V&V Reference Report
L2 ASCDS Version : 8.4.3

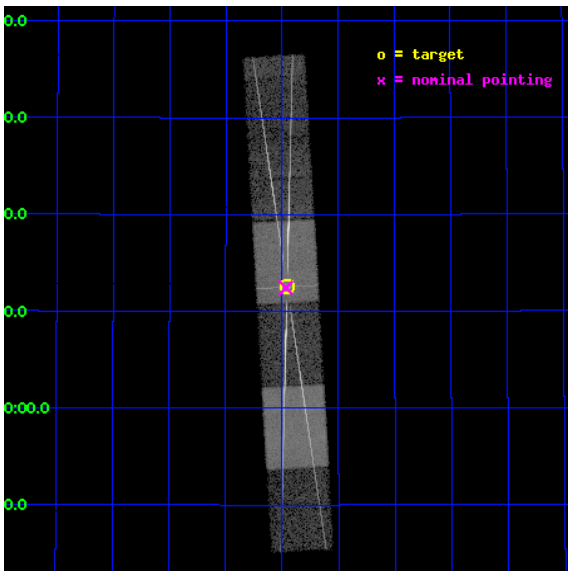
Observation 13098 - L2 Version 3
Chandra X-Ray Center

L2 Processing Date : Mar 21 2012

Contents

1 Front

seq_num	790228	Sequence number
obs_id	13098	Observation id
title	AO-12 Calibration Observations of Mkn421	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	MKN421	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.113333	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.11646047806	Nominal RA [deg]
dec_nom	38.207282940938	Nominal Dec [deg]
roll_nom	266.61774271136	Nominal Roll [deg]
revision	3	Processing version of data
ontime	14797.5	Sum of GTIs [s]
livetime	14558.50754022	Livetime [s]
ontime4	14797.5	Sum of GTIs [s]
ontime5	14797.5	Sum of GTIs [s]
ontime6	14797.5	Sum of GTIs [s]
ontime7	14797.5	Sum of GTIs [s]
ontime8	14797.5	Sum of GTIs [s]
ontime9	14797.5	Sum of GTIs [s]
l2events	248265	Number of level 2 events

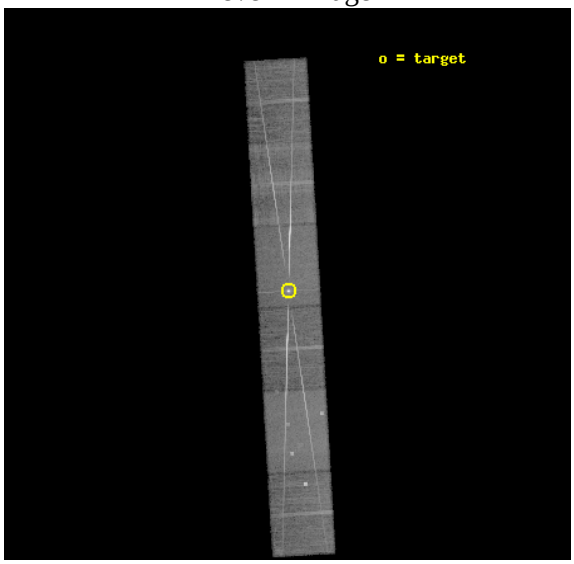


2 OBI

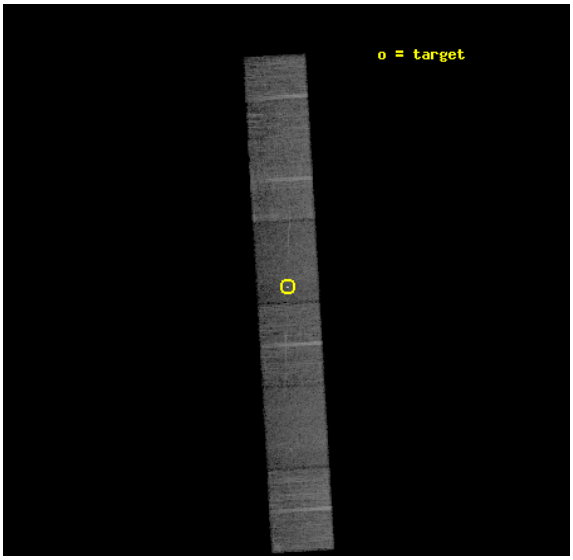
2.1 OBI

2.1.1 Images

Level 1 Image

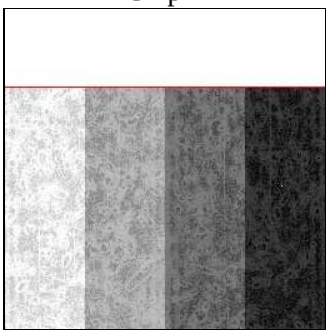


Level 1 Bad Events

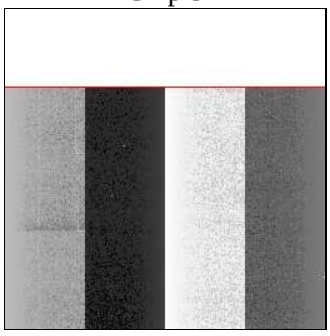


2.1.2 Bias

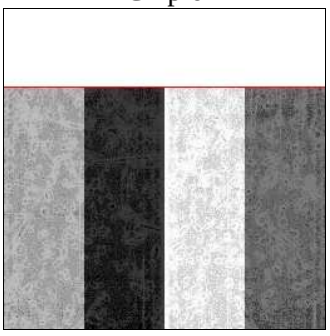
Chip 4



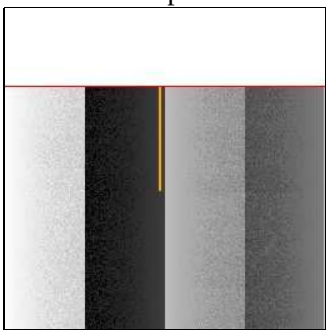
Chip 5



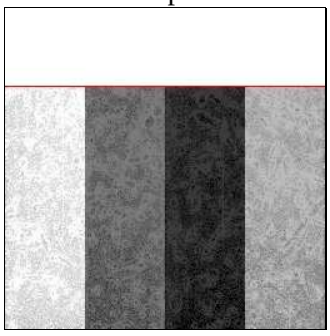
Chip 6



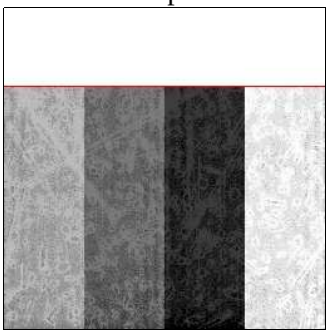
Chip 7



Chip 8



Chip 9



2.1.3 Parameters

obi_num	0	Obi number
ascdsver	8.4.3	Processing system revision
caldbver	4.4.8	
date	2012-03-18T18:45:34	Date and time of file creation
revision	2	Processing version of data

sched_exp_time	14750.000000	[s] Scheduled observation exposure time
ontime	14797.5	Sum of GTIs [s]
ontime4	14797.5	Sum of GTIs [s]
ontime5	14797.5	Sum of GTIs [s]
ontime6	14797.5	Sum of GTIs [s]
ontime7	14797.5	Sum of GTIs [s]
ontime8	14797.5	Sum of GTIs [s]
ontime9	14797.5	Sum of GTIs [s]
l1events	652356	Number of level 1 events

2.1.4 Events

	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	88122	128858	112379	129198	119930	73869
rejected events	71340	54811	60978	50283	68978	59734
rejected %	80%	42%	54%	38%	57%	80%

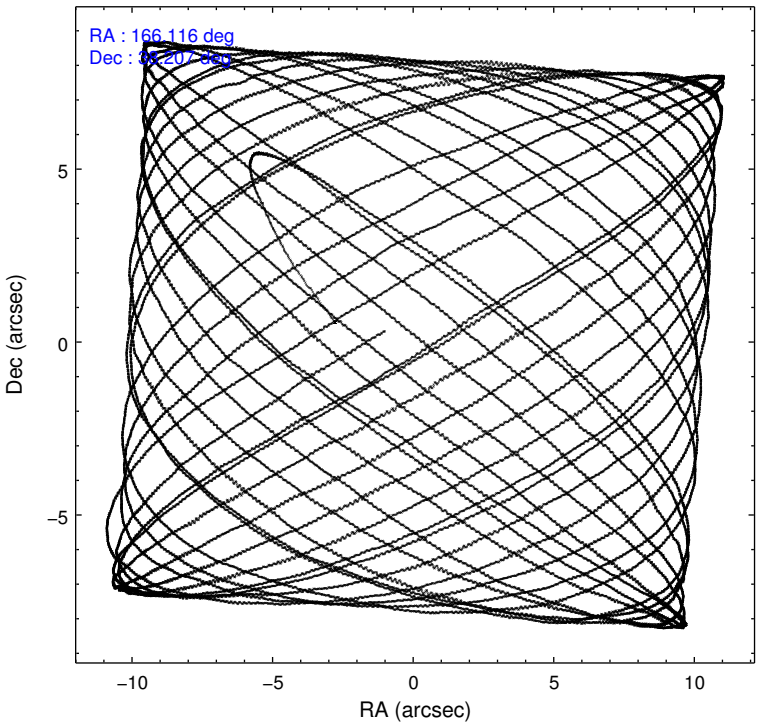
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	10657	15224	37514	13770	28679	7584
	12%	11%	33%	10%	23%	10%
grade 1 events	90	323	276	287	176	58
	0%	0%	0%	0%	0%	0%
grade 2 events	2536	20739	6519	18240	8310	2472
	2%	16%	5%	14%	6%	3%
grade 3 events	1058	4232	2286	7965	3298	1155
	1%	3%	2%	6%	2%	1%
grade 4 events	969	4078	2316	7989	3106	1061
	1%	3%	2%	6%	2%	1%
grade 5 events	3165	8723	3504	9963	4783	3601
	3%	6%	3%	7%	3%	4%
grade 6 events	1568	29781	2777	30972	7581	1867
	1%	23%	2%	23%	6%	2%
grade 7 events	68079	45758	57187	40012	63997	56071
	77%	35%	50%	30%	53%	75%

