V&V Reference Report
L2 ASCDS Version : 8.4.5

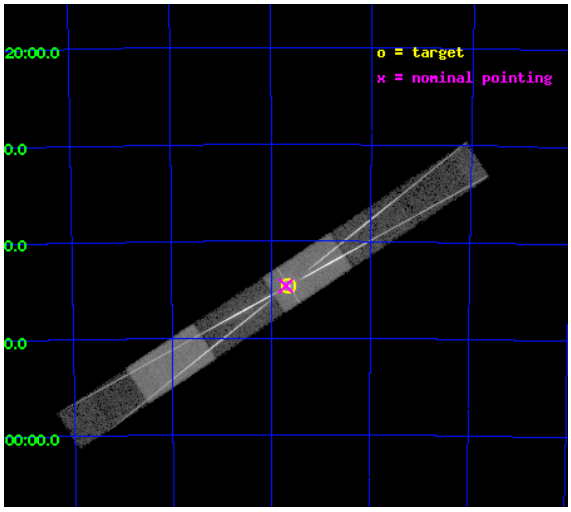
Observation 12089 - L2 Version 3
Chandra X-Ray Center

L2 Processing Date : Jun 21 2012

Contents

1 Front

seq_num	401109	Sequence number
obs_id	12089	Observation id
title	Deep Chandra Observations of the Black Hole LMC X-1	Proposal title
observer	Dr. Michael Nowak	Principal investigator
object	LMC X-1	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	84.911667	Observer's specified target RA [deg]
dec_targ	-69.74325	Observer's specified target Dec [deg]
ra_nom	84.925687842511	Nominal RA [deg]
dec_nom	-69.743424355114	Nominal Dec [deg]
roll_nom	326.66977396352	Nominal Roll [deg]
revision	3	Processing version of data
ontime	15068.629207671	Sum of GTIs [s]
livetime	14713.429704682	Livetime [s]
ontime4	15066.929217517	Sum of GTIs [s]
ontime5	15068.588167667	Sum of GTIs [s]
ontime6	15068.547127664	Sum of GTIs [s]
ontime7	15068.629207671	Sum of GTIs [s]
ontime8	15068.506087661	Sum of GTIs [s]
ontime9	15068.465047657	Sum of GTIs [s]
l2events	343012	Number of level 2 events

