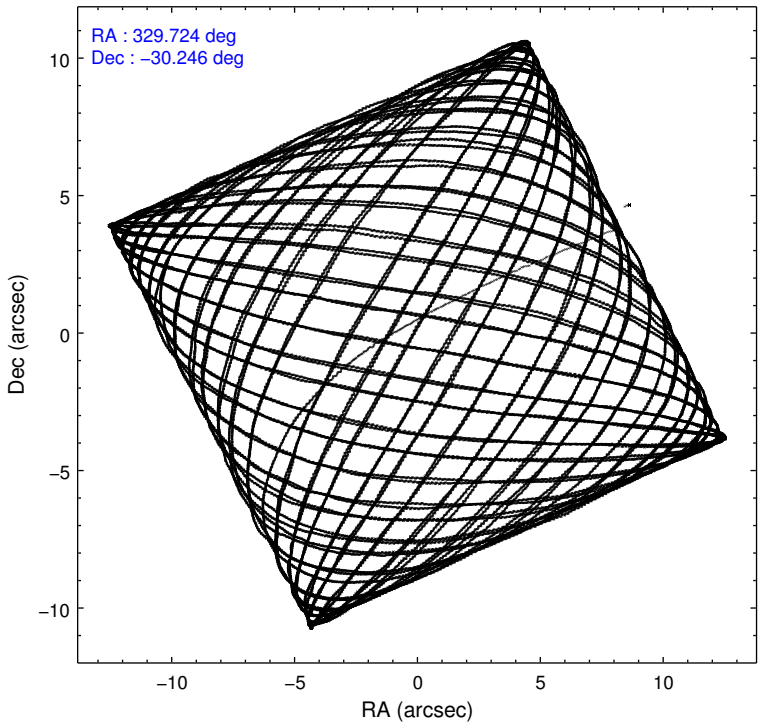
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	1853	7482	19939	19133	4141	1659
	5%	16%	38%	18%	9%	5%
grade 1 events	7	346	38	803	11	11
	0%	0%	0%	0%	0%	0%
grade 2 events	865	6158	2940	19086	2145	722
	2%	13%	5%	18%	4%	2%
grade 3 events	568	2255	1349	8802	1275	592
	1%	4%	2%	8%	2%	2%
grade 4 events	576	2506	1276	8589	1131	551
	1%	5%	2%	8%	2%	1%
grade 5 events	1008	3624	951	5947	1413	1043
	2%	7%	1%	5%	3%	3%
grade 6 events	689	9448	1101	22362	3067	610
	2%	20%	2%	22%	7%	2%
grade 7 events	28294	14486	24365	16833	30185	22463
	83%	31%	46%	16%	69%	81%

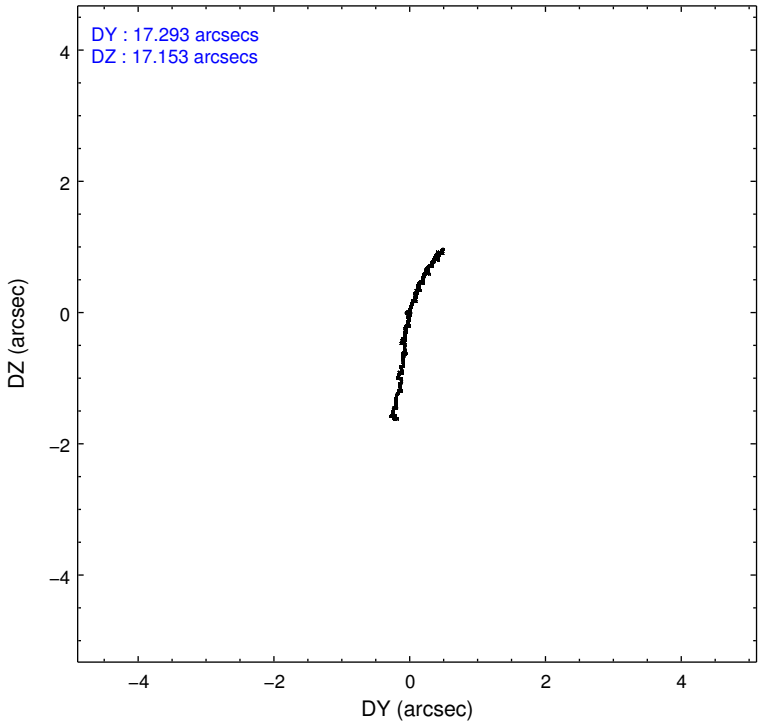
2.2 Compared Parameters

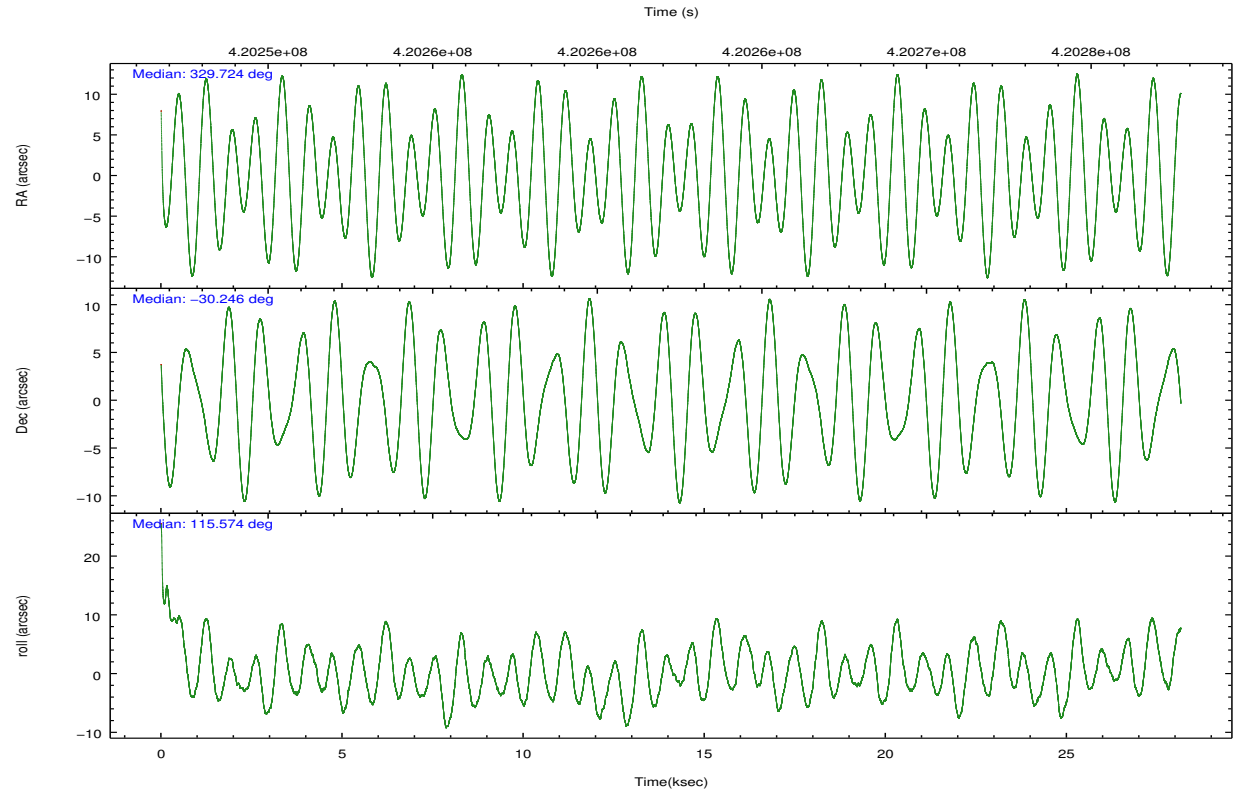
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-456789	ACIS-456789
Grating	LETG	LETG
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	329.750732	329.7243699651037
[deg] Pointing Dec	-30.260652	-30.24551461745396
[deg] Pointing Roll	115.440075	115.5834283460251
[s] Window start time (MET)	418003266.184000	418003266.184000
[s] Window stop time (MET)	423187266.184000	423187266.184000
[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)	420248323.184000	420247307.39141
Observation start date	2011-04-26T23:37:37	2011-04-26T23:21:47
[s] Observation end time (MET)	420276323.184000	420277056.48046
Observation end date	2011-04-27T07:24:17	2011-04-27T07:37:36
Read mode	TIMED	TIMED