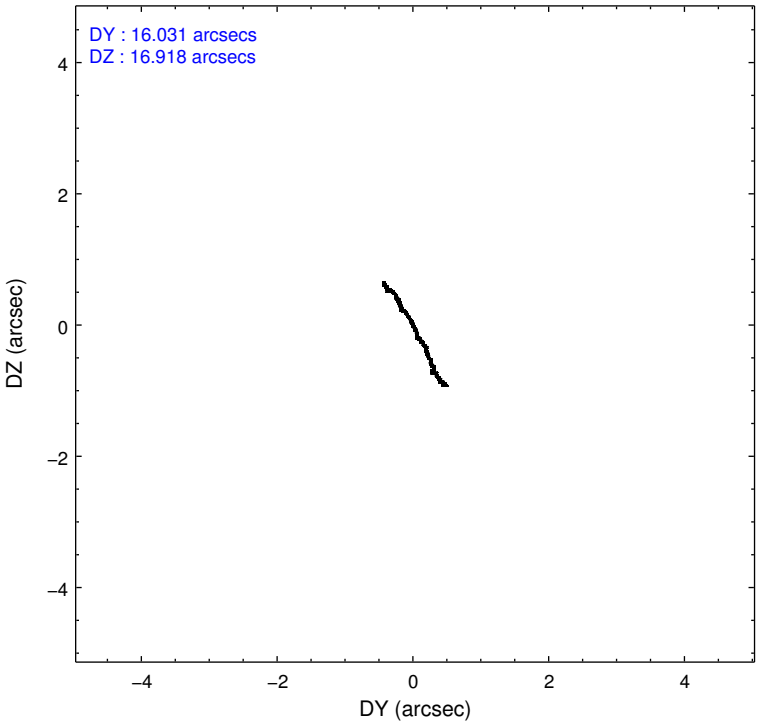
2.2 Compared Parameters

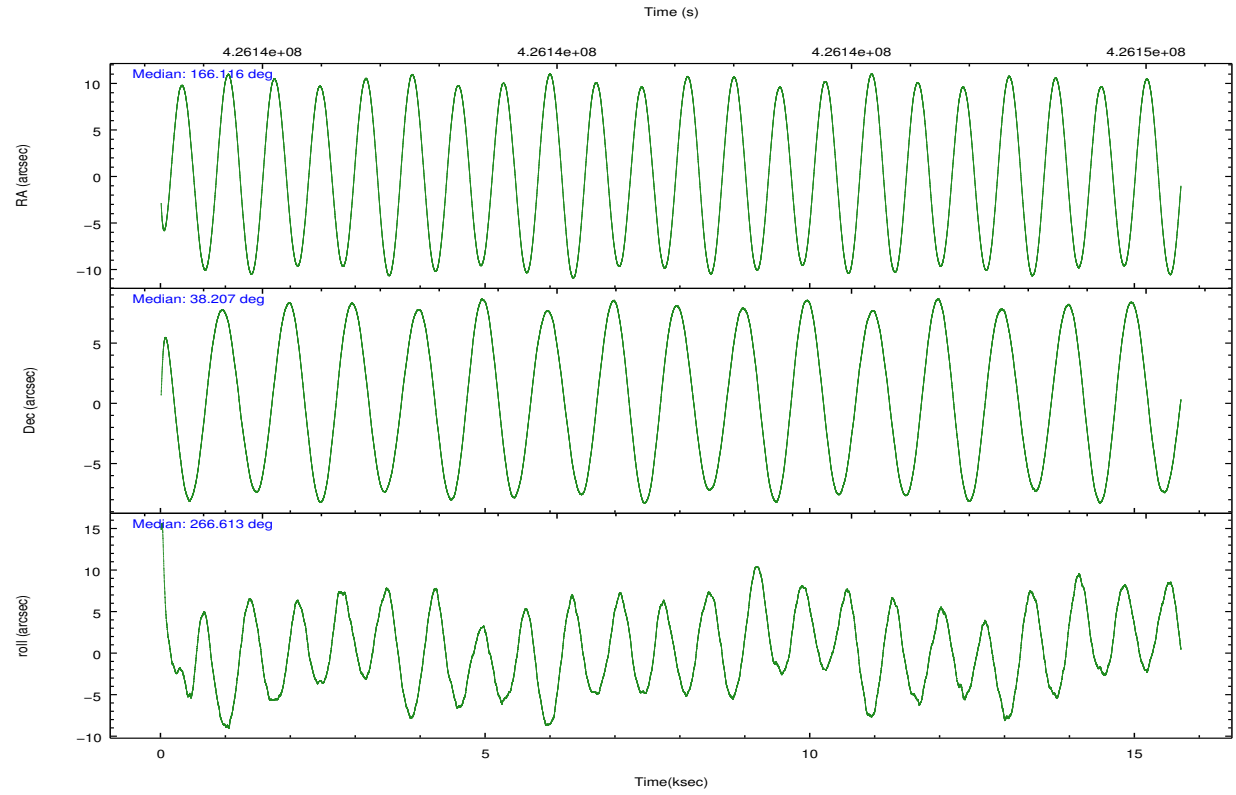
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-456789	ACIS-456789
Grating	HETG	HETG
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	166.100456	166.1164604780627
[deg] Pointing Dec	38.231592	38.20728294093841
[deg] Pointing Roll	266.471003	266.6177427113581
[s] Window start time (MET)	423273666.184000	423273666.184000
[s] Window stop time (MET)	431136066.184000	431136066.184000
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[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)	426134868.184000	426133002.7349
Observation start date	2011-07-04T02:46:42	2011-07-04T02:16:42
[s] Observation end time (MET)	426149618.184000	426150053.61079
Observation end date	2011-07-04T06:52:32	2011-07-04T07:00:53
Read mode	TIMED	TIMED

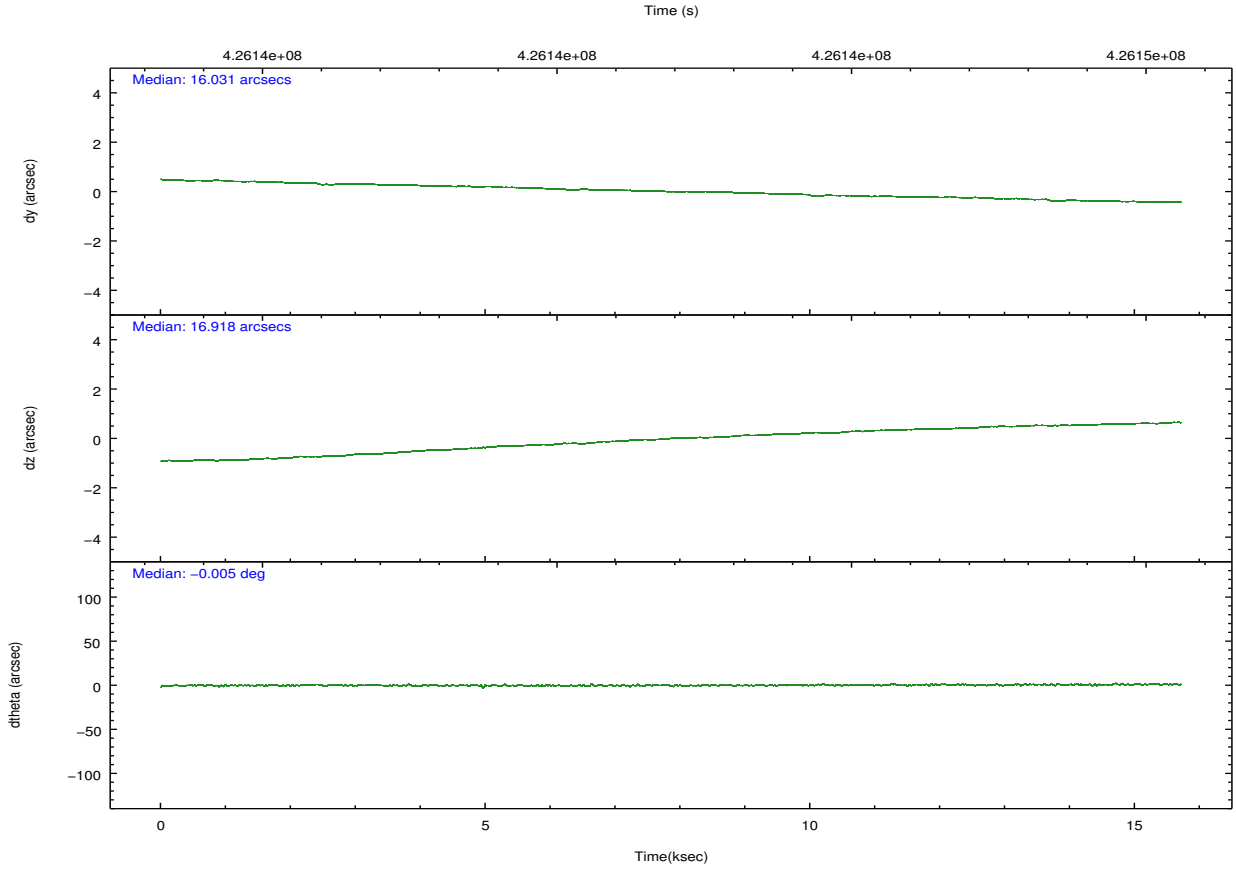
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
CCD I0 on	N	N
CCD I1 on	N	N
CCD I2 on	N	N
CCD I3 on	N	N
CCD S0 on	O1	Y
CCD S1 on	Y	Y
CCD S2 on	Y	Y
CCD S3 on	Y	Y
CCD S4 on	Y	Y
CCD S5 on	Y	Y
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	CUSTOM	CUSTOM
Subarray start row	1	1
Subarray row count	774	774
Alternating exposures requested	N	N
[s] Primary exposure time	0.000000	2.5

2.3 Aspect


RA : 166.116 deg
Dec : 64.207 deg
Dec (arcsec)
RA (arcsec)
5
0
−5
−10
−5
0
5
10


DY : 16.031 arcsecs
DZ : 16.918 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
4.2614e+08
4.2614e+08
4.2614e+08
4.2615e+08
Median: 166.116 deg
RA (arcsec)
Median: 38.207 deg
Dec (arcsec)
Median: 266.613 deg
roll (arcsec)
Time(ksec)

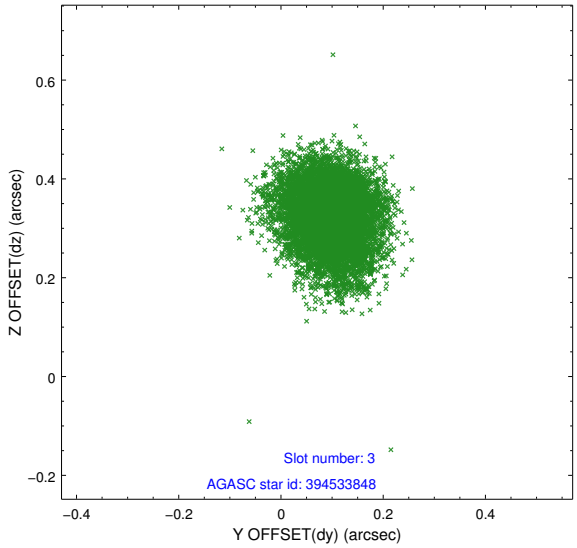

Time (s)
4.2614e+08
4.2614e+08
4.2614e+08
4.2615e+08
Median: 16.031 arcsecs
dy (arcsec)
Median: 16.918 arcsecs
dz (arcsec)
Median: −0.005 deg
dtheta (arcsec)
Time(ksec)