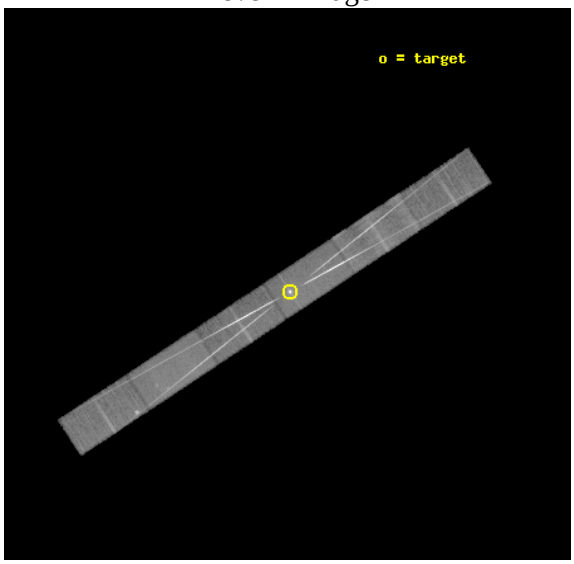


2 OBI

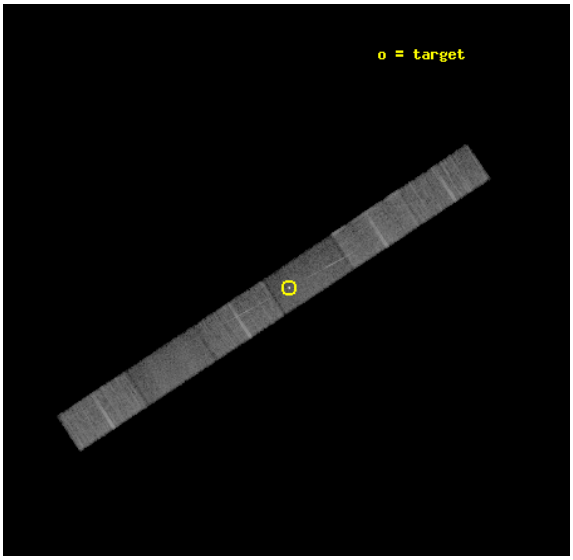
2.1 OBI

2.1.1 Images

Level 1 Image

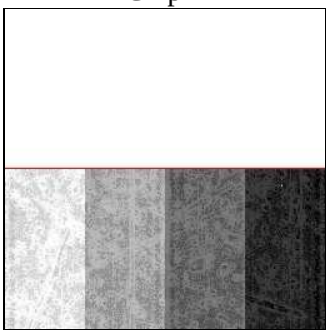


Level 1 Bad Events

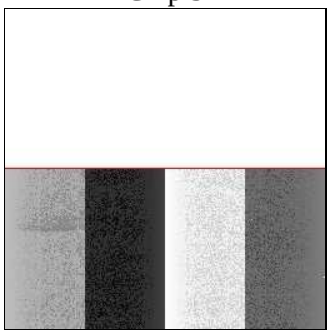


2.1.2 Bias

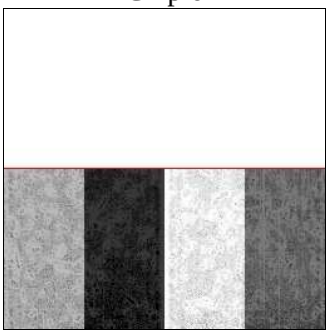
Chip 4



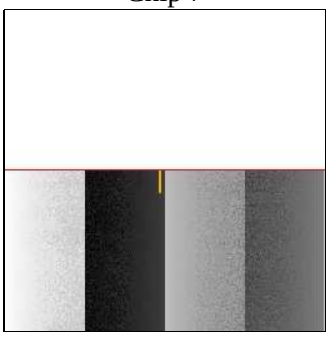
Chip 5



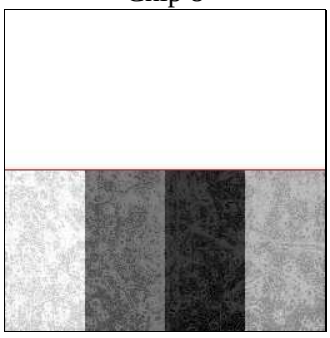
Chip 6



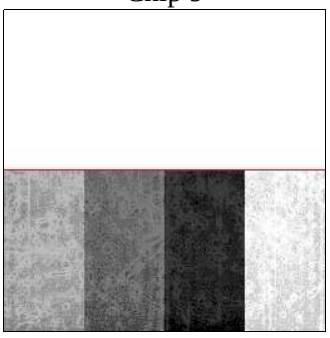
Chip 7



Chip 8



Chip 9



2.1.3 Parameters

obi_num	0	Obi number
ascdsver	8.4.5	Processing system revision
caldbver	4.4.10	
date	2012-06-19T23:06:54	Date and time of file creation
revision	2	Processing version of data

sched_exp_time	15000.000000	[s] Scheduled observation exposure time
ontime	15068.629207671	Sum of GTIs [s]
ontime4	15066.929217517	Sum of GTIs [s]
ontime5	15068.588167667	Sum of GTIs [s]
ontime6	15068.547127664	Sum of GTIs [s]
ontime7	15068.629207671	Sum of GTIs [s]
ontime8	15068.506087661	Sum of GTIs [s]
ontime9	15068.465047657	Sum of GTIs [s]
l1events	724791	Number of level 1 events

2.1.4 Events

	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	83820	113885	155369	167710	130077	73930
rejected events	69278	46132	60601	43918	67063	58349
rejected %	82%	40%	39%	26%	51%	78%

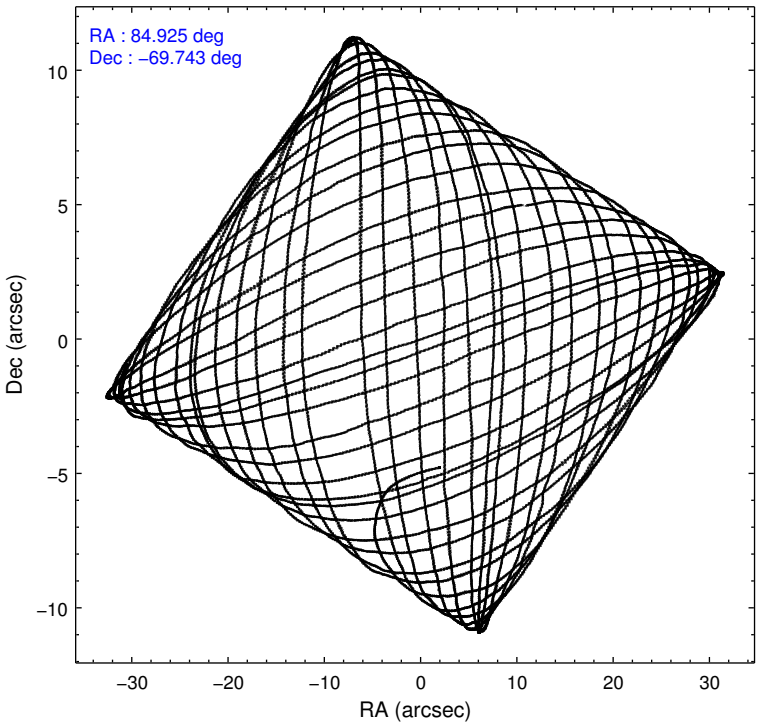
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	8502	12407	71254	22996	38732	8994
	10%	10%	45%	13%	29%	12%
grade 1 events	59	185	576	403	263	52
	0%	0%	0%	0%	0%	0%
grade 2 events	2396	19399	11475	30207	9511	2468
	2%	17%	7%	18%	7%	3%
grade 3 events	1121	4774	4215	13646	3772	1244
	1%	4%	2%	8%	2%	1%
grade 4 events	1074	4620	3988	13611	3545	1183
	1%	4%	2%	8%	2%	1%
grade 5 events	2537	8082	2951	9292	3941	2843
	3%	7%	1%	5%	3%	3%
grade 6 events	1451	26567	3856	43358	7466	1695
	1%	23%	2%	25%	5%	2%
grade 7 events	66680	37851	57054	34197	62847	55451
	79%	33%	36%	20%	48%	75%