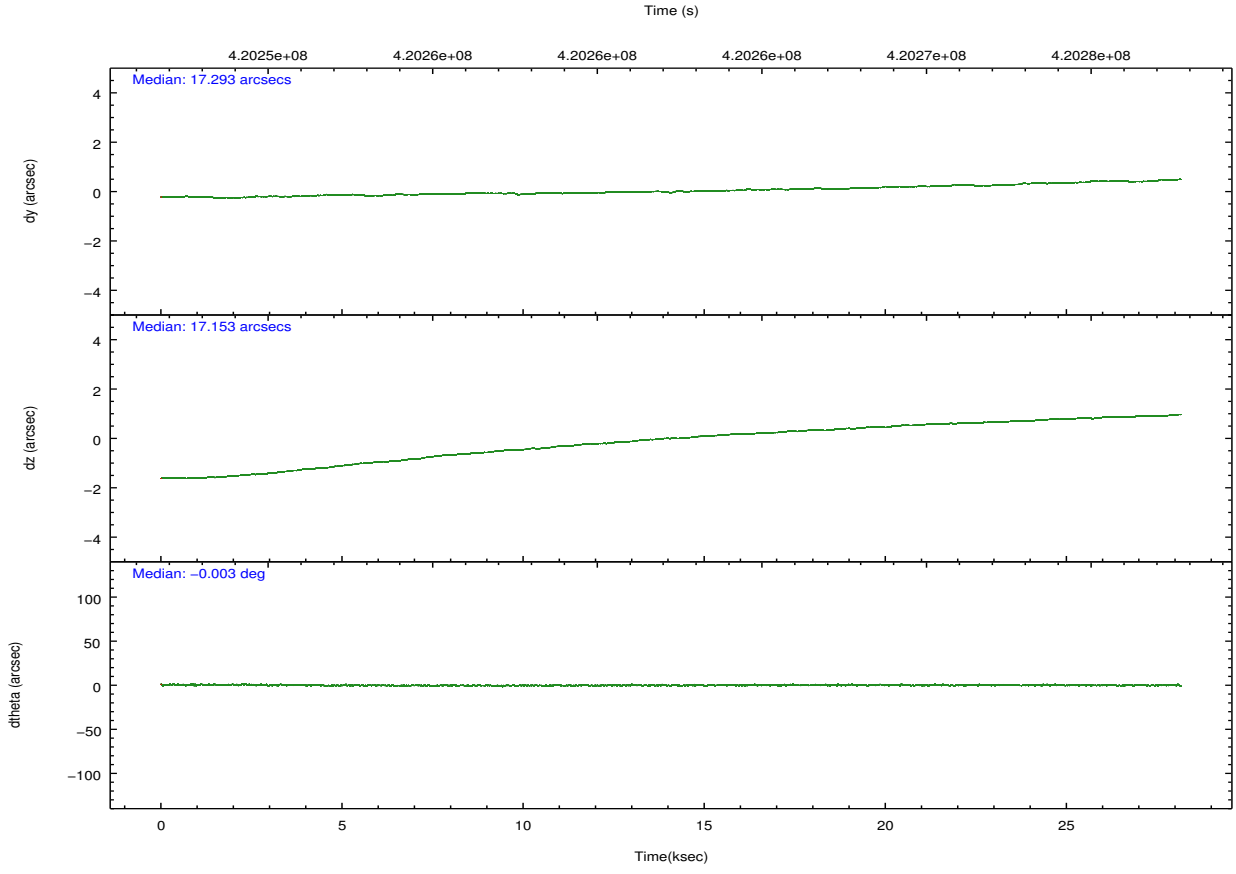
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
CCD I0 on	N	N
CCD I1 on	N	N
CCD I2 on	N	N
CCD I3 on	N	N
CCD S0 on	O1	Y
CCD S1 on	Y	Y
CCD S2 on	Y	Y
CCD S3 on	Y	Y
CCD S4 on	Y	Y
CCD S5 on	Y	Y
Number of optional ACIS chips dropped	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 : 329.724 deg
Dec : –30.246 deg
Dec (arcsec)
RA (arcsec)
10
5
0
–5
–10
–10
–5
0
5
10


DY : 17.293 arcsecs
DZ : 17.153 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
–2
–4
–4
–2
0
2
4


Time (s)
4.2025e+08
4.2026e+08
4.2026e+08
4.2026e+08
4.2027e+08
4.2028e+08
Median: 329.724 deg
RA (arcsec)
Median: −30.246 deg
Dec (arcsec)
Median: 115.574 deg
roll (arcsec)
Time(ksec)

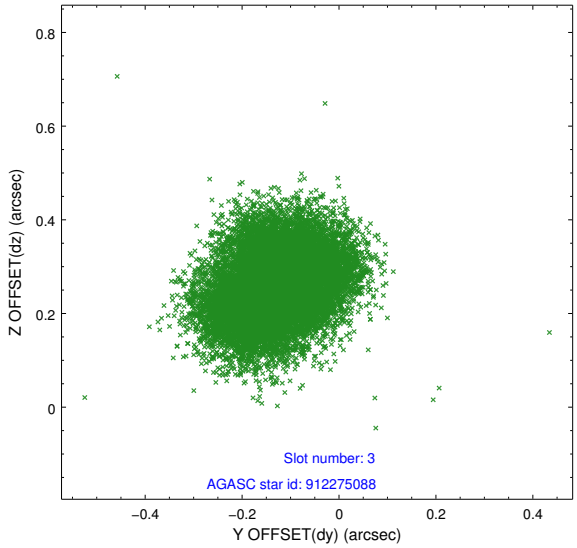

Time (s)
4.2025e+08
4.2026e+08
4.2026e+08
4.2026e+08
4.2027e+08
4.2028e+08
Median: 17.293 arcsecs
dy (arcsec)
Median: 17.153 arcsecs
dz (arcsec)
Median: −0.003 deg
dtheta (arcsec)
Time(ksec)

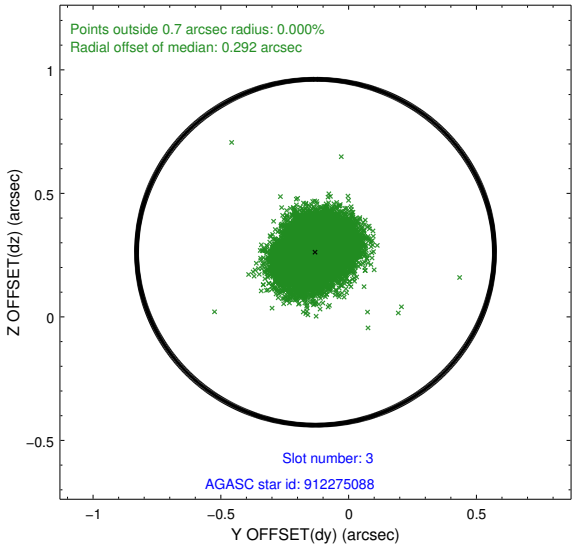
Slot Statistics

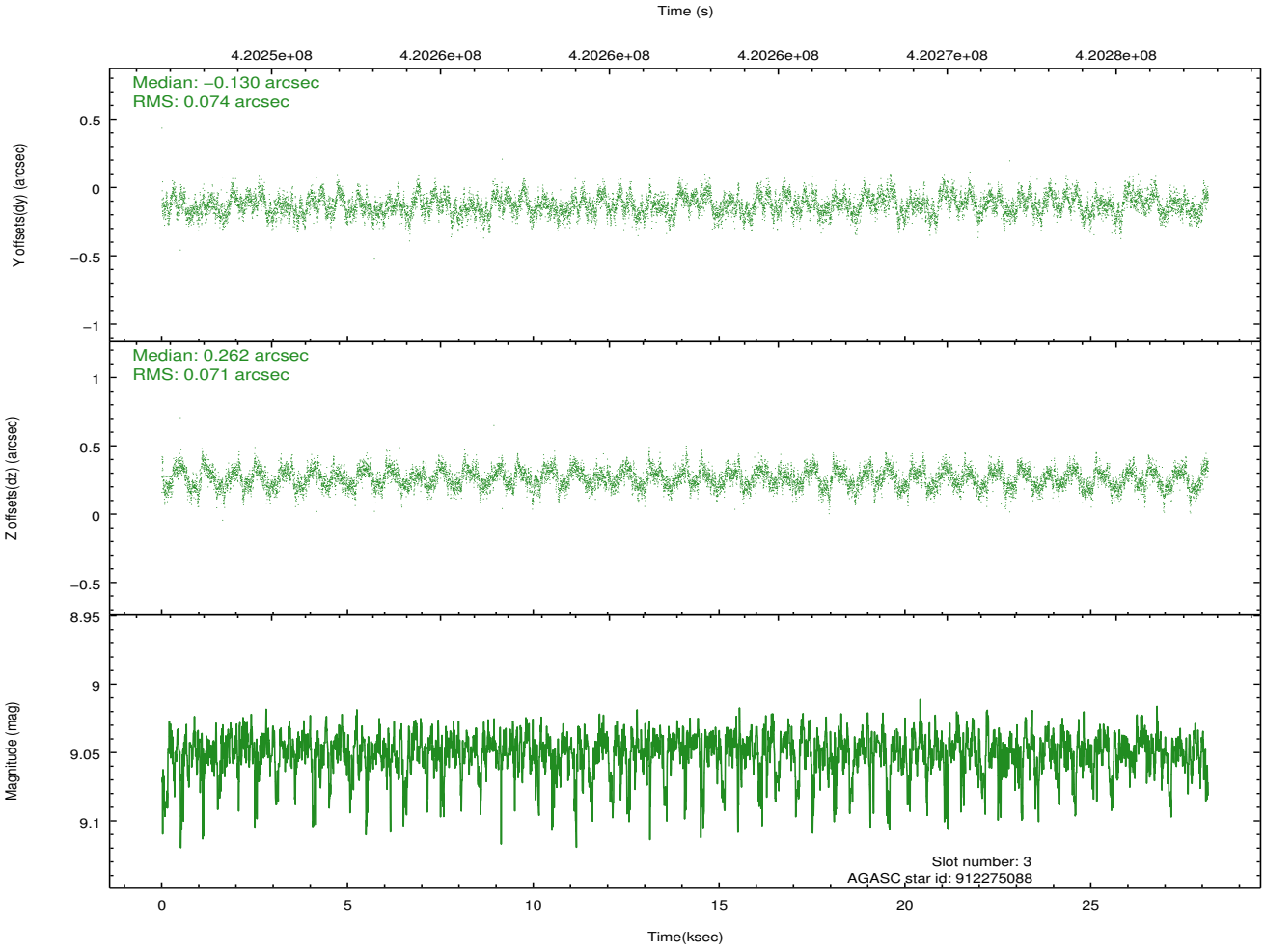
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-2	6.96	6868	-0.148	-0.117	0.011	0.019	0.000000	0.000000	-769.97	-1903.25
1	FID	ACIS-S-4	7.03	6868	0.139	0.074	0.011	0.020	0.000000	0.000000	2143.58	5.26
2	FID	ACIS-S-6	7.25	6868	-0.018	0.050	0.017	0.037	0.000000	0.000000	392.28	642.75
3	GUIDE	912275088	9.05	13728	-0.130	0.262	0.110	0.171	329.619228	-29.738698	1873.48	-435.45
4	GUIDE	981468016	8.99	13723	-0.090	-0.180	0.090	0.145	328.842457	-30.034984	1939.37	2212.04
5	GUIDE	981468128	9.36	13711	0.169	0.223	0.115	0.180	329.756350	-30.158334	325.51	-173.86
6	GUIDE	981478152	9.39	13712	0.098	-0.226	0.106	0.165	329.415589	-30.057192	1108.98	628.83
7	GUIDE	912131856	9.71	13637	-0.043	-0.076	0.138	0.225	328.758728	-29.933690	2379.70	2294.84