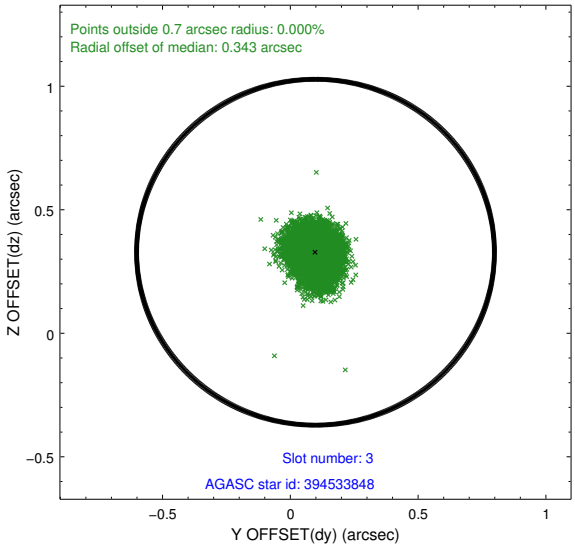
Slot Statistics

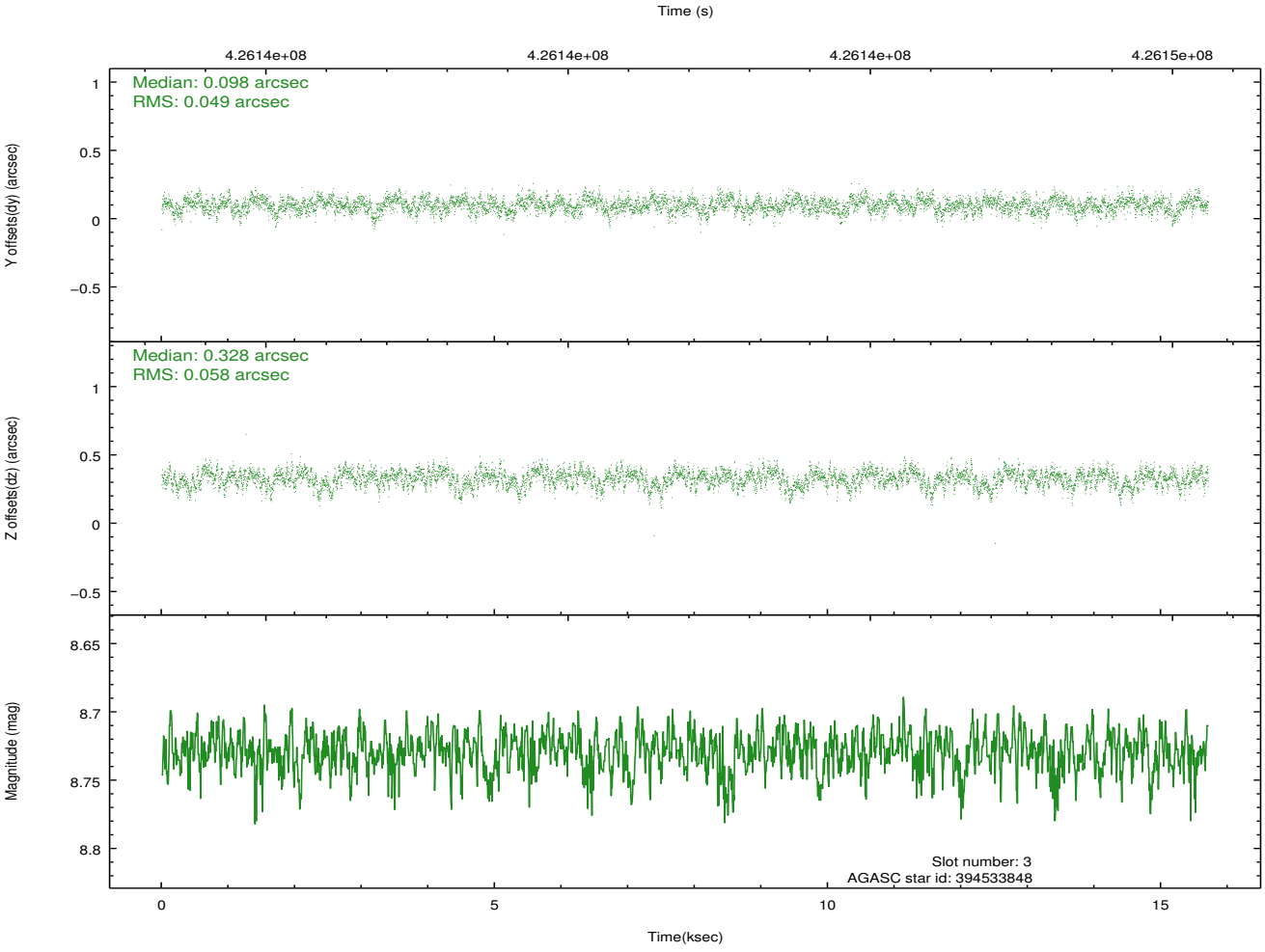
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-1	6.95	3831	-0.042	0.028	0.024	0.036	0.000000	0.000000	927.16	-1796.01
1	FID	ACIS-S-4	6.97	3831	0.080	0.017	0.017	0.025	0.000000	0.000000	2144.84	107.83
2	FID	ACIS-S-6	7.13	3830	-0.063	-0.034	0.012	0.018	0.000000	0.000000	393.43	745.45
3	GUIDE	394533848	8.73	7661	0.098	0.328	0.080	0.132	166.382906	38.276007	-210.18	783.41
4	GUIDE	394543960	9.79	7613	0.164	0.197	0.124	0.198	165.802757	37.787371	1647.34	-746.41
5	GUIDE	394546712	6.59	7662	-0.167	0.244	0.057	0.091	166.451462	38.394357	-647.27	951.74
6	GUIDE	394546720	6.43	7663	0.027	-0.906	0.094	0.145	166.130115	38.241361	-40.15	80.95
7	GUIDE	394530152	7.49	7662	-0.127	0.137	0.080	0.125	166.075805	38.868252	-2283.32	-209.88