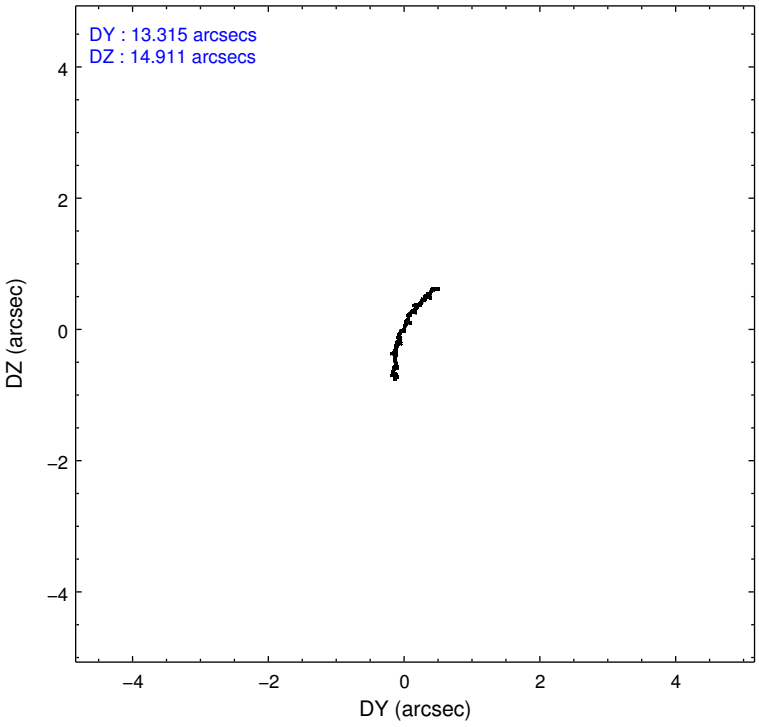
2.2 Compared Parameters

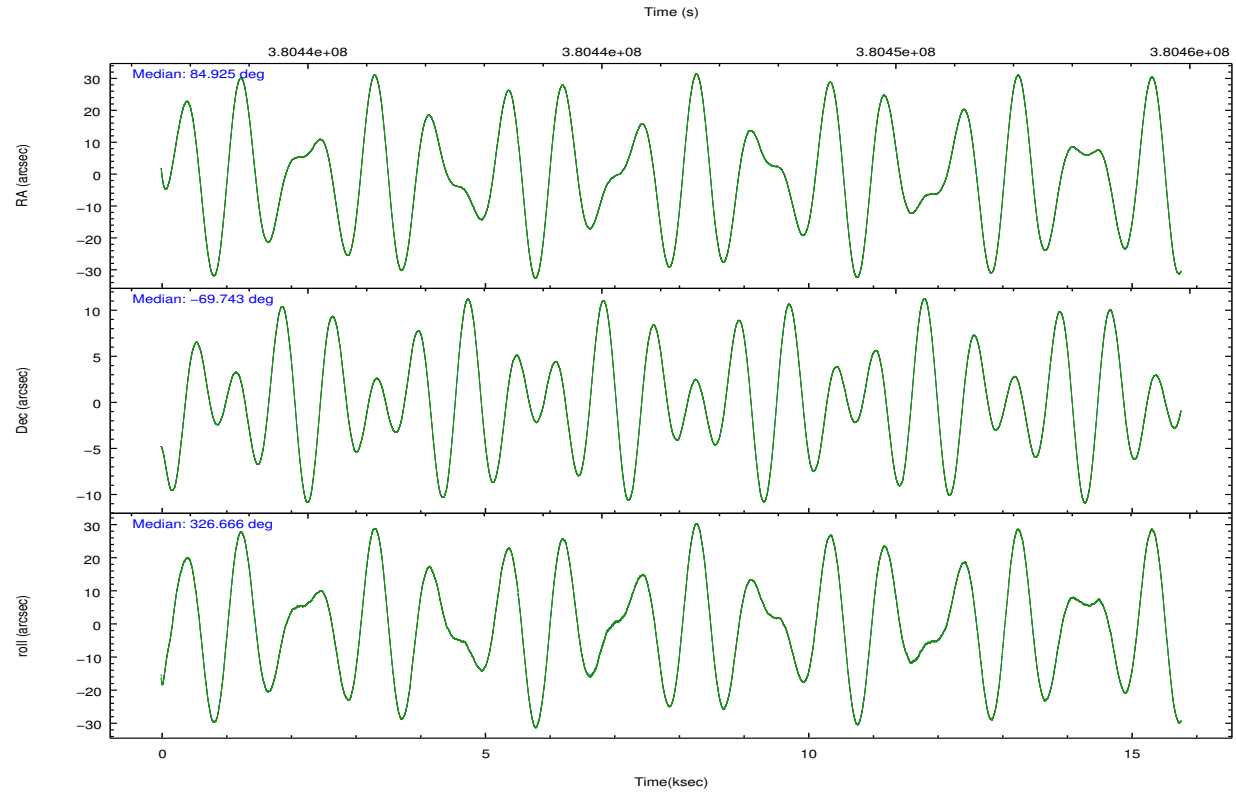
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-456789	ACIS-456789
Grating	HETG	HETG
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	84.846764	84.92568784251071
[deg] Pointing Dec	-69.742148	-69.74342435511419
[deg] Pointing Roll	326.439115	326.6697739635238
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[mm] SIM defocus	0	0.001444936568705701
[mm] SIM translation stage pos	-183.992523	-183.985022191653
[mm] SIM translation stage offset	-6.14	-6.147500391354811
[s] Observation start time (MET)	380439060.184000	380437339.06252
Observation start date	2010-01-21T05:29:54	2010-01-21T05:02:19
[s] Observation end time (MET)	380454060.184000	380454680.0134
Observation end date	2010-01-21T09:39:54	2010-01-21T09:51:20
Read mode	TIMED	TIMED

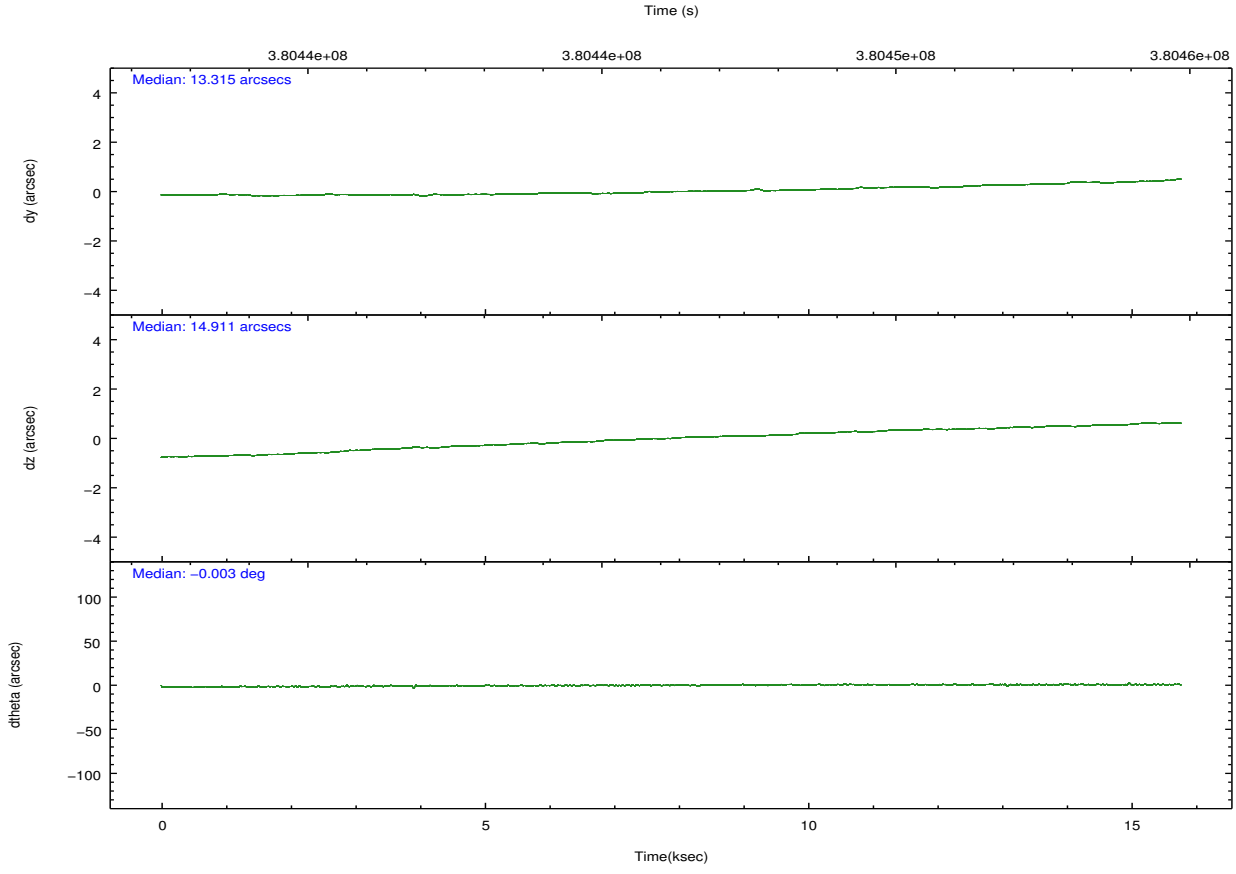
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
CCD I0 on	N	N
CCD I1 on	N	N
CCD I2 on	N	N
CCD I3 on	N	N
CCD S0 on	O1	Y
CCD S1 on	Y	Y
CCD S2 on	Y	Y
CCD S3 on	Y	Y
CCD S4 on	Y	Y
CCD S5 on	Y	Y
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	CUSTOM	1/2
Subarray start row	1	1
Subarray row count	512	512
Alternating exposures requested	N	N
[s] Primary exposure time	0.000000	1.7