2.4 Star Slots

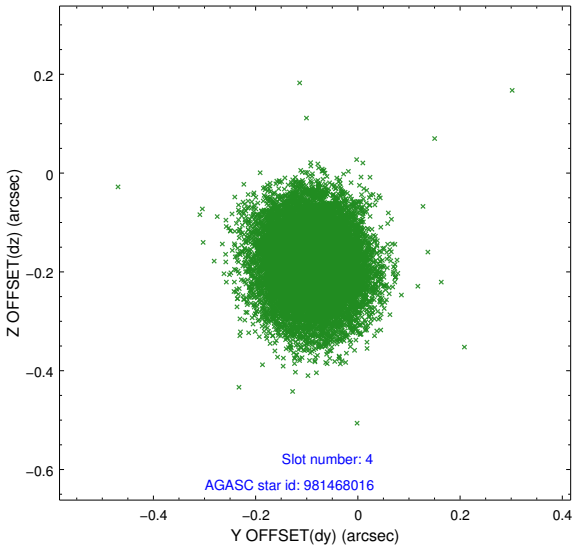
2.4.1 Slot 3

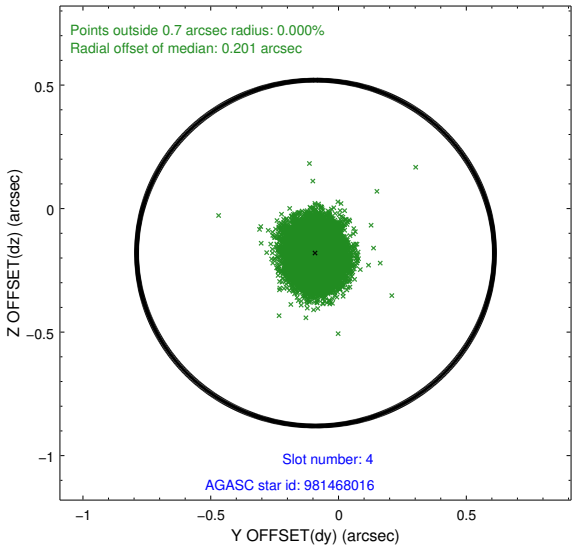


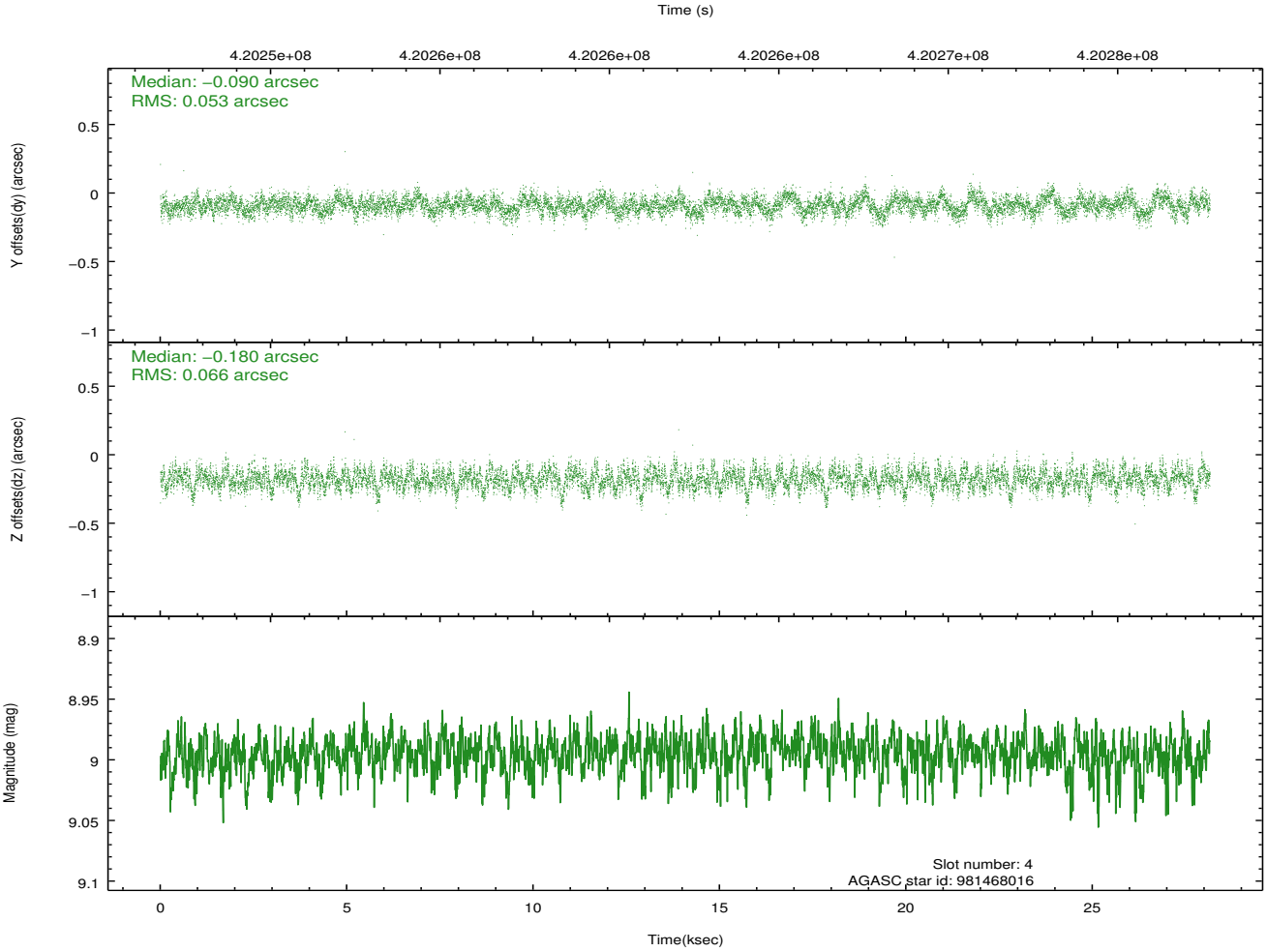




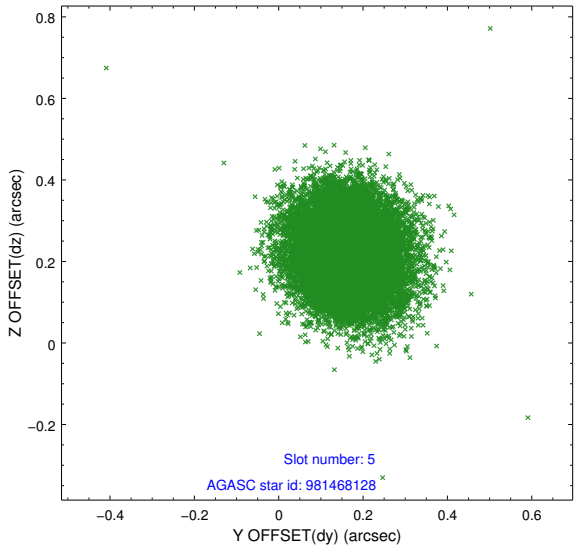
2.4.2 Slot 4

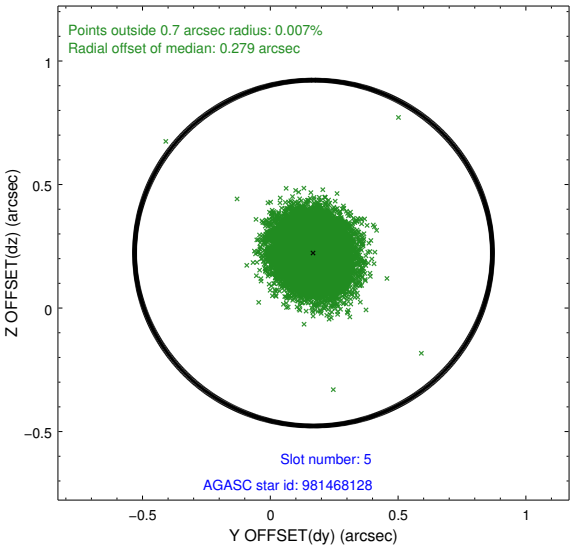

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 981468016

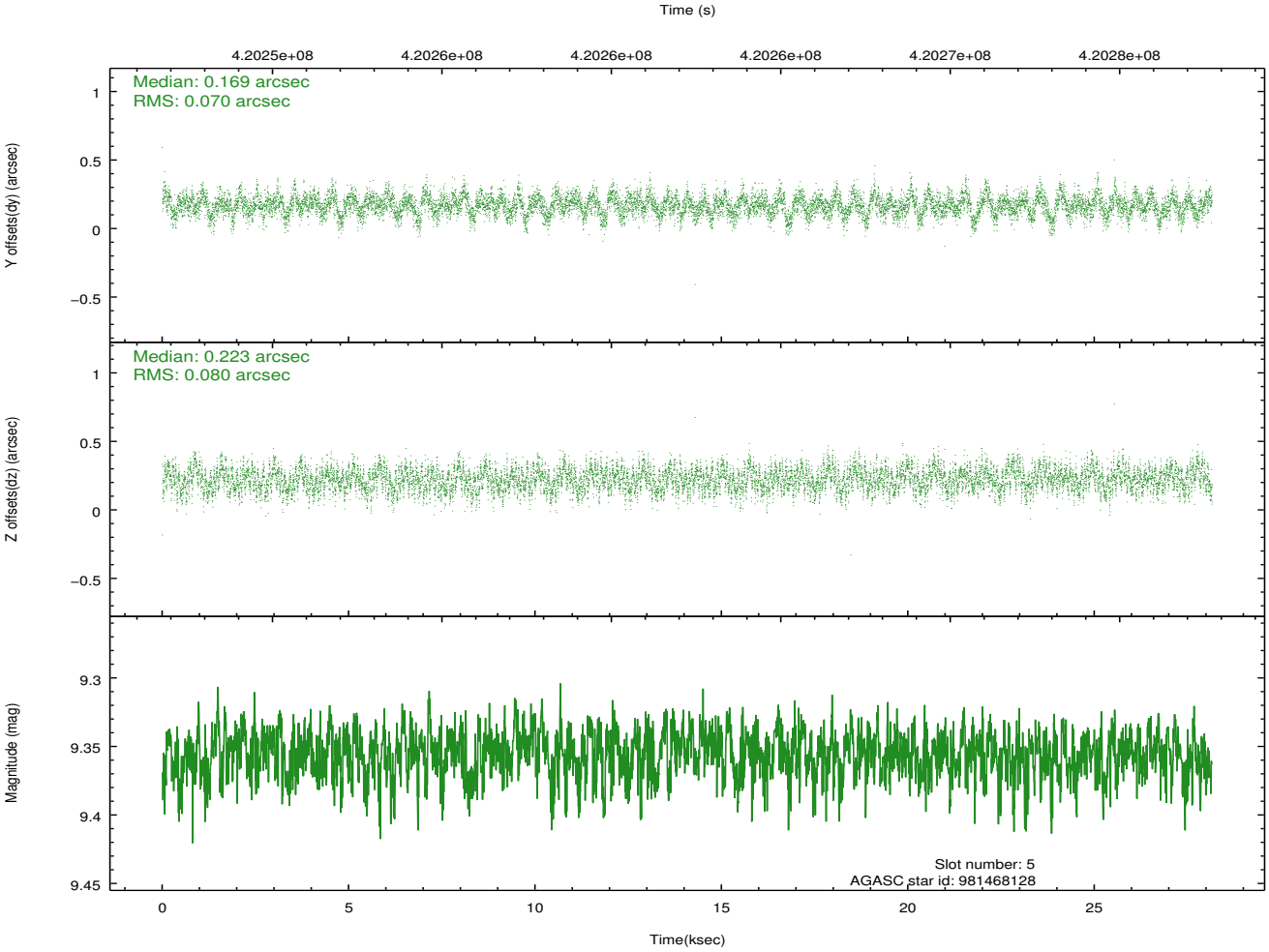

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.201 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 981468016


Time (s)