2.4 Star Slots

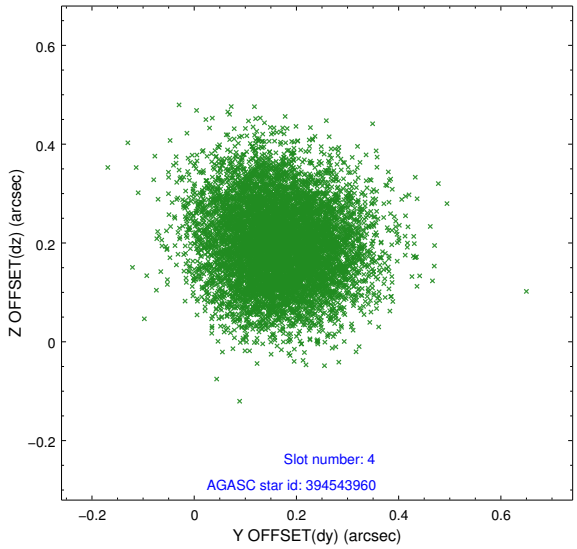
2.4.1 Slot 3

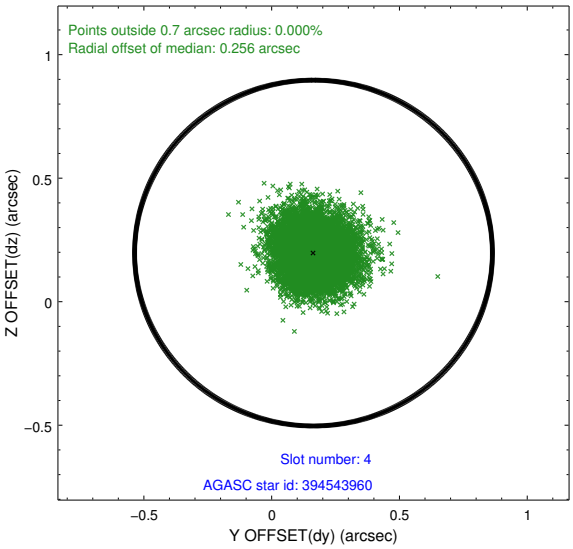


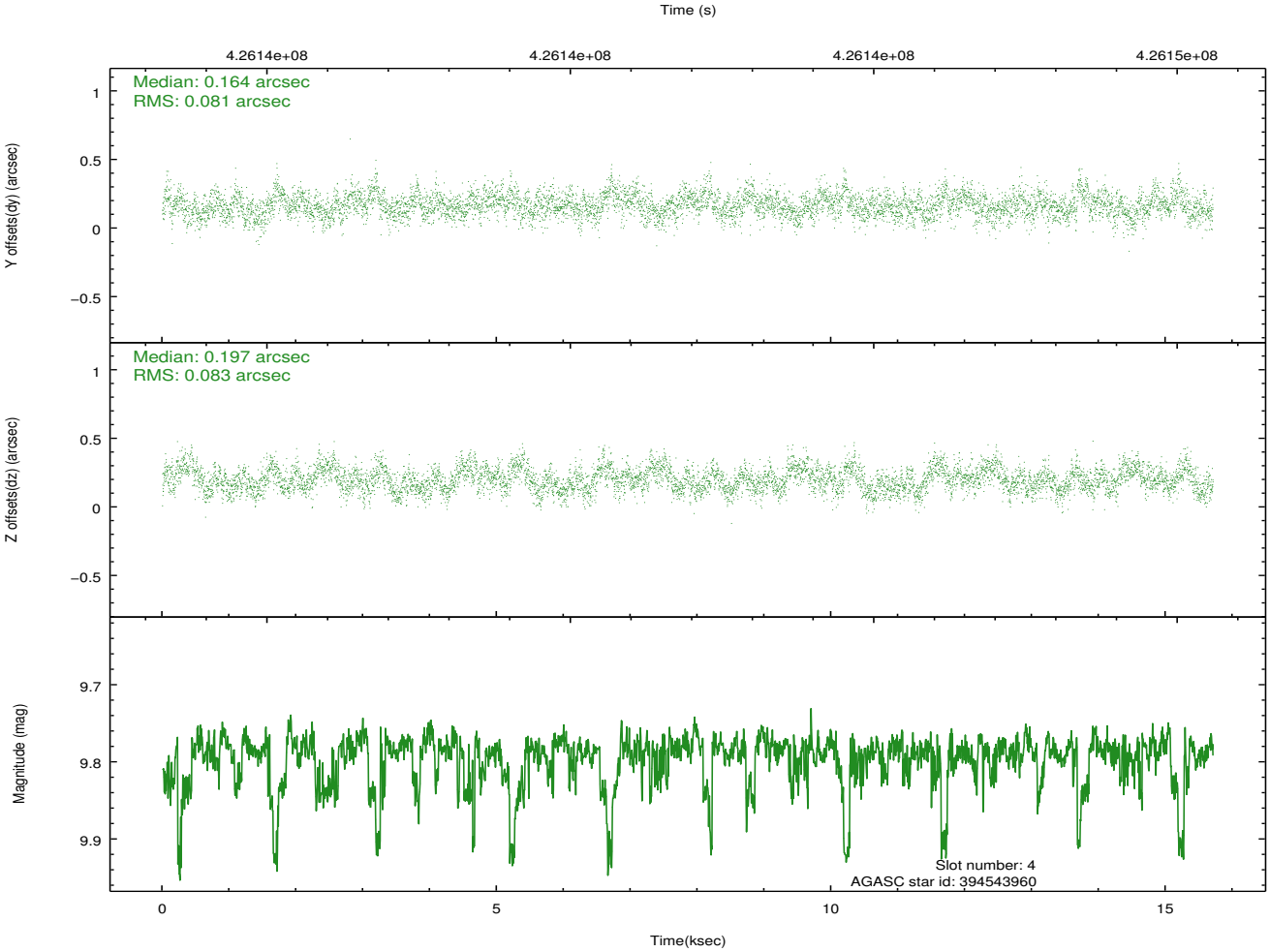




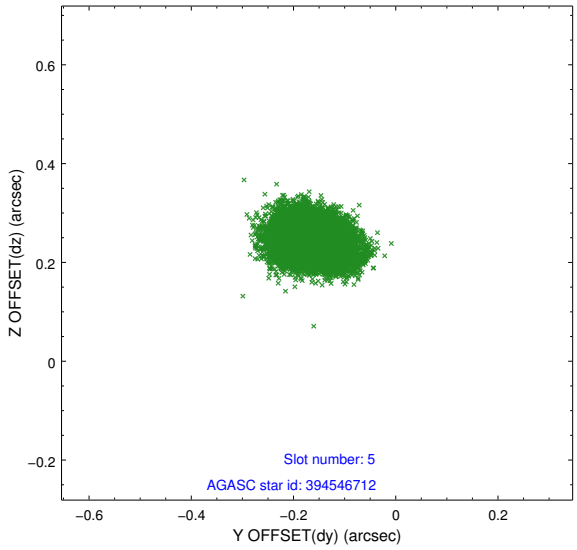
2.4.2 Slot 4

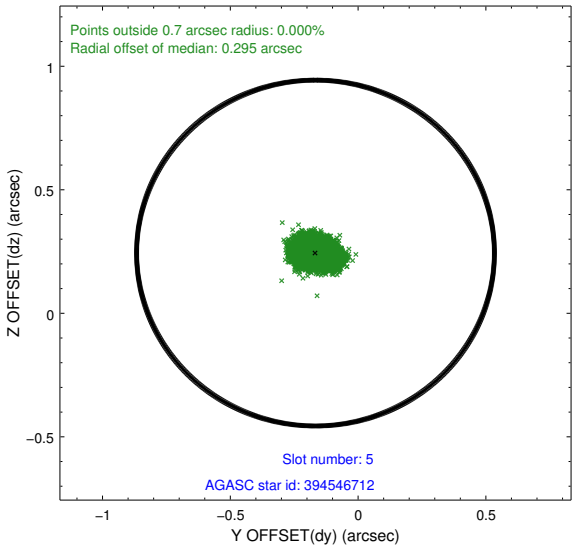

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 394543960

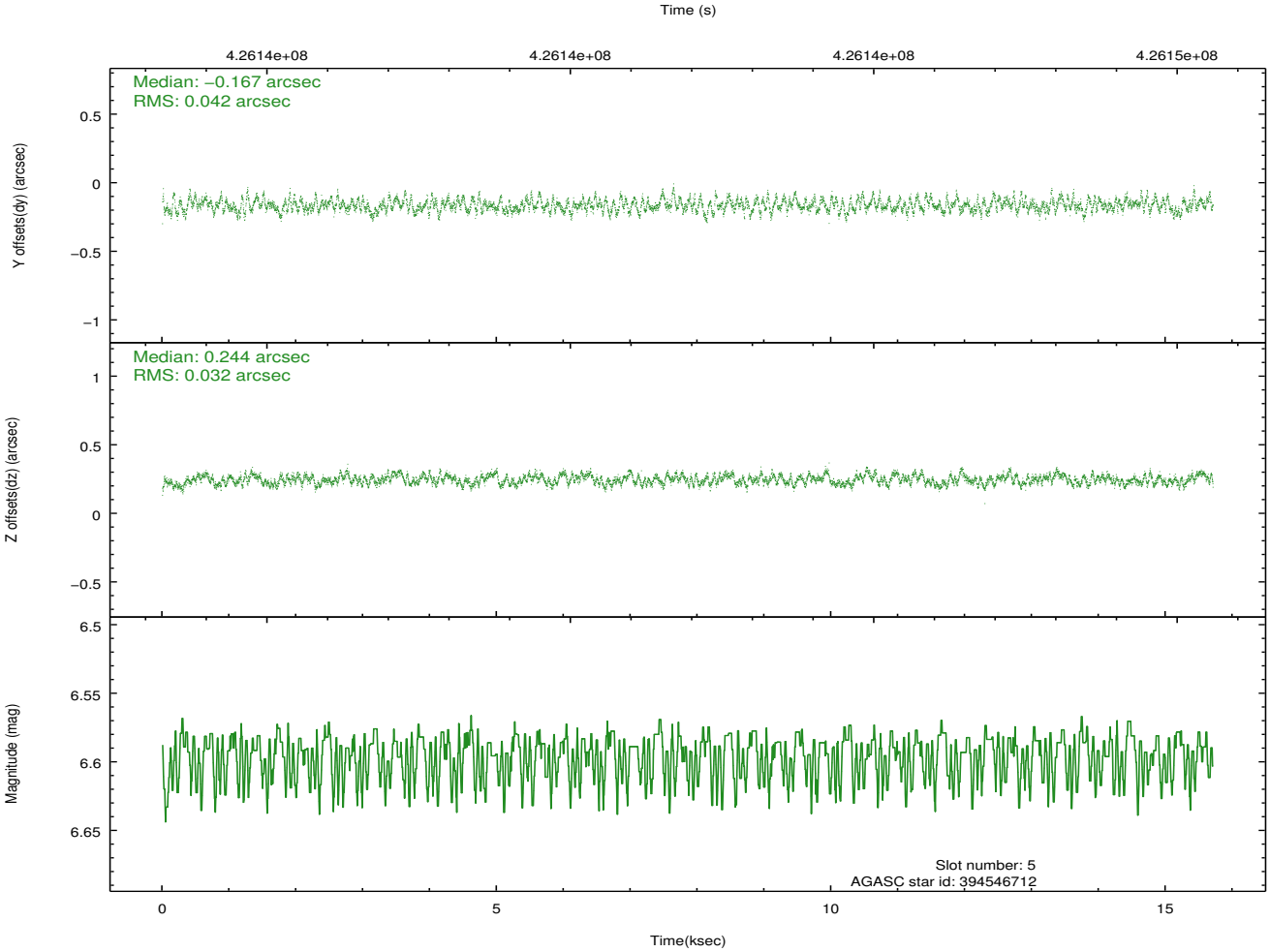

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.256 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 394543960


Time (s)
4.2614e+08
4.2614e+08
4.2614e+08
4.2615e+08
Median: 0.164 arcsec
RMS: 0.081 arcsec
Y offsets(dy) (arcsec)
Median: 0.197 arcsec
RMS: 0.083 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 394543960
Time(ksec)

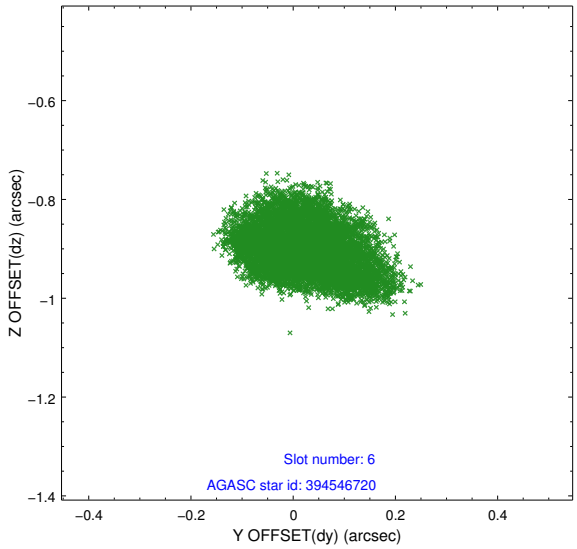
2.4.3 Slot 5

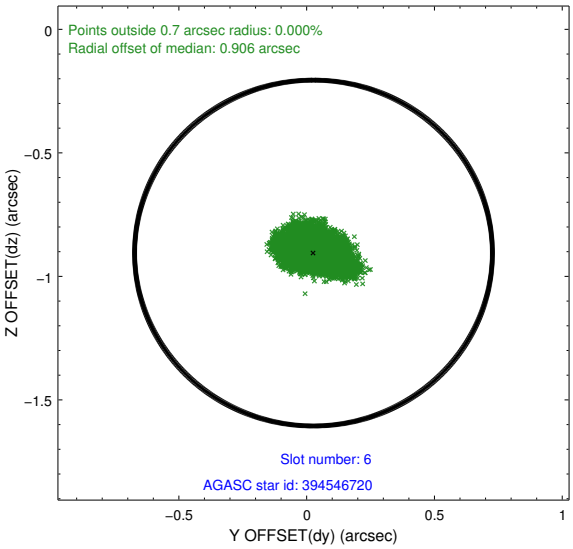

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 394546712

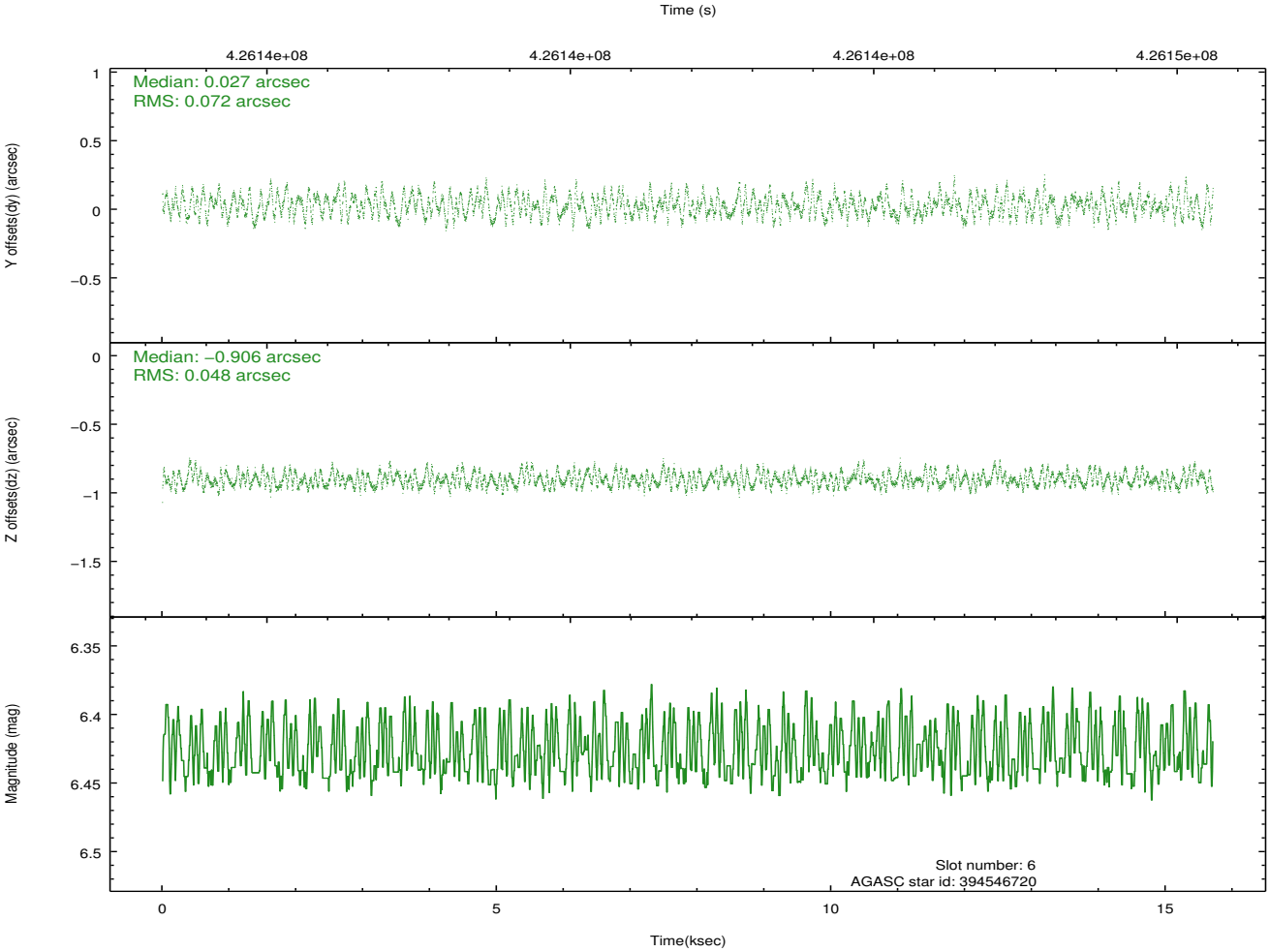

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.295 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 394546712


Time (s)
4.2614e+08
4.2614e+08
4.2614e+08
4.2615e+08
Median: −0.167 arcsec
RMS: 0.042 arcsec
Y offsets(dy) (arcsec)
Median: 0.244 arcsec
RMS: 0.032 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 394546712
Time(ksec)