2.3 Aspect


RA : 84.925 deg
Dec : −69.743 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−30
−20
−10
0
10
20
30


DY : 13.315 arcsecs
DZ : 14.911 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
3.8044e+08
3.8044e+08
3.8045e+08
3.8046e+08
Median: 84.925 deg
RA (arcsec)
Median: −69.743 deg
Dec (arcsec)
Median: 326.666 deg
roll (arcsec)
Time(ksec)

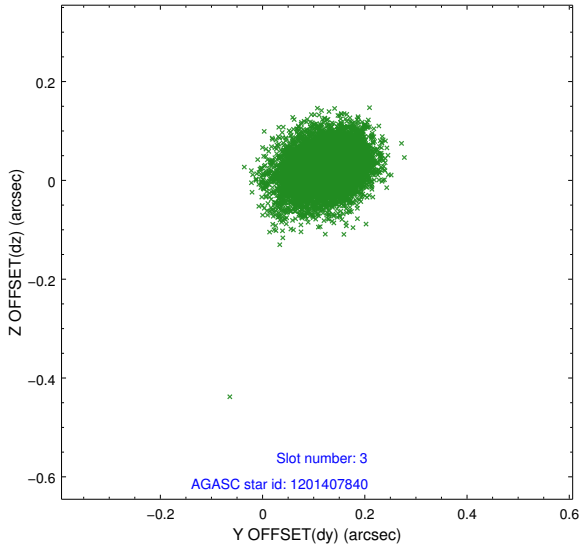

Time (s)
3.8044e+08
3.8044e+08
3.8045e+08
3.8046e+08
Median: 13.315 arcsecs
dy (arcsec)
Median: 14.911 arcsecs
dz (arcsec)
Median: −0.003 deg
dtheta (arcsec)
Time(ksec)