Median: −0.090 arcsec
RMS: 0.053 arcsec
Y offsets(dy) (arcsec)
Median: −0.180 arcsec
RMS: 0.066 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 981468016
Time(ksec)

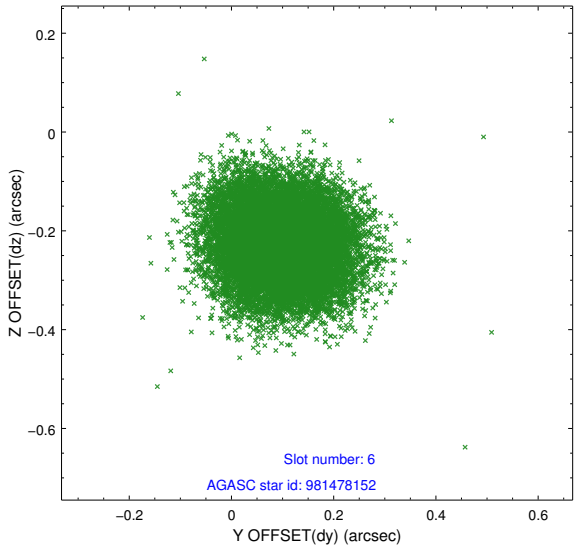
2.4.3 Slot 5

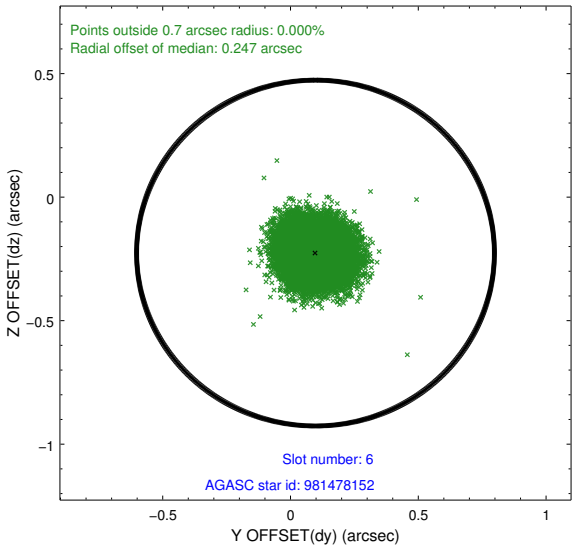

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 981468128

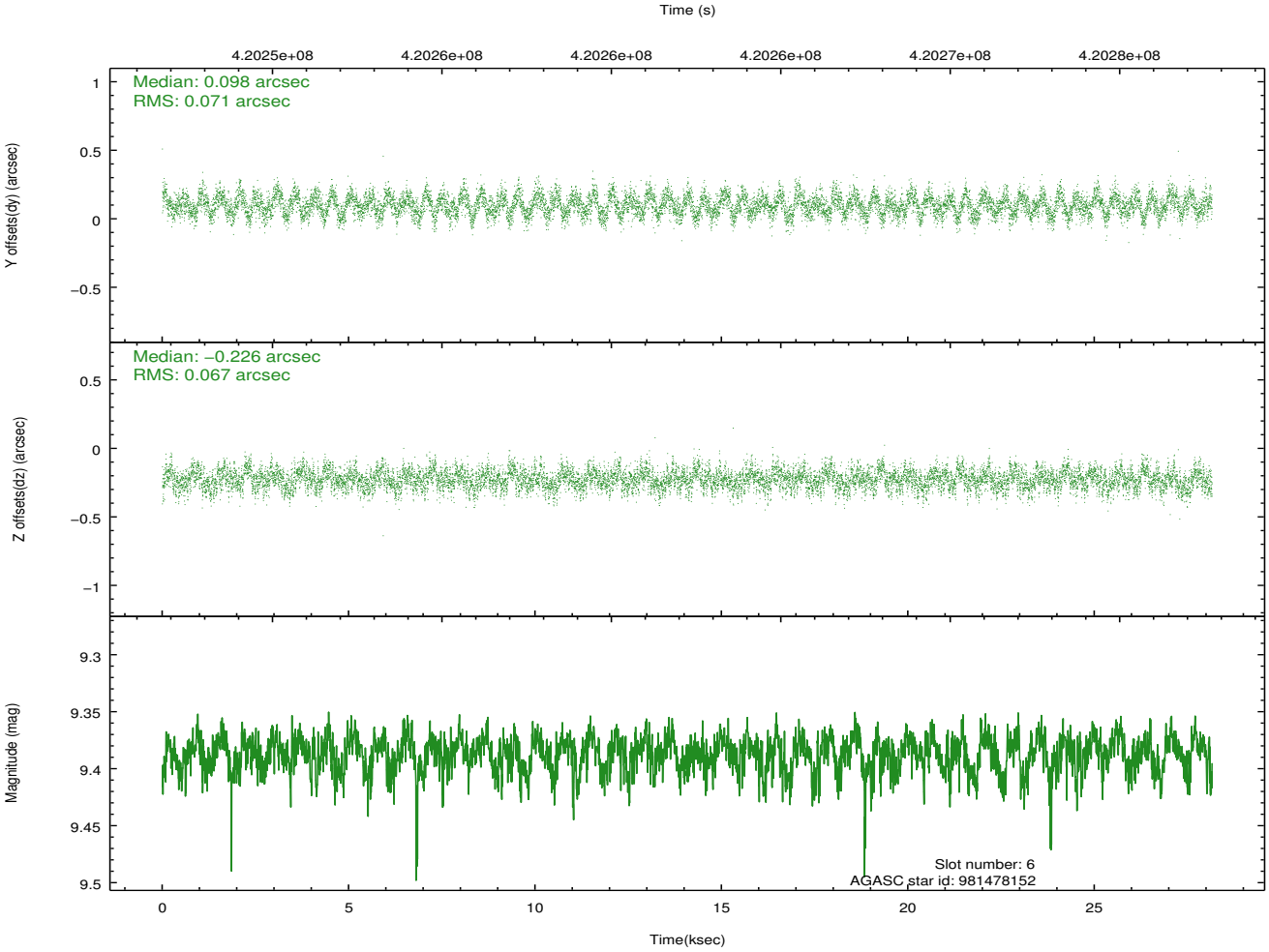

Points outside 0.7 arcsec radius: 0.007%
Radial offset of median: 0.279 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 981468128