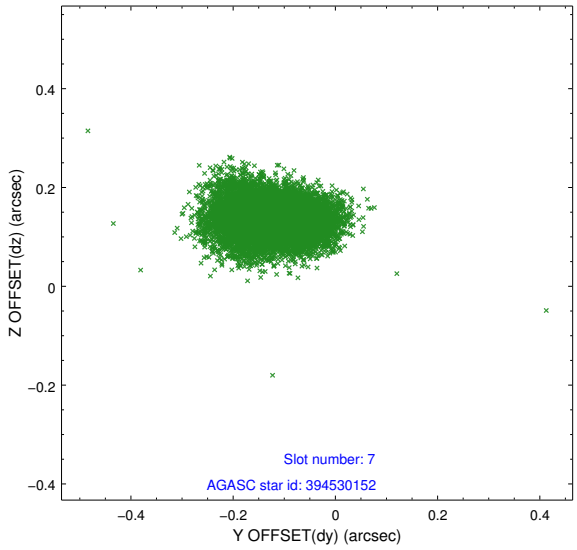
2.4.4 Slot 6

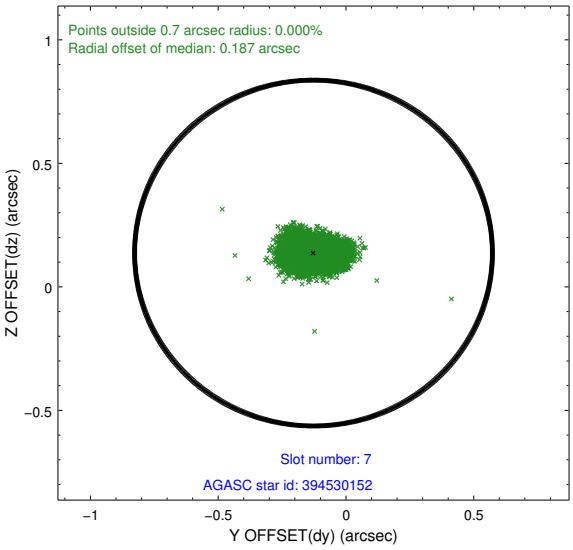

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 394546720

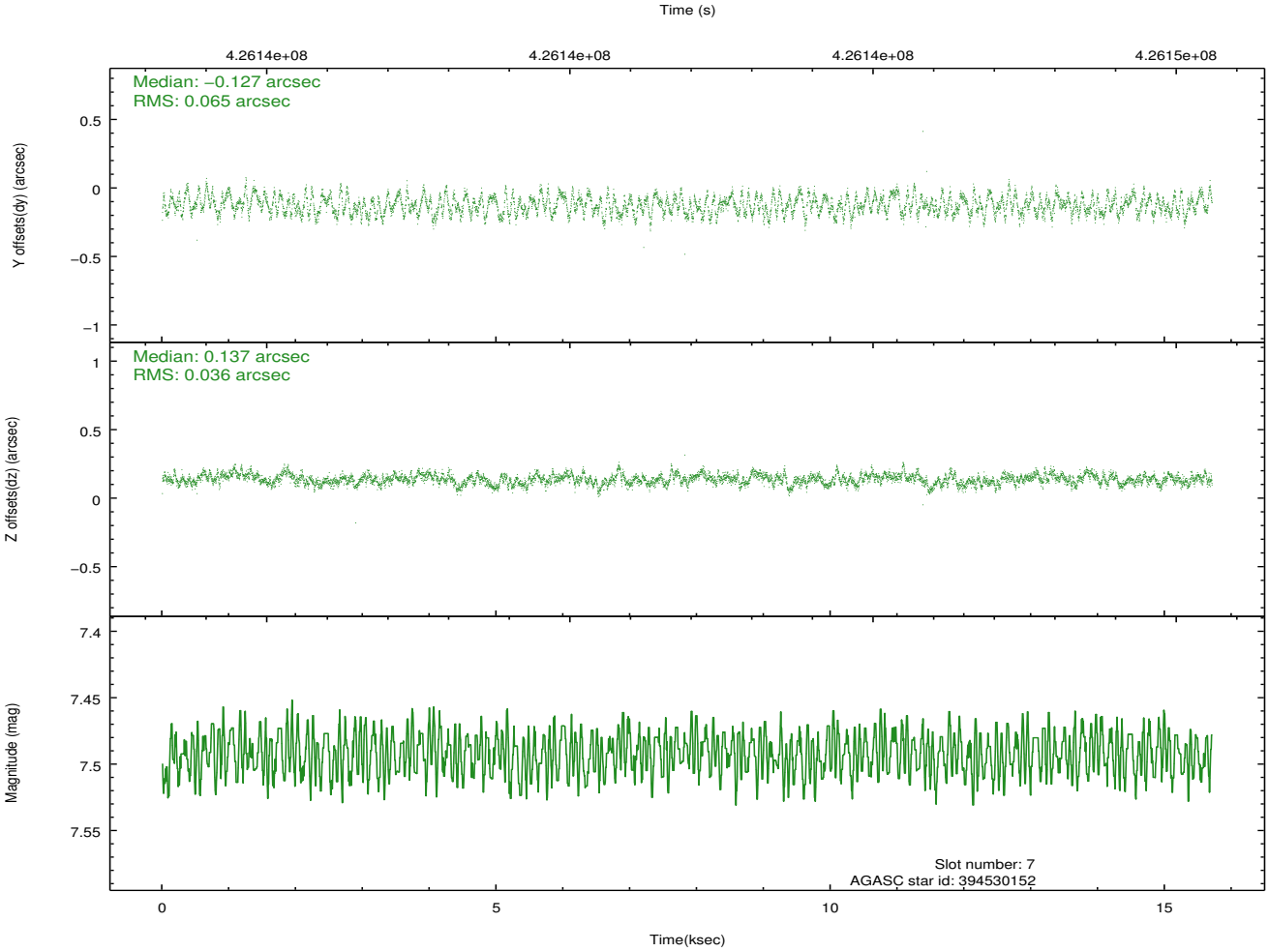

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.906 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 394546720


Time (s)
4.2614e+08
4.2614e+08
4.2614e+08
4.2615e+08
Median: 0.027 arcsec
RMS: 0.072 arcsec
Y offsets(dy) (arcsec)
Median: −0.906 arcsec
RMS: 0.048 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 394546720
Time(ksec)

2.4.5 Slot 7

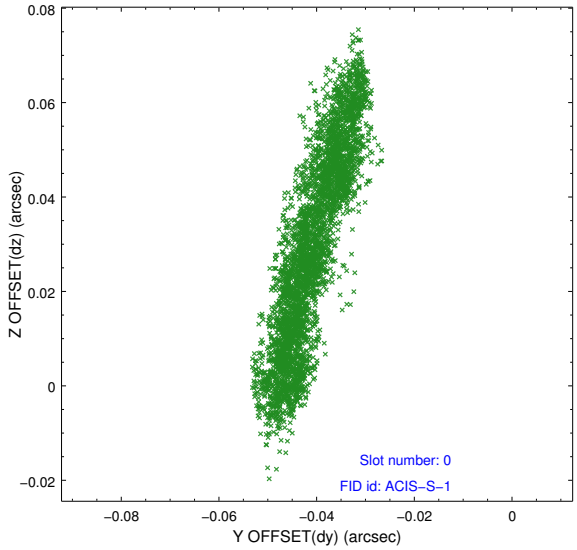

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 394530152

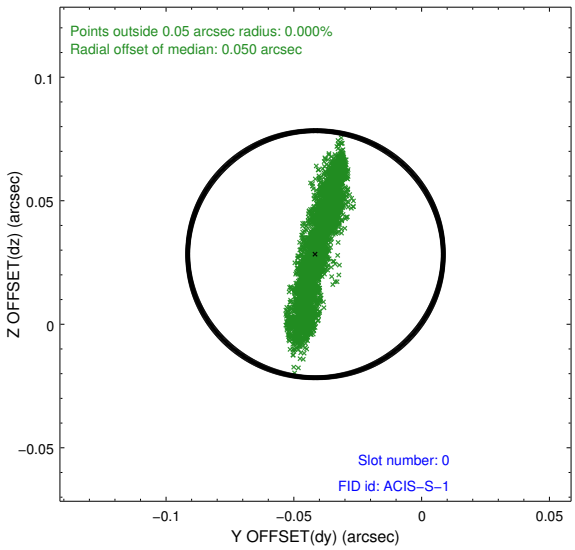

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.187 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 394530152

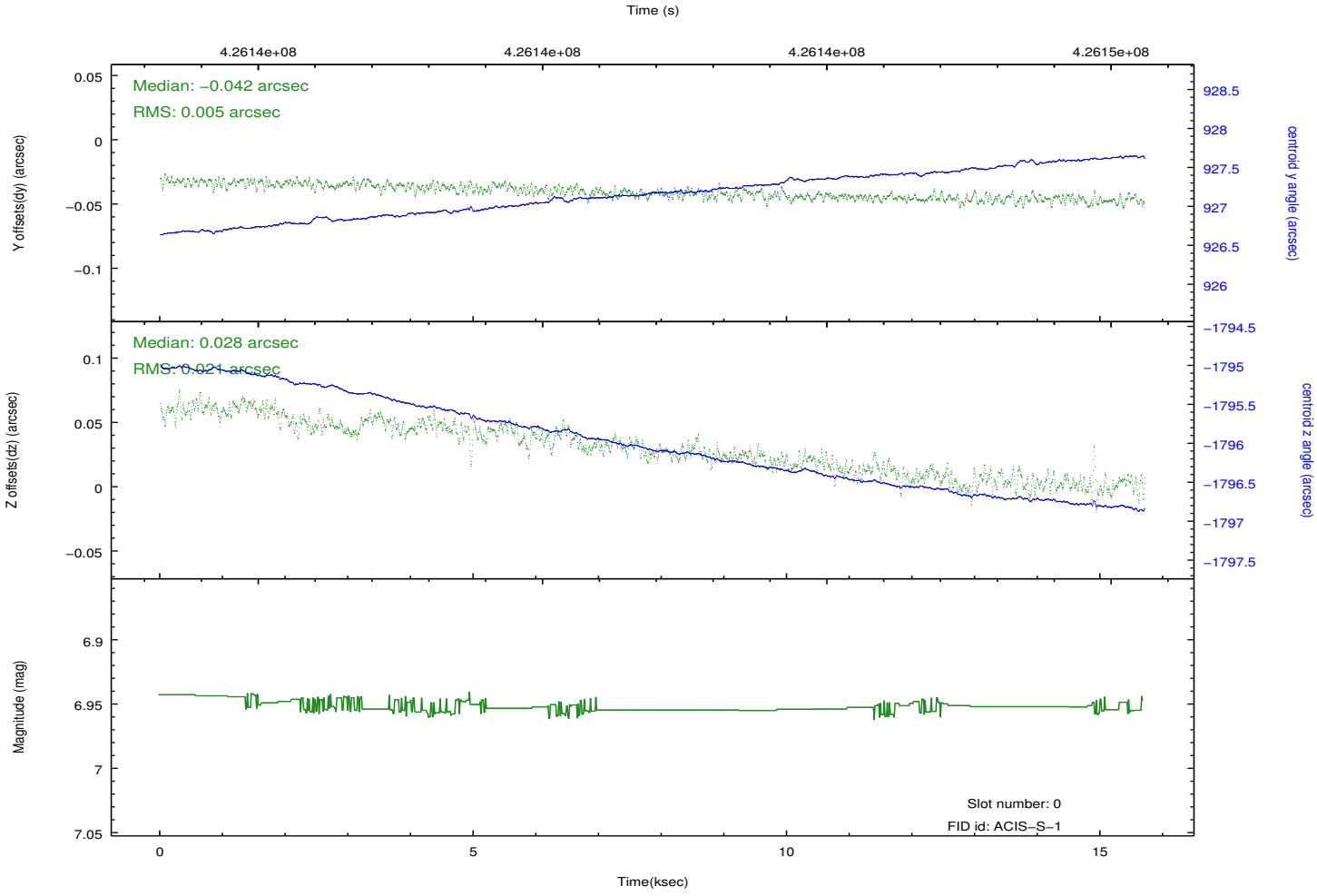

Time (s)
Median: −0.127 arcsec
RMS: 0.065 arcsec
Y offsets(dy) (arcsec)
Median: 0.137 arcsec
RMS: 0.036 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 394530152
Time(ksec)