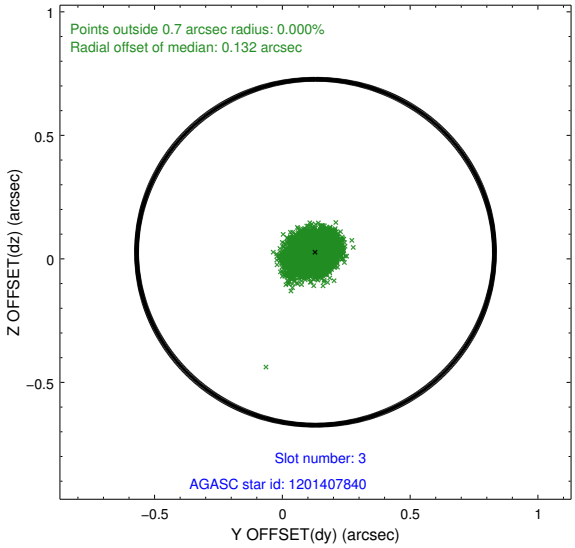
Slot Statistics

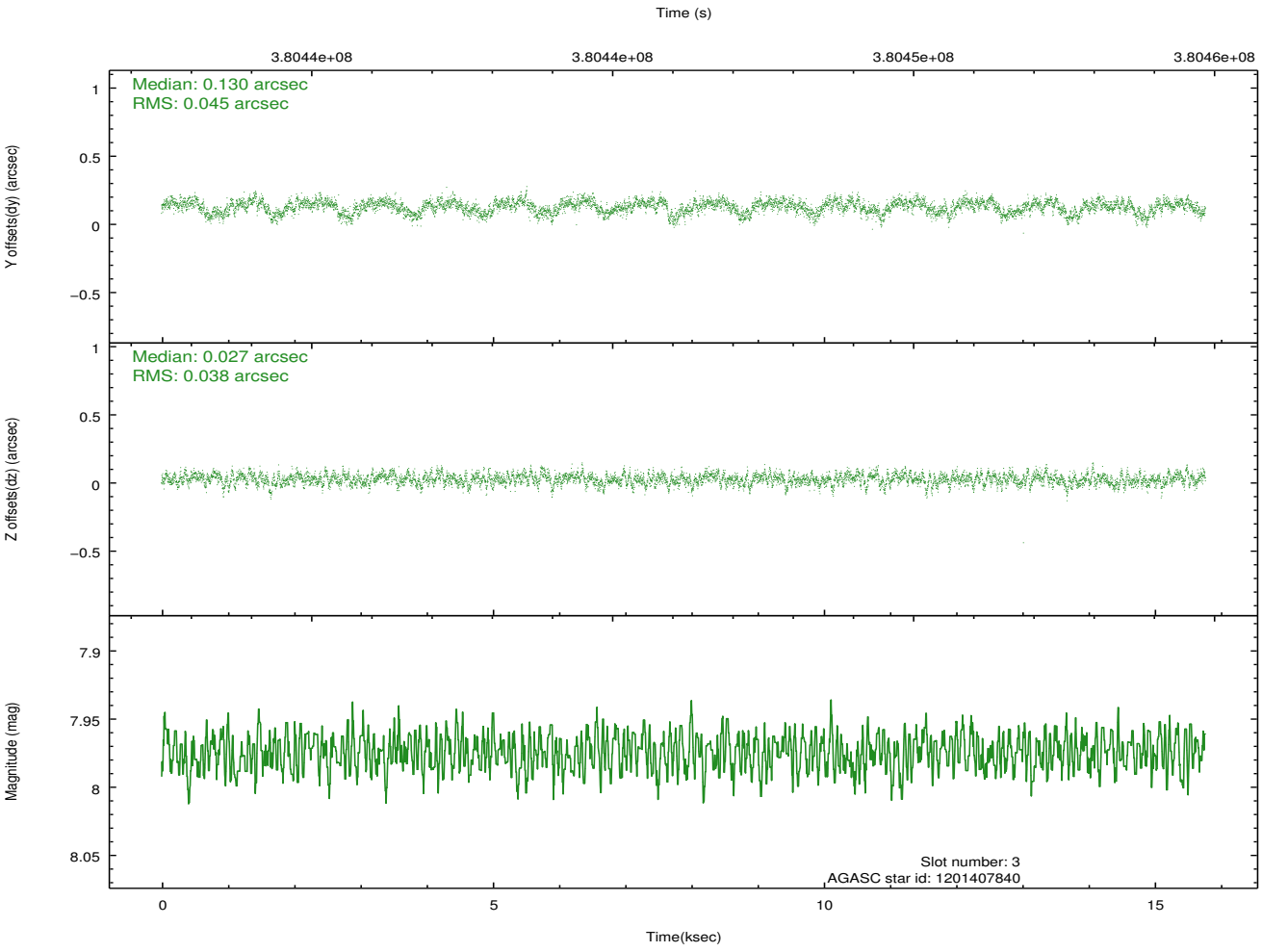
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-2	6.89	3847	-0.063	-0.113	0.018	0.034	0.000000	0.000000	-765.95	-1863.06
1	FID	ACIS-S-4	6.97	3847	0.155	0.060	0.009	0.023	0.000000	0.000000	2147.46	45.20
2	FID	ACIS-S-5	7.02	3847	-0.122	0.061	0.021	0.031	0.000000	0.000000	-1818.46	39.27
3	GUIDE	1201407840	7.97	7693	0.130	0.027	0.062	0.103	83.696303	-70.172201	-306.75	-2077.63
4	GUIDE	1201539448	8.93	7684	0.146	-0.049	0.103	0.165	85.635707	-70.382152	2072.29	-1397.60
5	GUIDE	1201540816	7.98	7552	-0.135	-0.091	0.059	0.095	86.998494	-69.749817	2275.46	1419.73
6	GUIDE	1201541752	7.39	7690	-0.048	0.034	0.053	0.083	85.373891	-70.033762	1122.46	-518.32
7	GUIDE	1201406184	7.91	7691	-0.091	0.074	0.070	0.112	82.503234	-69.975517	-1911.21	-2342.66