Time (s)
Median: 0.169 arcsec
RMS: 0.070 arcsec
Y offsets(dy) (arcsec)
Median: 0.223 arcsec
RMS: 0.080 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 981468128
Time(ksec)

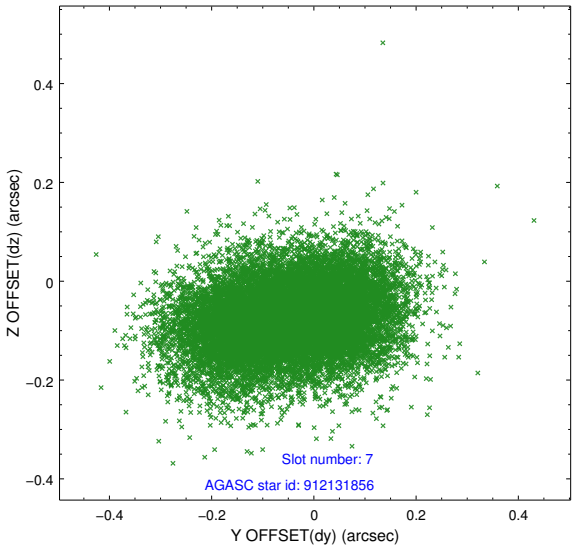
2.4.4 Slot 6

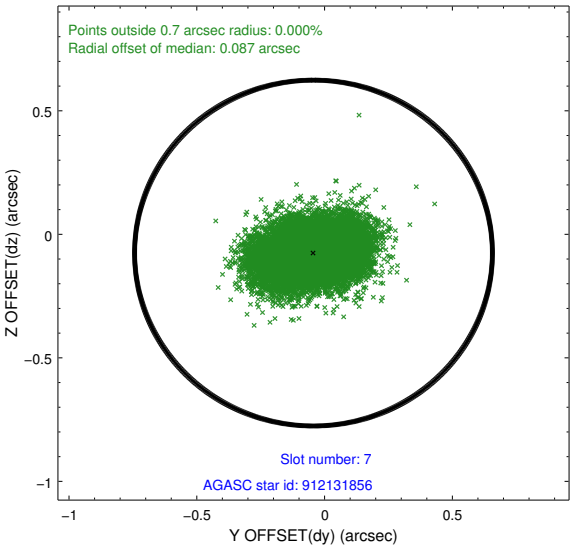

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 981478152

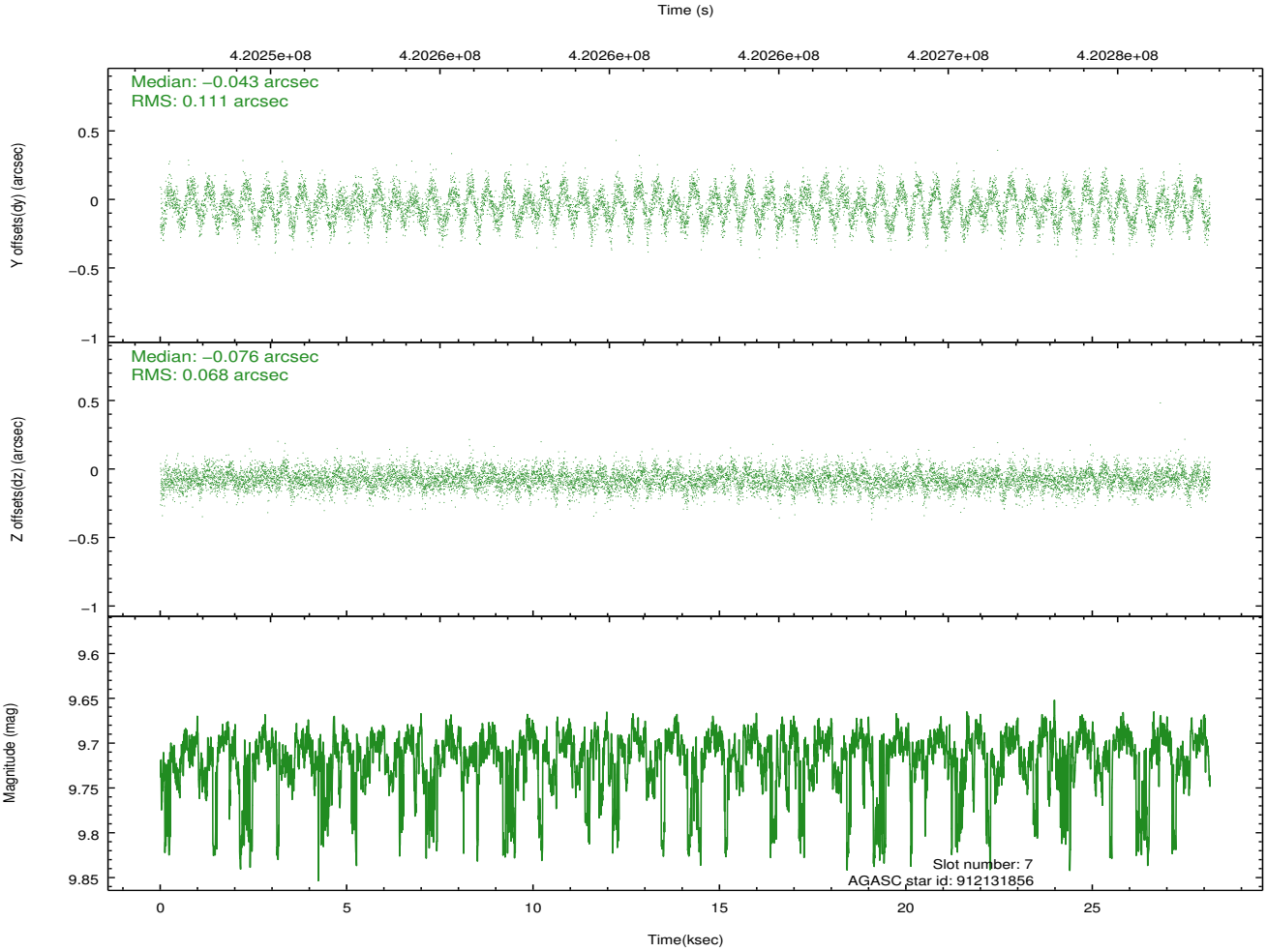

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.247 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 981478152


Time (s)
Median: 0.098 arcsec
RMS: 0.071 arcsec
Y offsets(dy) (arcsec)
Median: −0.226 arcsec
RMS: 0.067 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 981478152
Time(ksec)

2.4.5 Slot 7

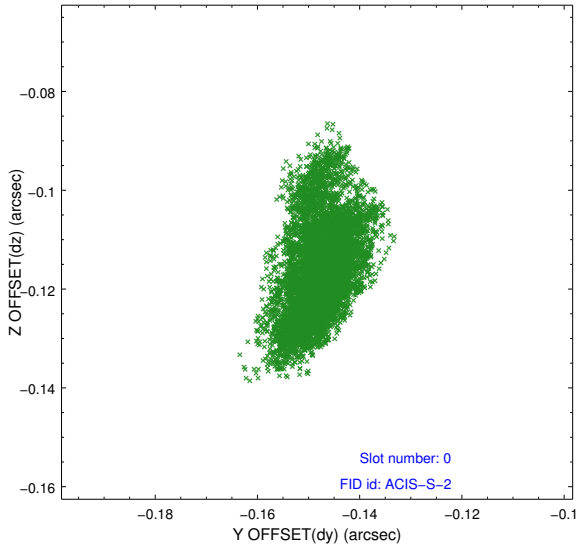

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 912131856

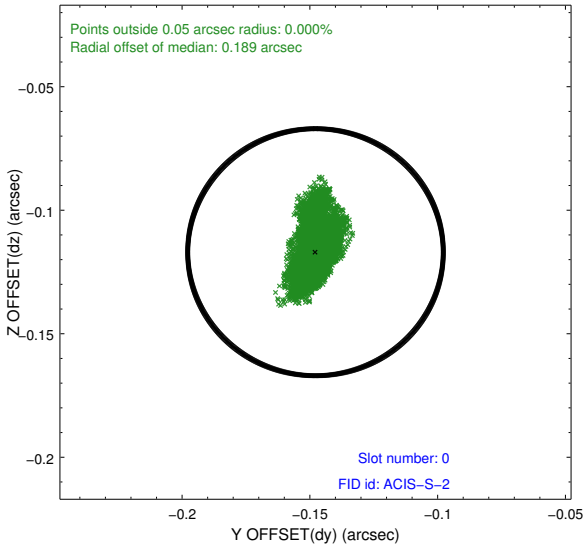

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.087 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 912131856