2.5 FID Slots

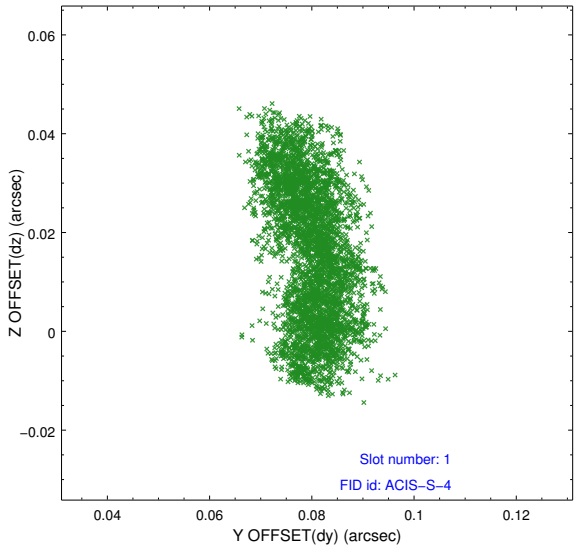
2.5.1 Slot 0

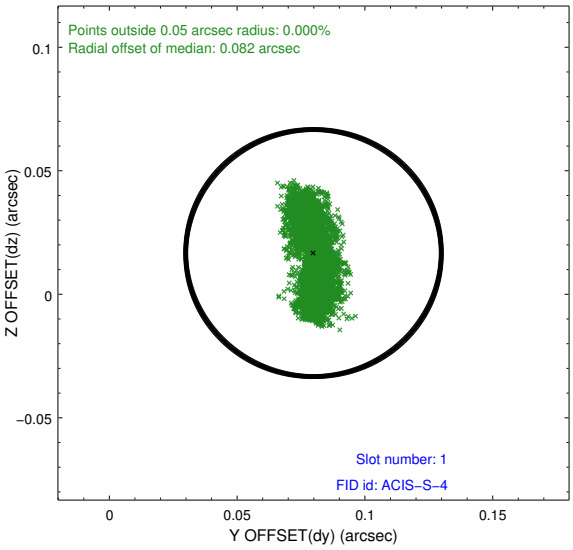


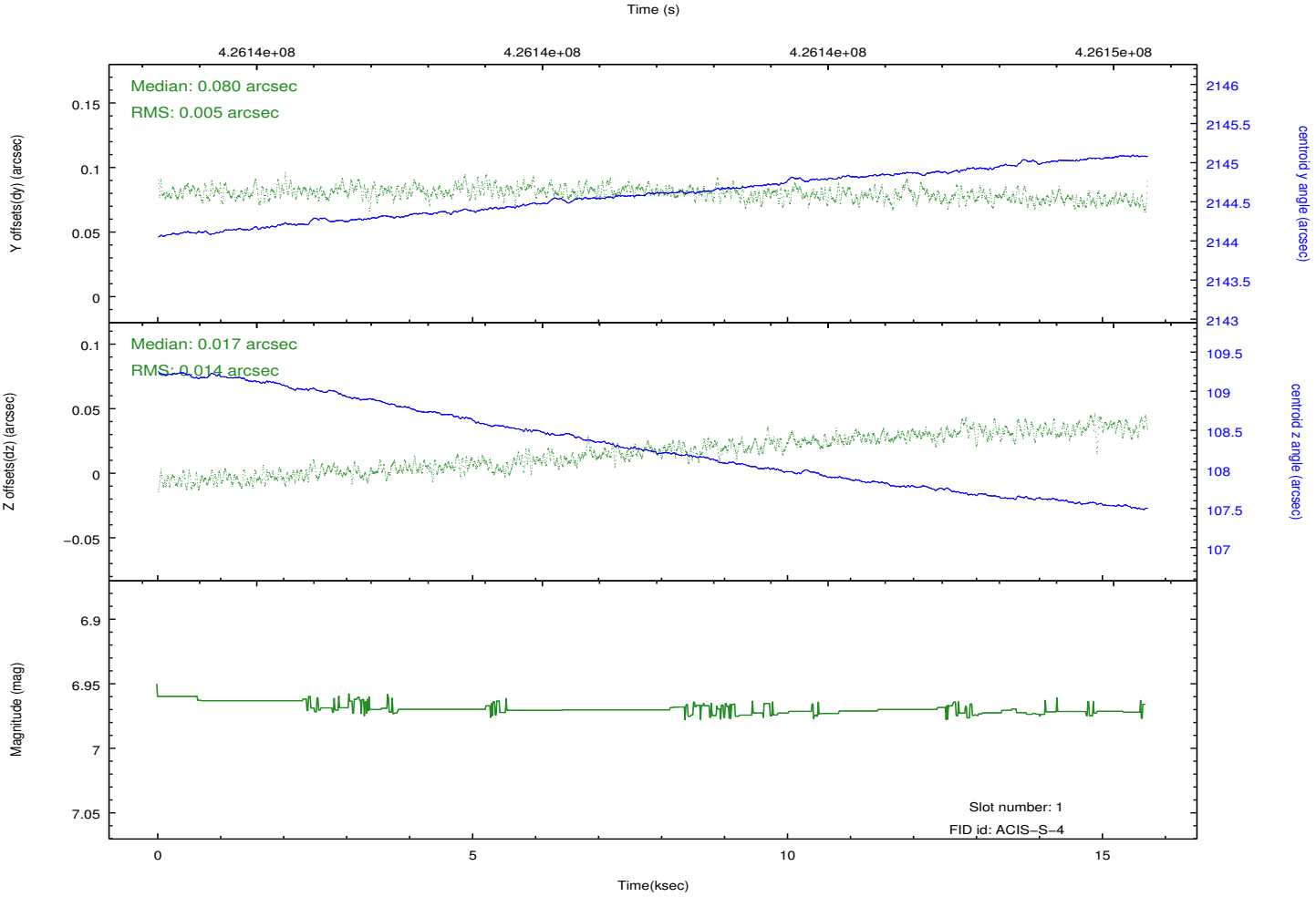




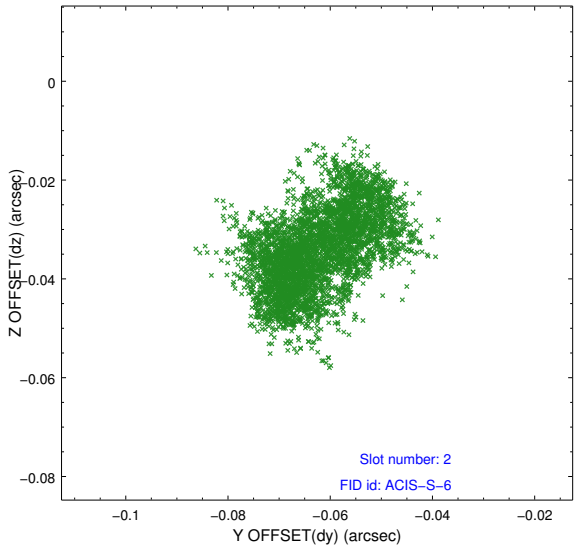
2.5.2 Slot 1

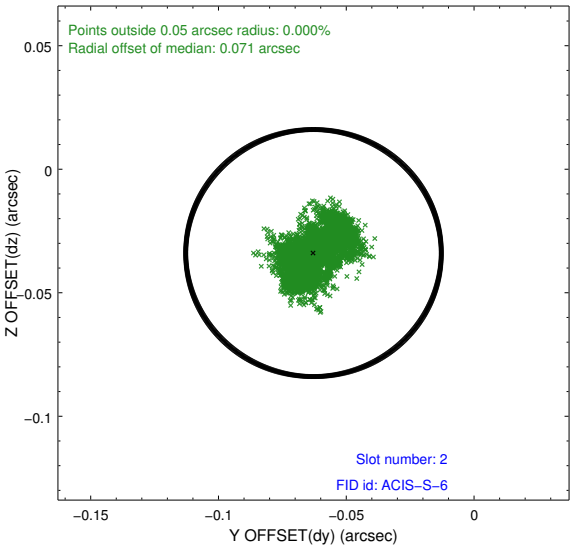

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

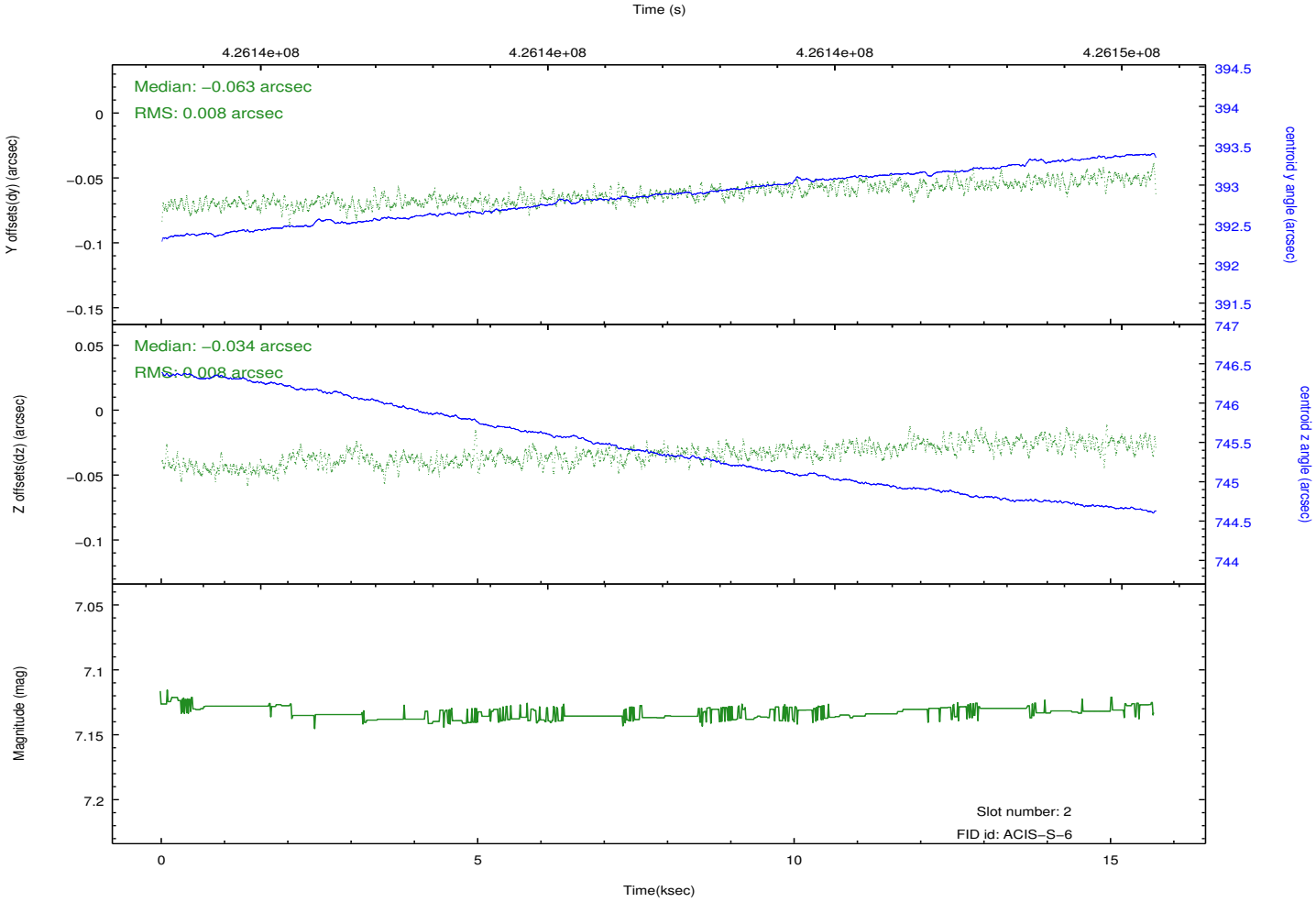

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.082 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.080 arcsec
RMS: 0.005 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.017 arcsec
RMS: 0.014 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

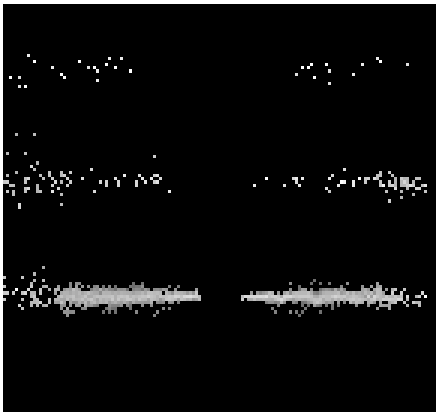

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6


Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.071 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−6

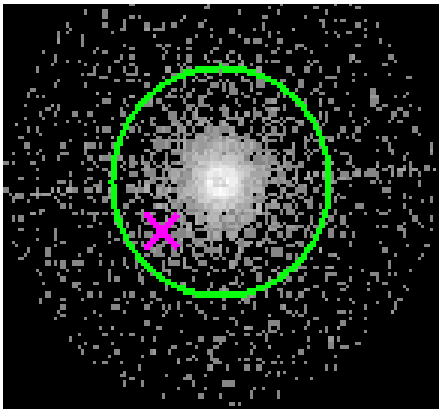

Time (s)
Median: −0.063 arcsec
RMS: 0.008 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: −0.034 arcsec
RMS: 0.008 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−6
Time(ksec)