2.4 Star Slots

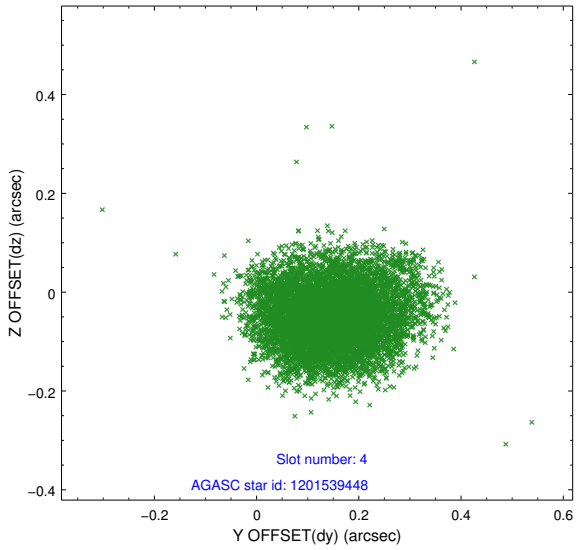
2.4.1 Slot 3

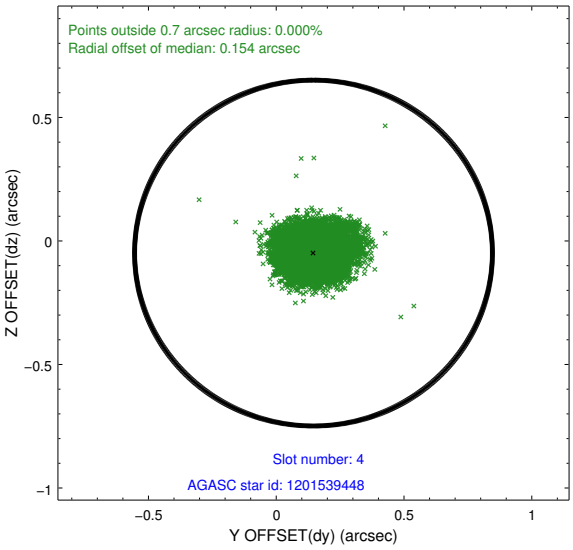


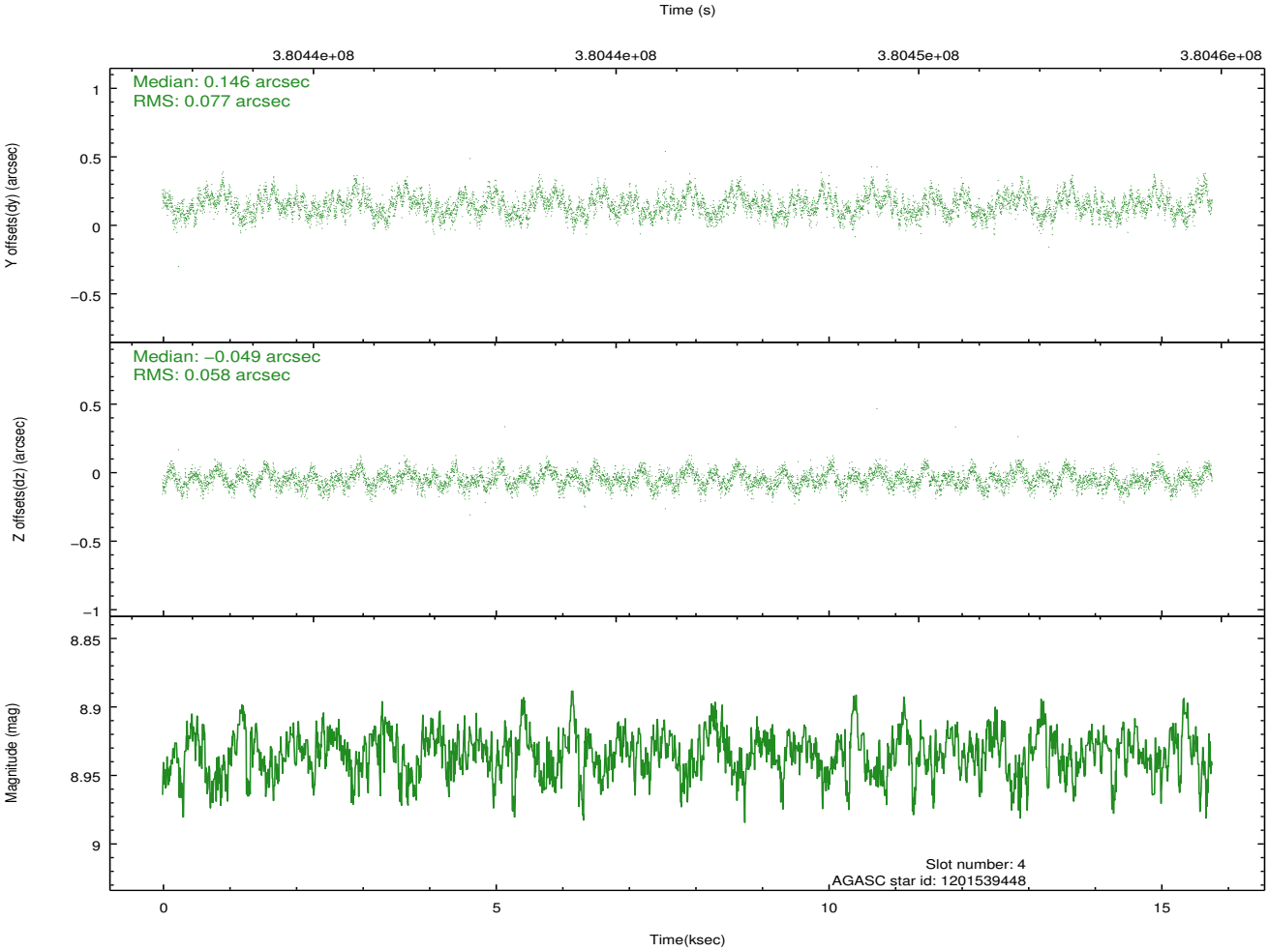




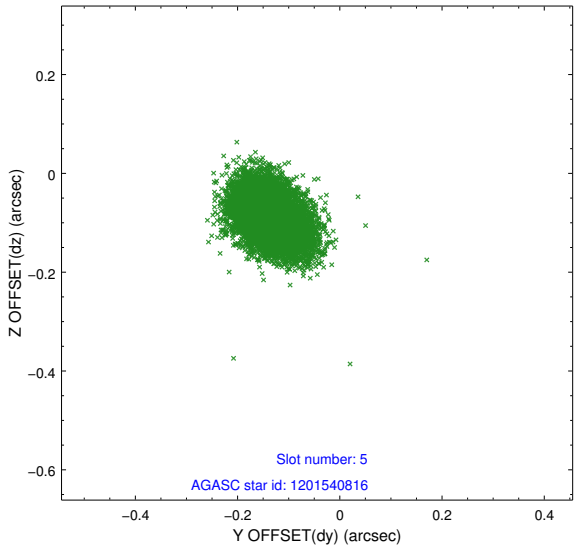
2.4.2 Slot 4

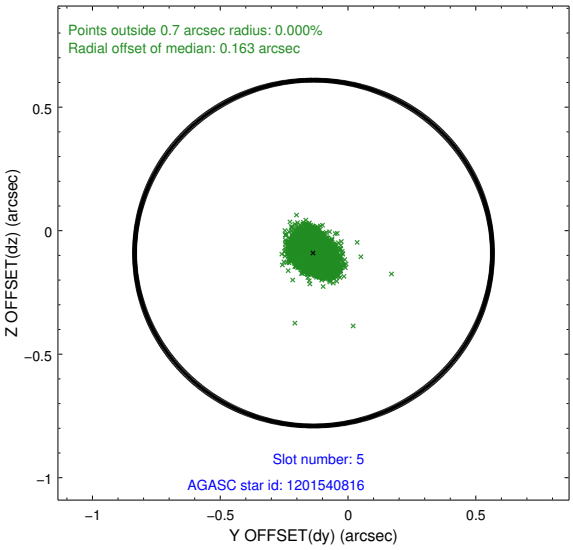

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 1201539448