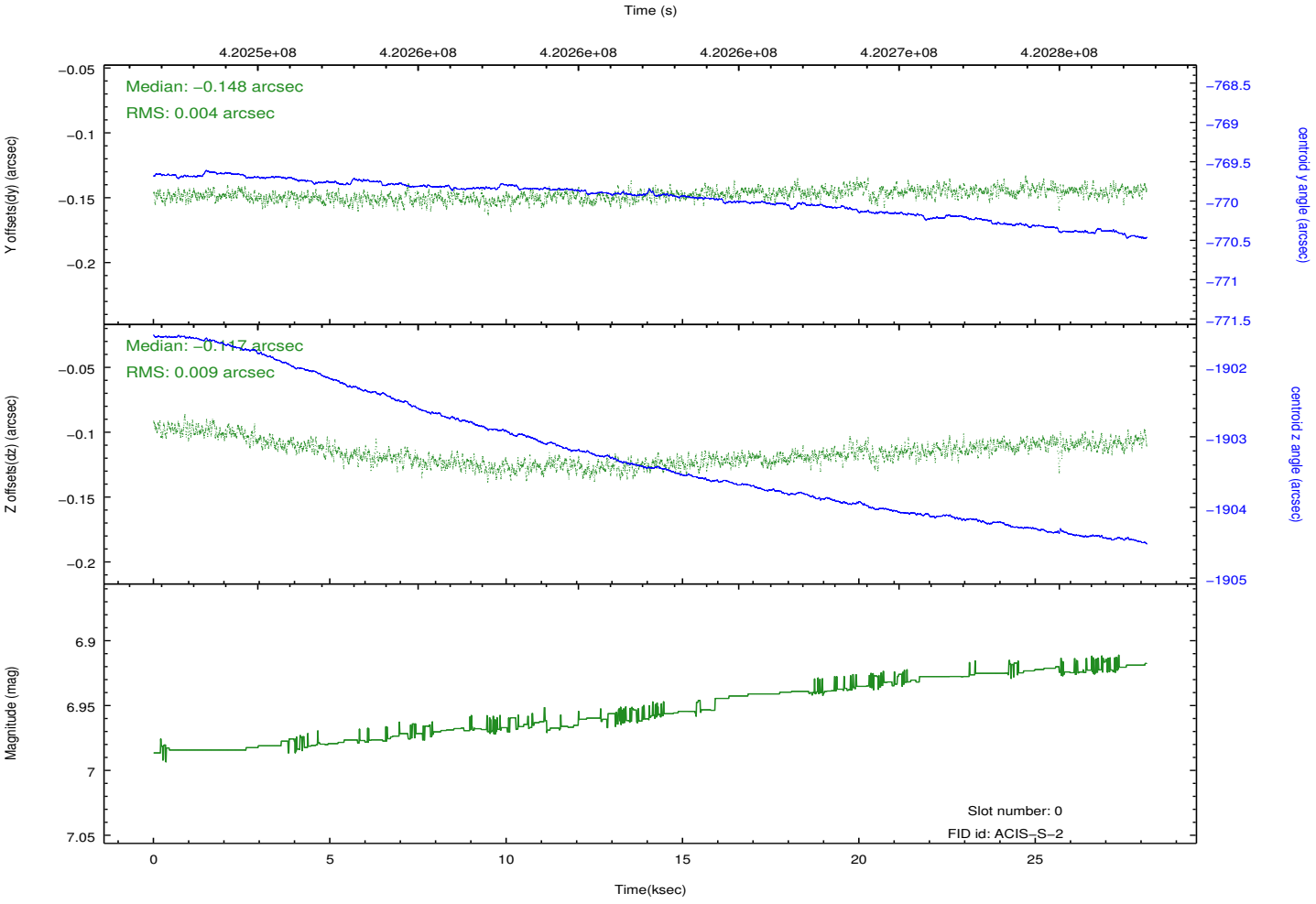

Time (s)
Median: −0.043 arcsec
RMS: 0.111 arcsec
Y offsets(dy) (arcsec)
Median: −0.076 arcsec
RMS: 0.068 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 912131856
Time(ksec)