3 Gratings

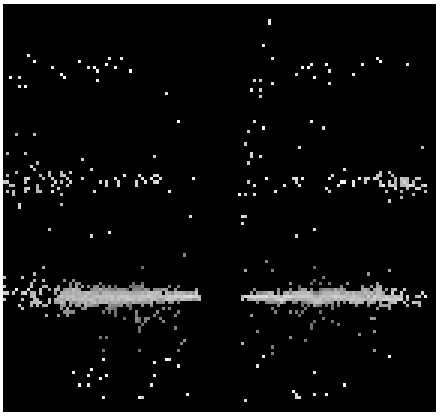
3.1 HEG Arm



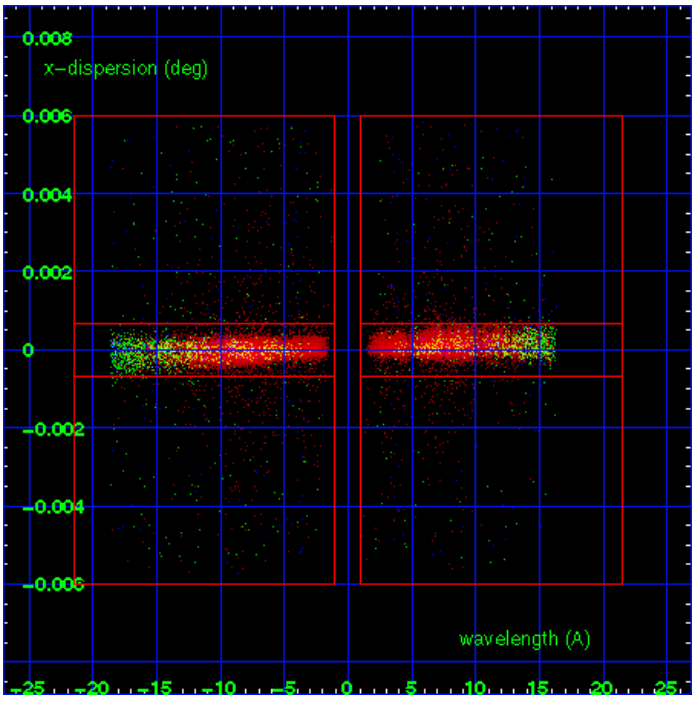
HEG Order Sort 123



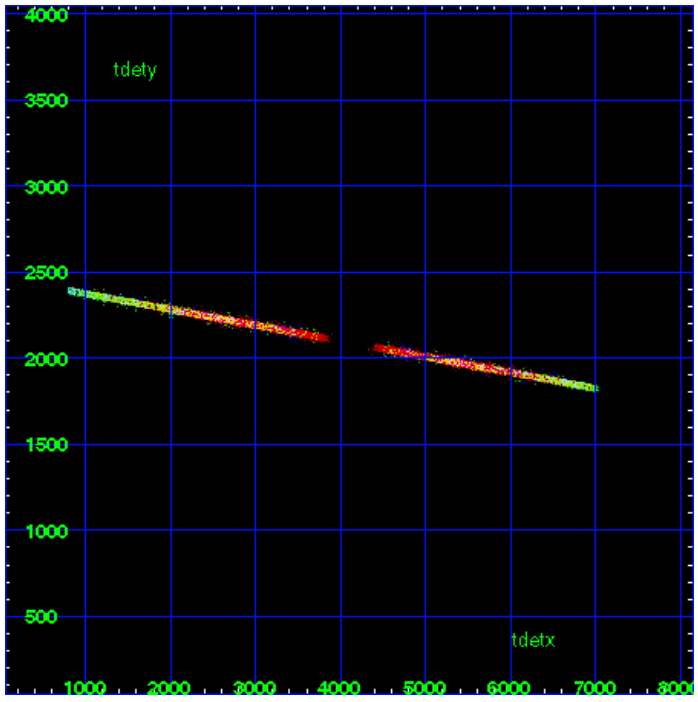
HEG Zero Order



HEG Order Sort ALL

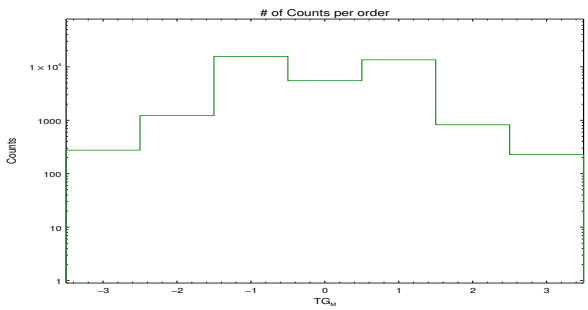


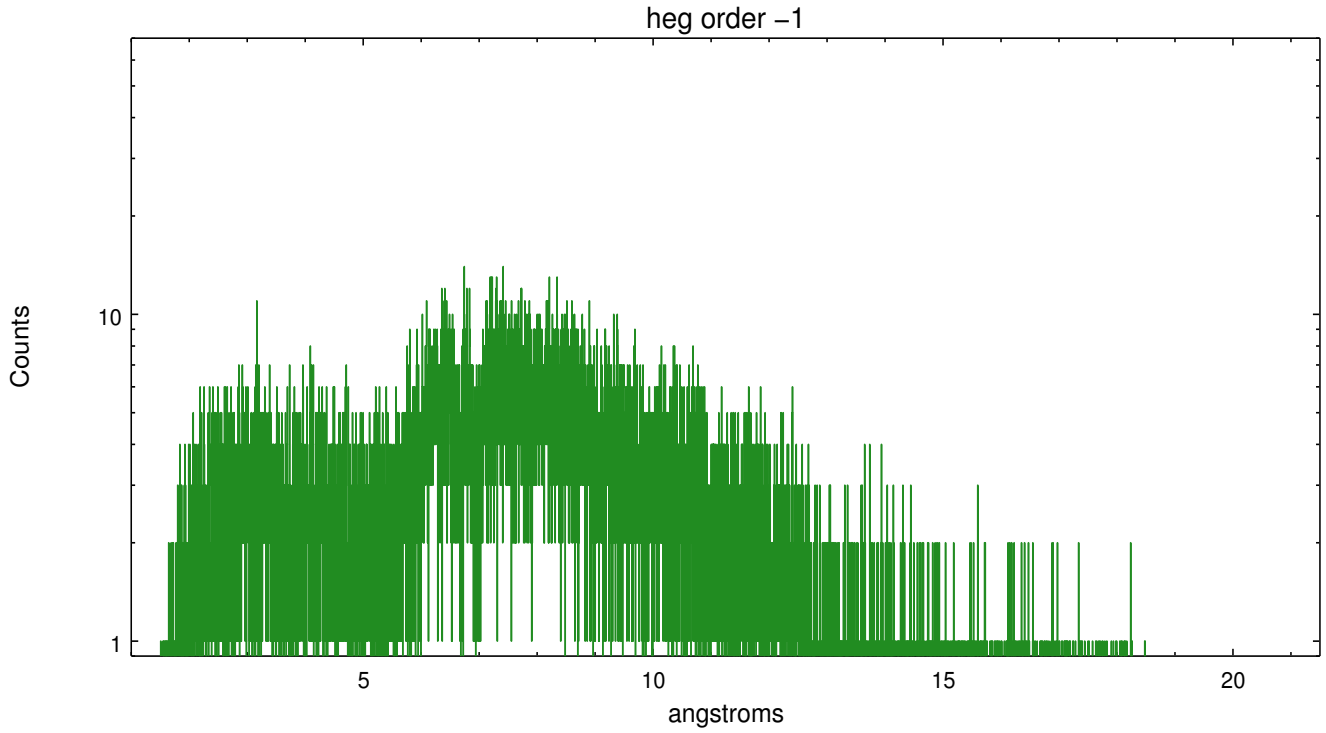
Spot Image HEG

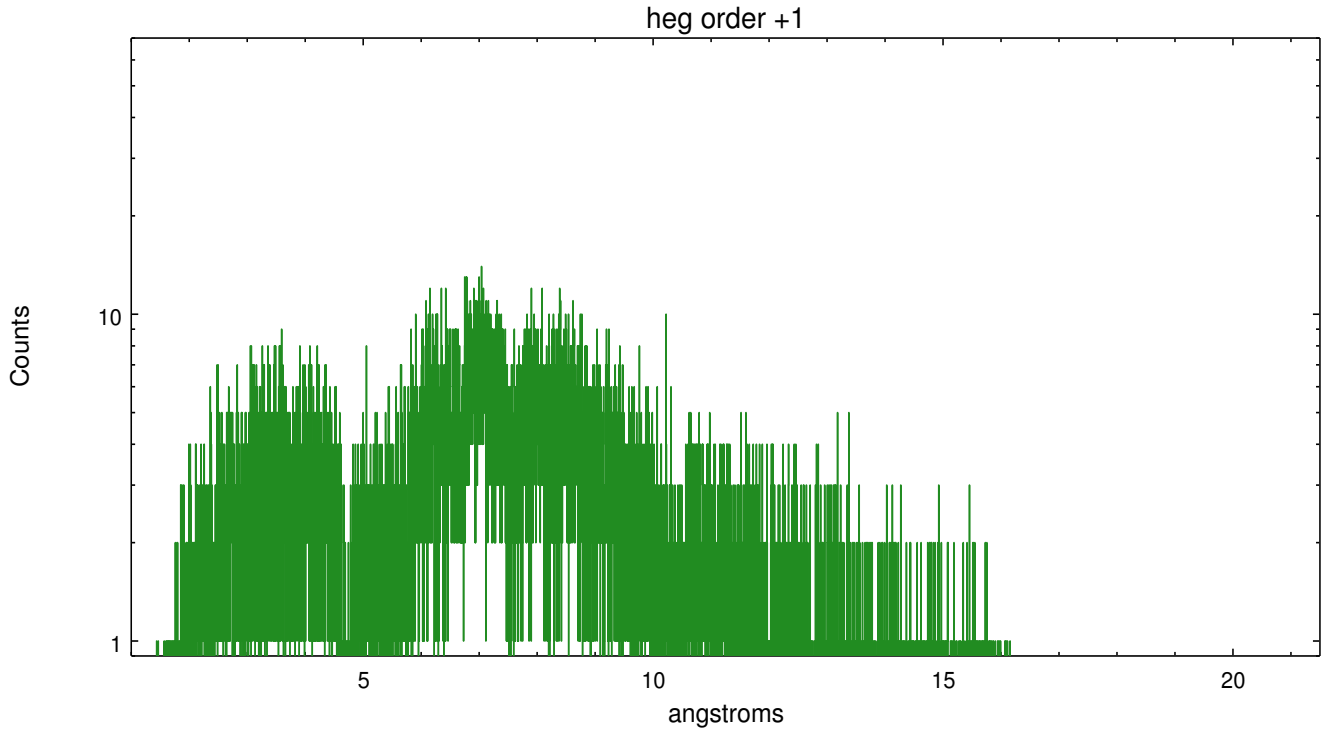


Full Detector HEG

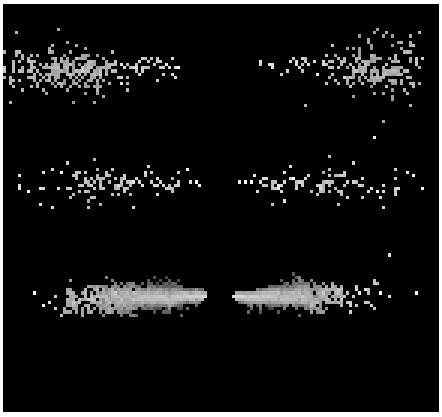
	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	276	1222	15678	5509	13520	825	228