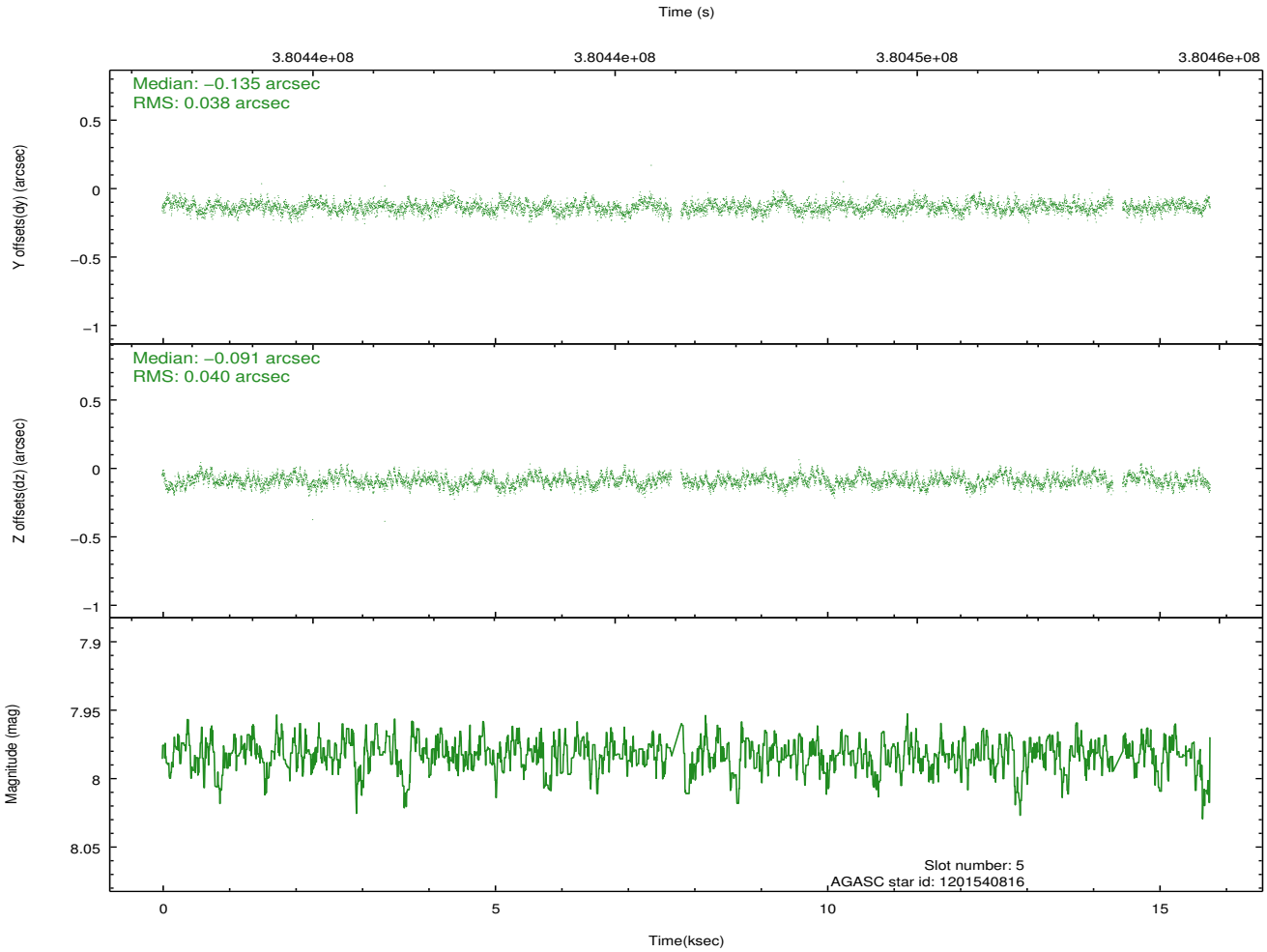

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.154 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 1201539448


Time (s)
Median: 0.146 arcsec
RMS: 0.077 arcsec
Y offsets(dy) (arcsec)
Median: −0.049 arcsec
RMS: 0.058 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 1201539448
Time(ksec)