2.5 FID Slots

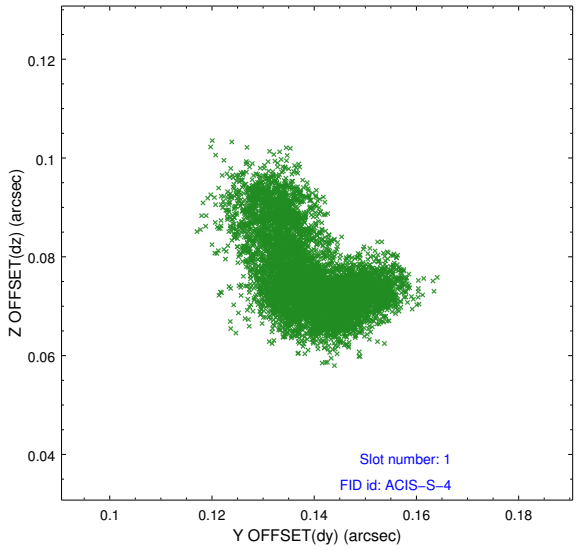
2.5.1 Slot 0

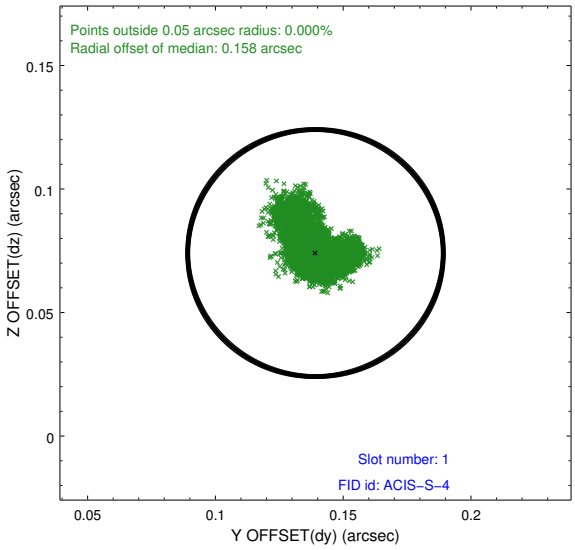


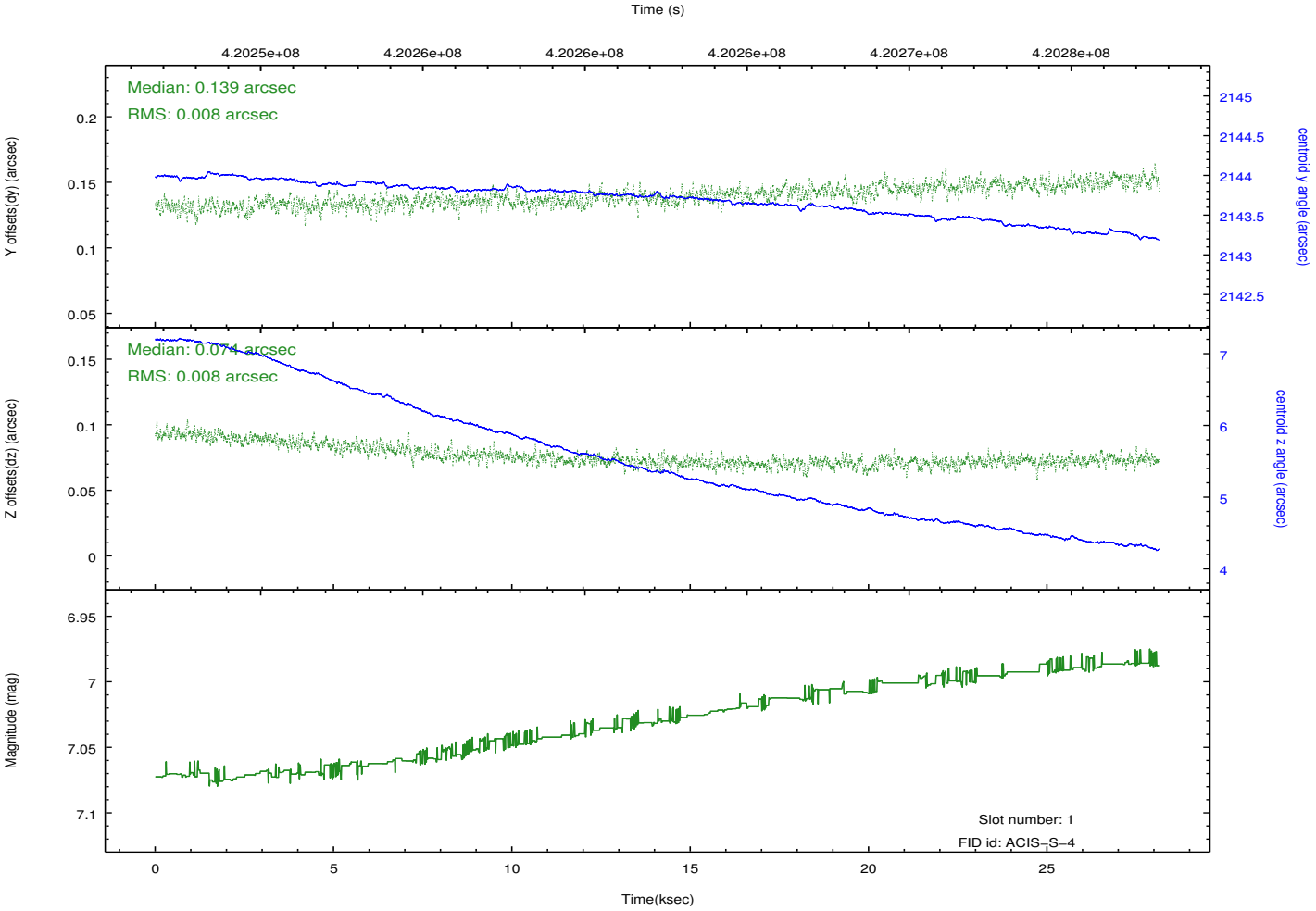




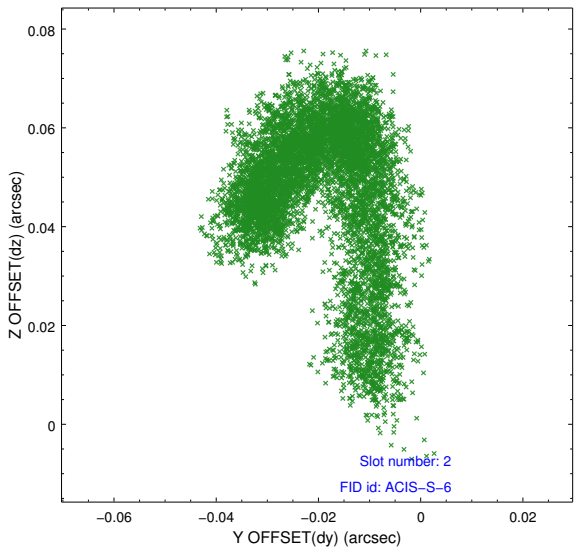
2.5.2 Slot 1

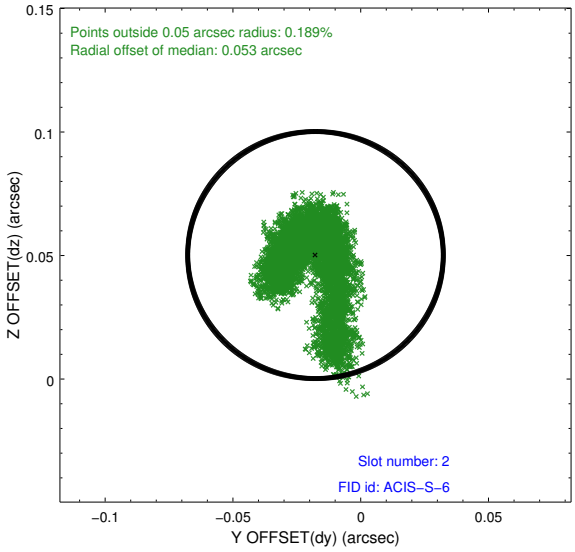

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

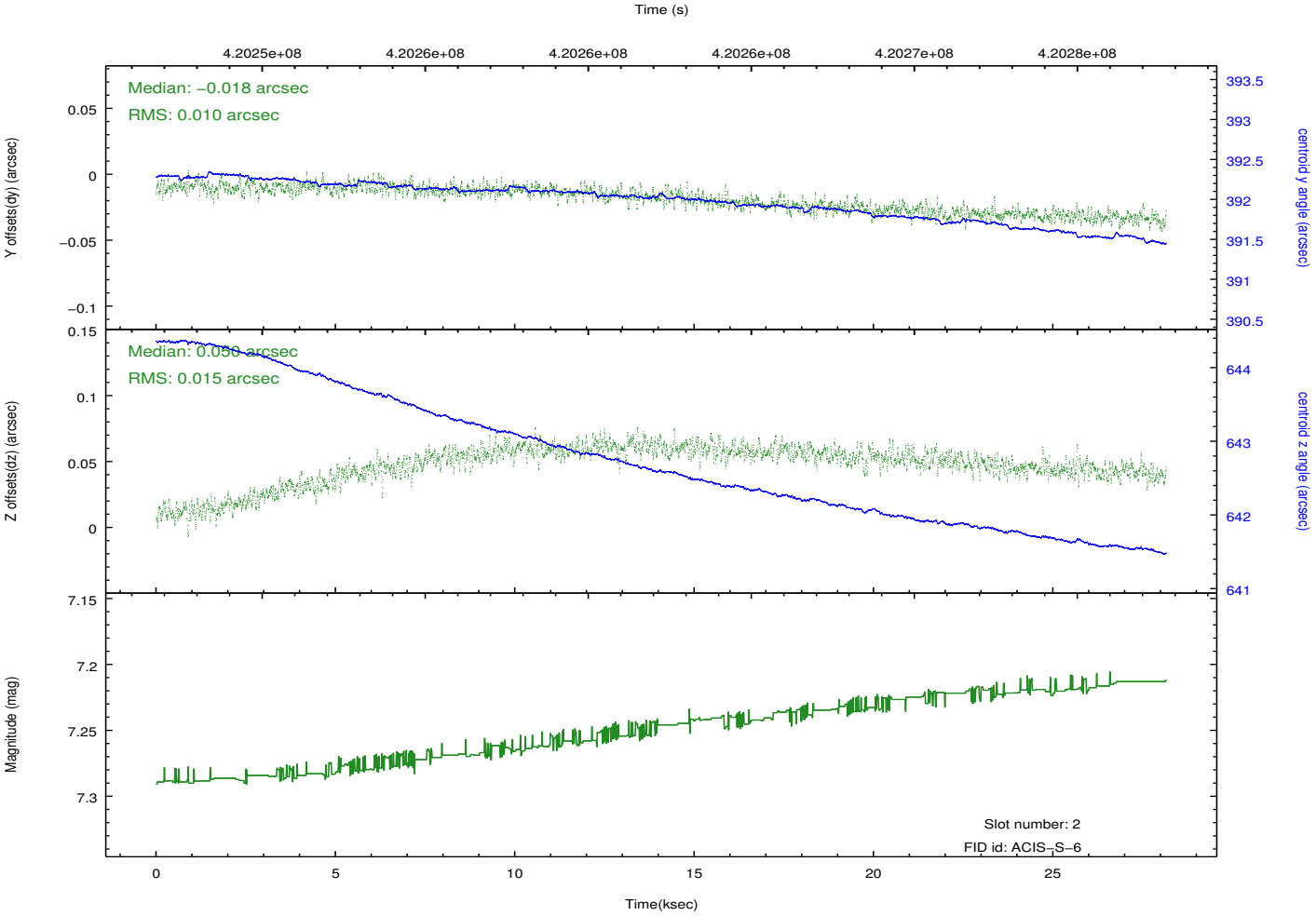

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.158 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.139 arcsec
RMS: 0.008 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.074 arcsec
RMS: 0.008 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

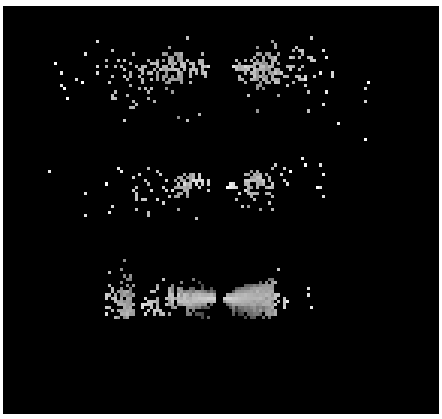

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6


Points outside 0.05 arcsec radius: 0.189%
Radial offset of median: 0.053 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6

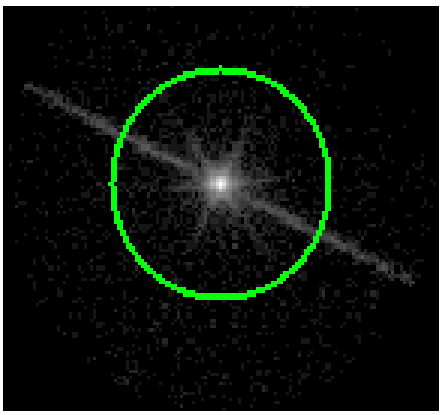

Time (s)
Median: −0.018 arcsec
RMS: 0.010 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.050 arcsec
RMS: 0.015 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−6
Time(ksec)