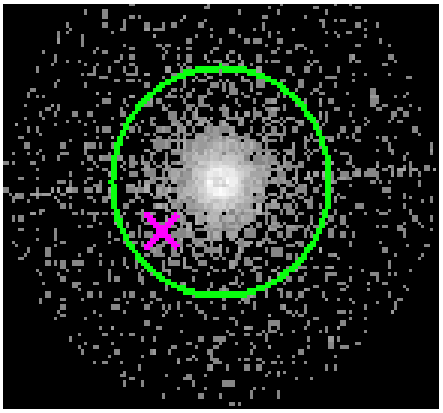

heg order −1
Counts
10
1
5
10
15
20
angstroms


heg order +1
Counts
10
1
5
10
15
20
angstroms

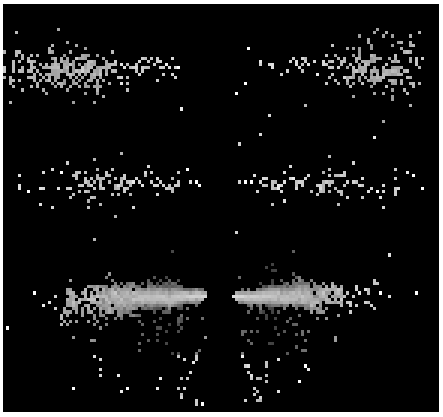
3.2 MEG Arm



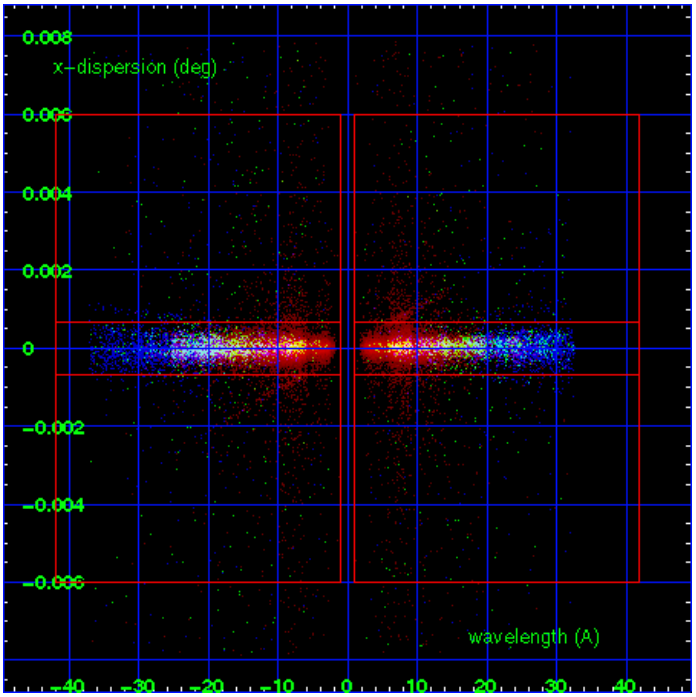
MEG Order Sort 123



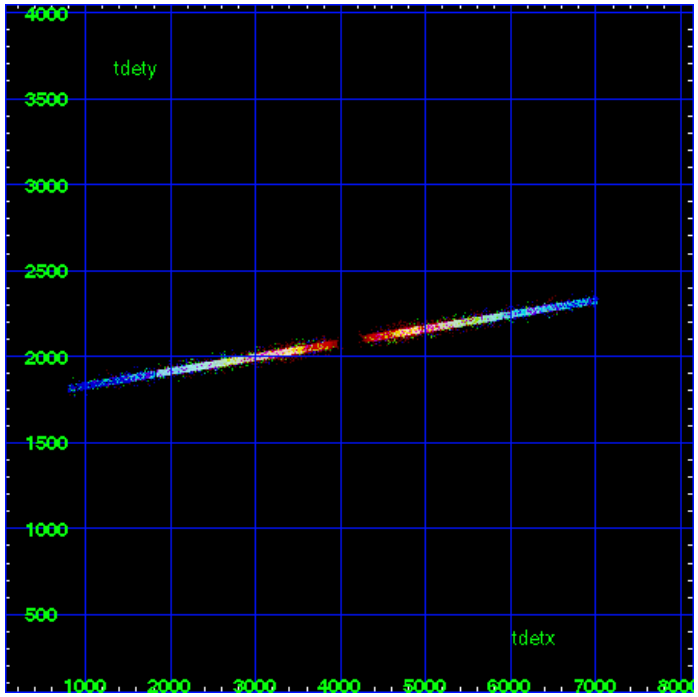
MEG Zero Order



MEG Order Sort ALL

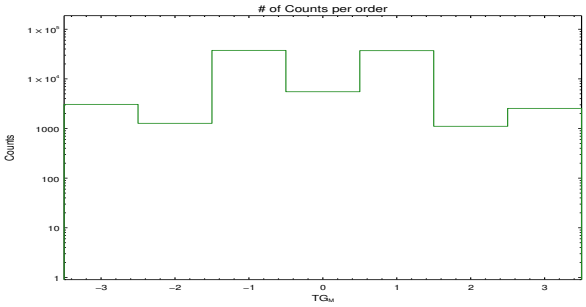


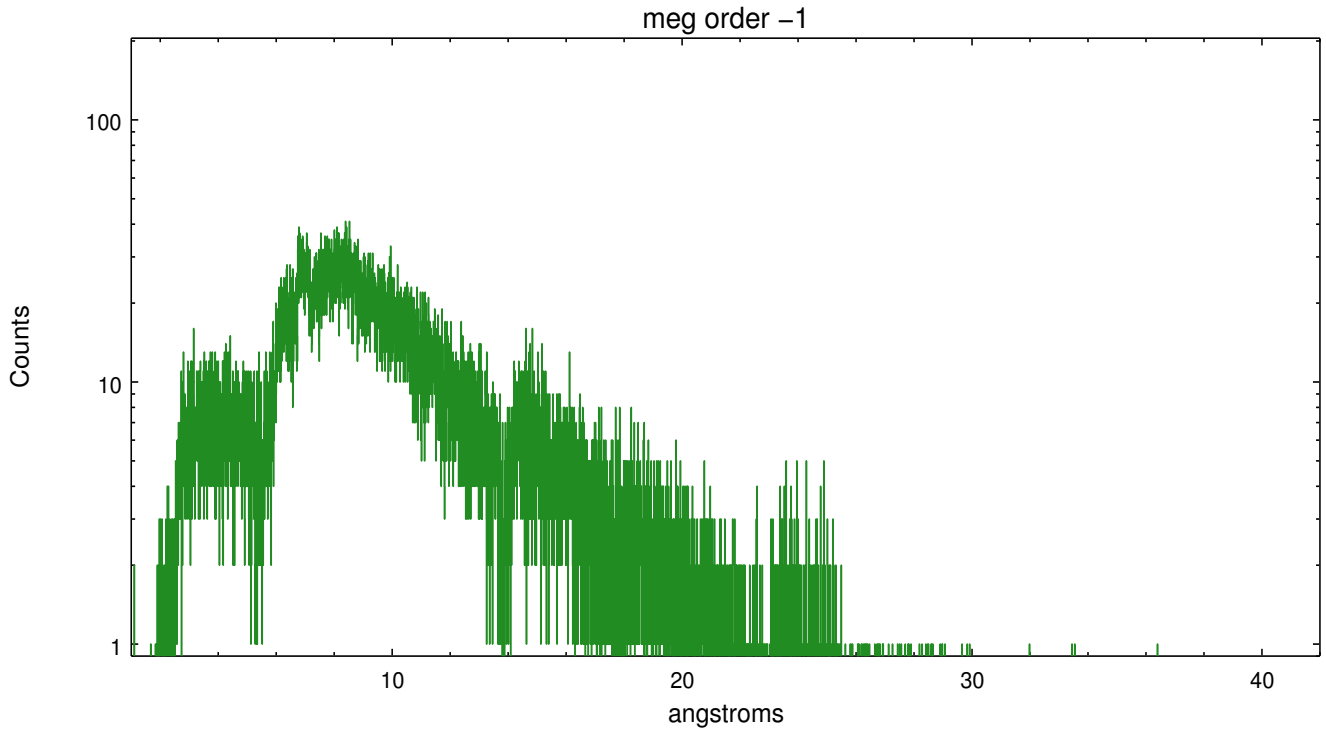
Spot Image MEG

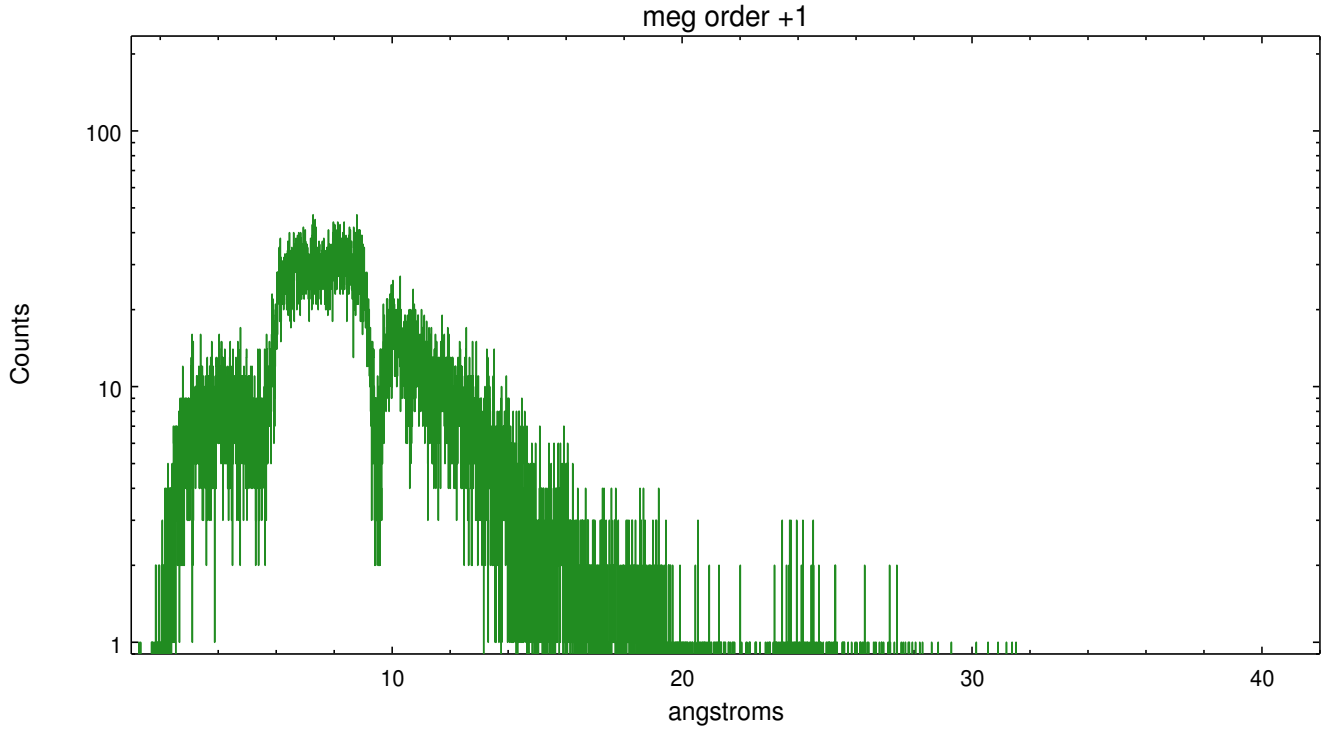


Full Detector MEG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	3063	1272	37517	5509	37031	1108	2544




meg order −1
100
10
1
Counts
10
20
30
40
angstroms


meg order +1
100
10
1
Counts
10
20
30
40
angstroms

A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2012.03.26
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	14.7975

A.2 Comments

Note: very bright source; MEG spectrum appears in bad-pixel image, meaning it may have significant pileup. 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=4111.22, y=4107.9) 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.