3 Gratings

3.1 LETG Arm

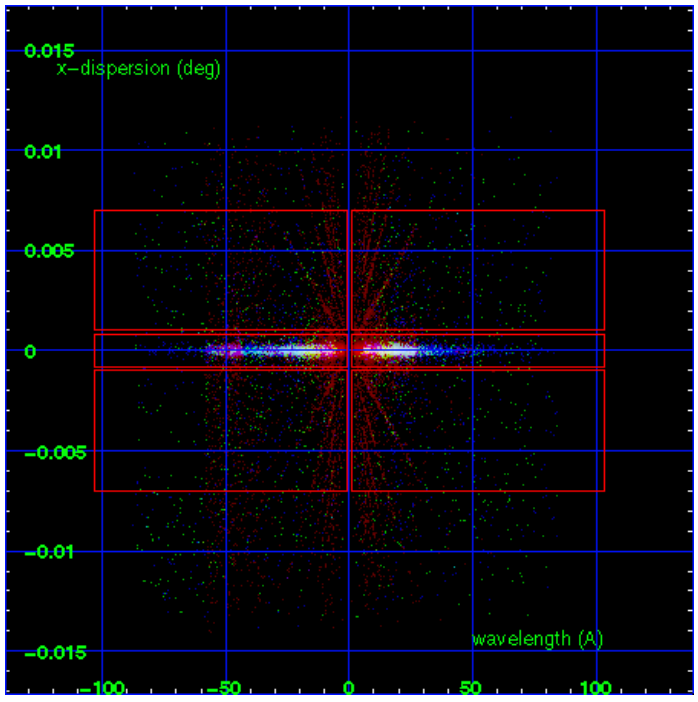


LETG Order Sort 123

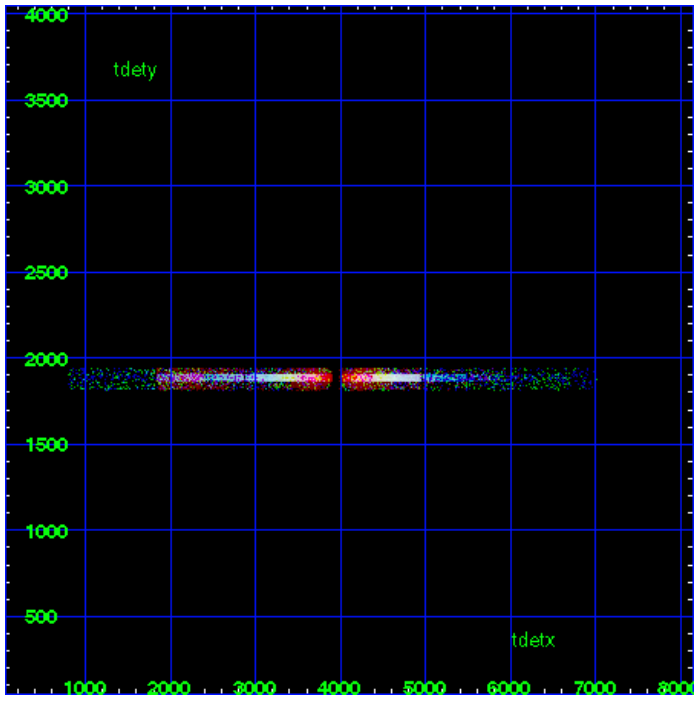


LETG Zero Order

LETG Order Sort ALL

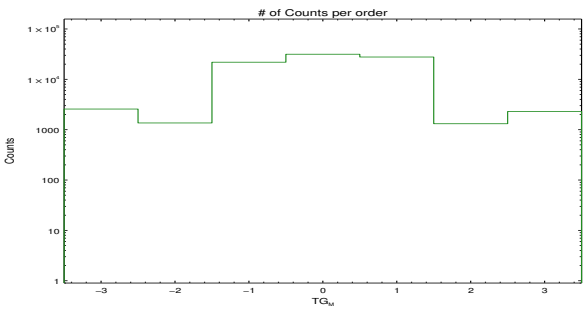


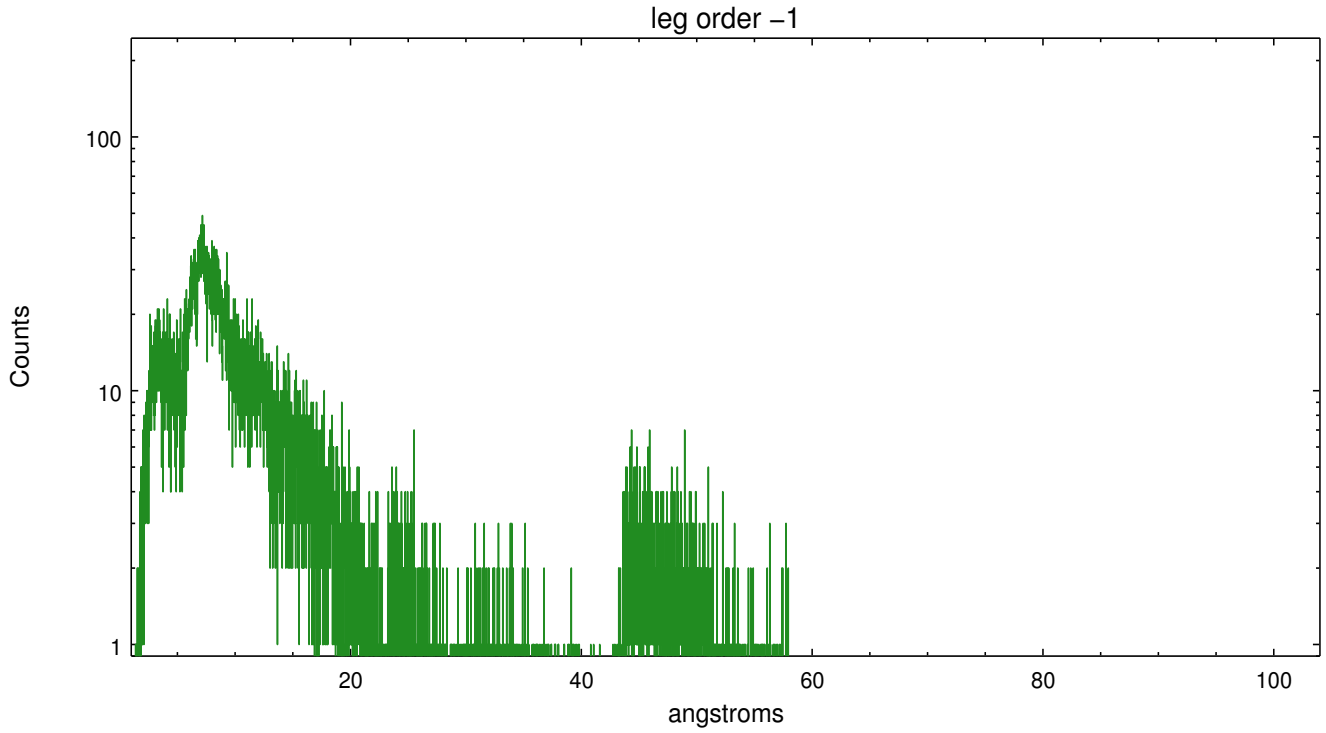
Spot Image LETG

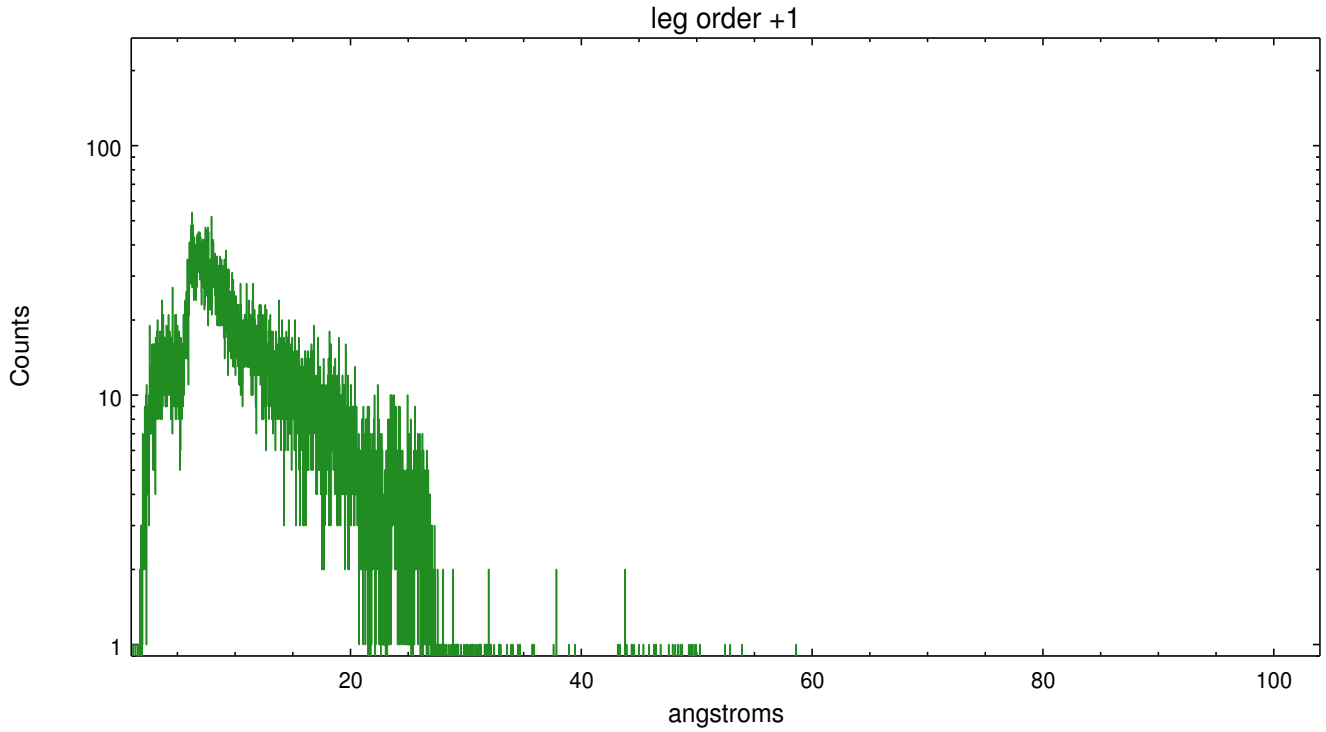


Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	2569	1360	21869	31493	27742	1313	2296




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)	2012.02.10
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	28.064399522007

A.2 Comments

The data for this observation have been processed using the 'EDSER' sub-pixel event-repositioning algorithm of Li et al. (2004, ApJ, 610, 1204). Small-scale features should become sharper for sources near the aim point. The improvement will be less noticeable for off-axis sources where the size of the point-spread function is comparable to or larger than the size of an ACIS pixel. To take full advantage of the improvement, images should be binned on spatial scales smaller than the size of an ACIS pixel. Note that, at present, the point-spread function has not been calibrated for data to which the EDSER algorithm has been applied. If dither was disabled for the observation, then the algorithm can introduce artificial aliasing effects on spatial scales smaller than a pixel. If you would prefer to use no sub-pixel adjustment or to apply a coordinate randomization, then use acis_process_events to reprocess the data with the parameter pix_adj=NONE or RANDOMIZE, respectively.