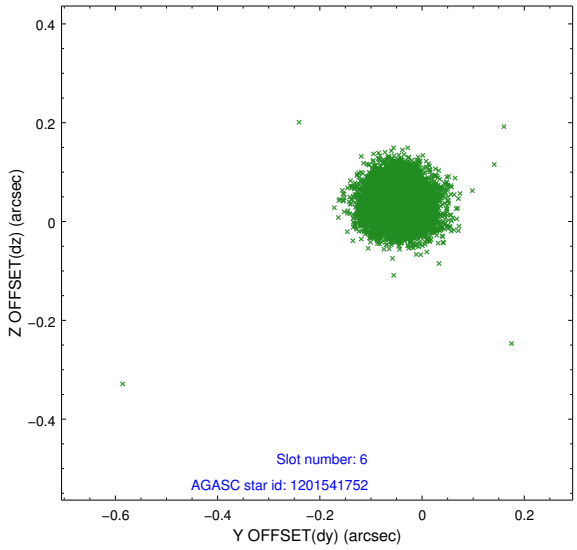
2.4.3 Slot 5

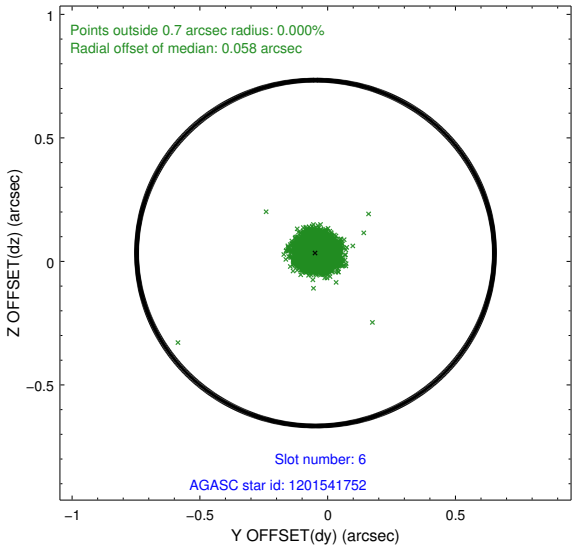

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 1201540816

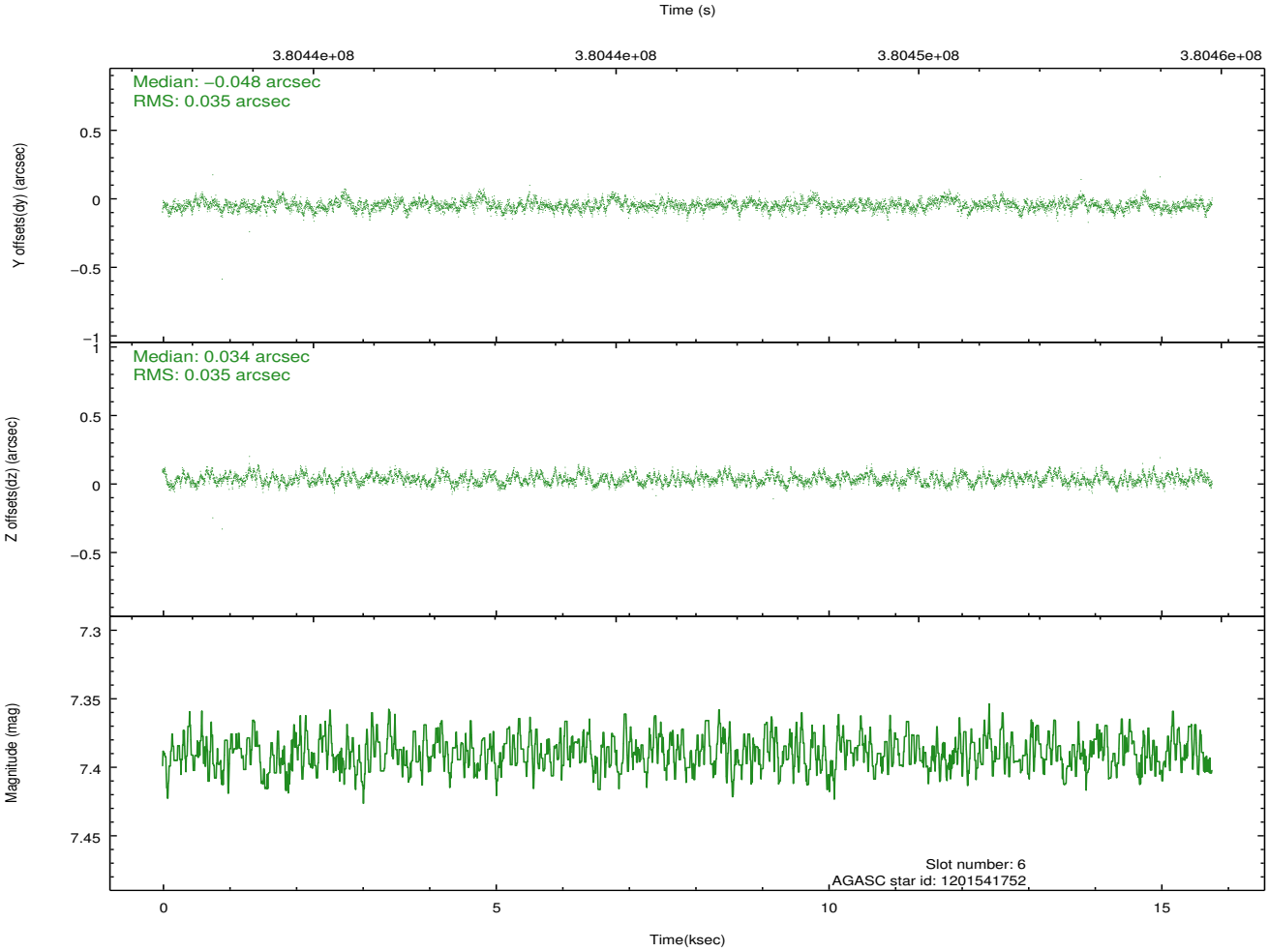

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.163 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 1201540816


Time (s)
3.8044e+08
3.8044e+08
3.8045e+08
3.8046e+08
Median: −0.135 arcsec
RMS: 0.038 arcsec
Y offsets(dy) (arcsec)
Median: −0.091 arcsec
RMS: 0.040 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 1201540816
Time(ksec)

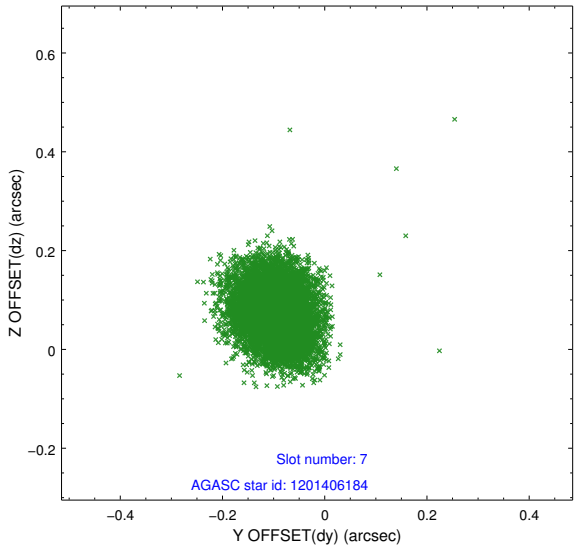
2.4.4 Slot 6

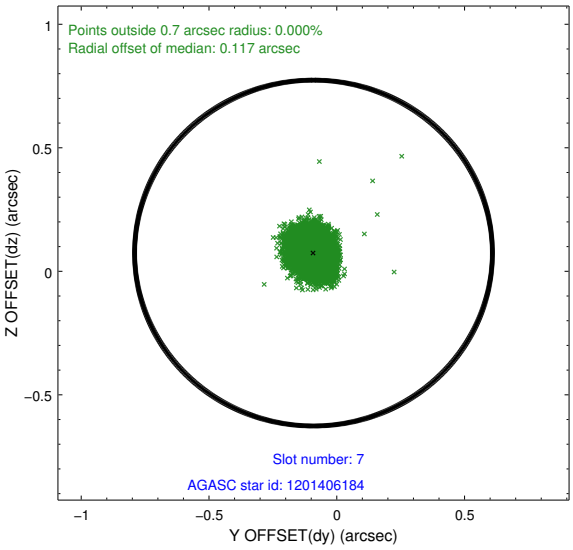

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 1201541752

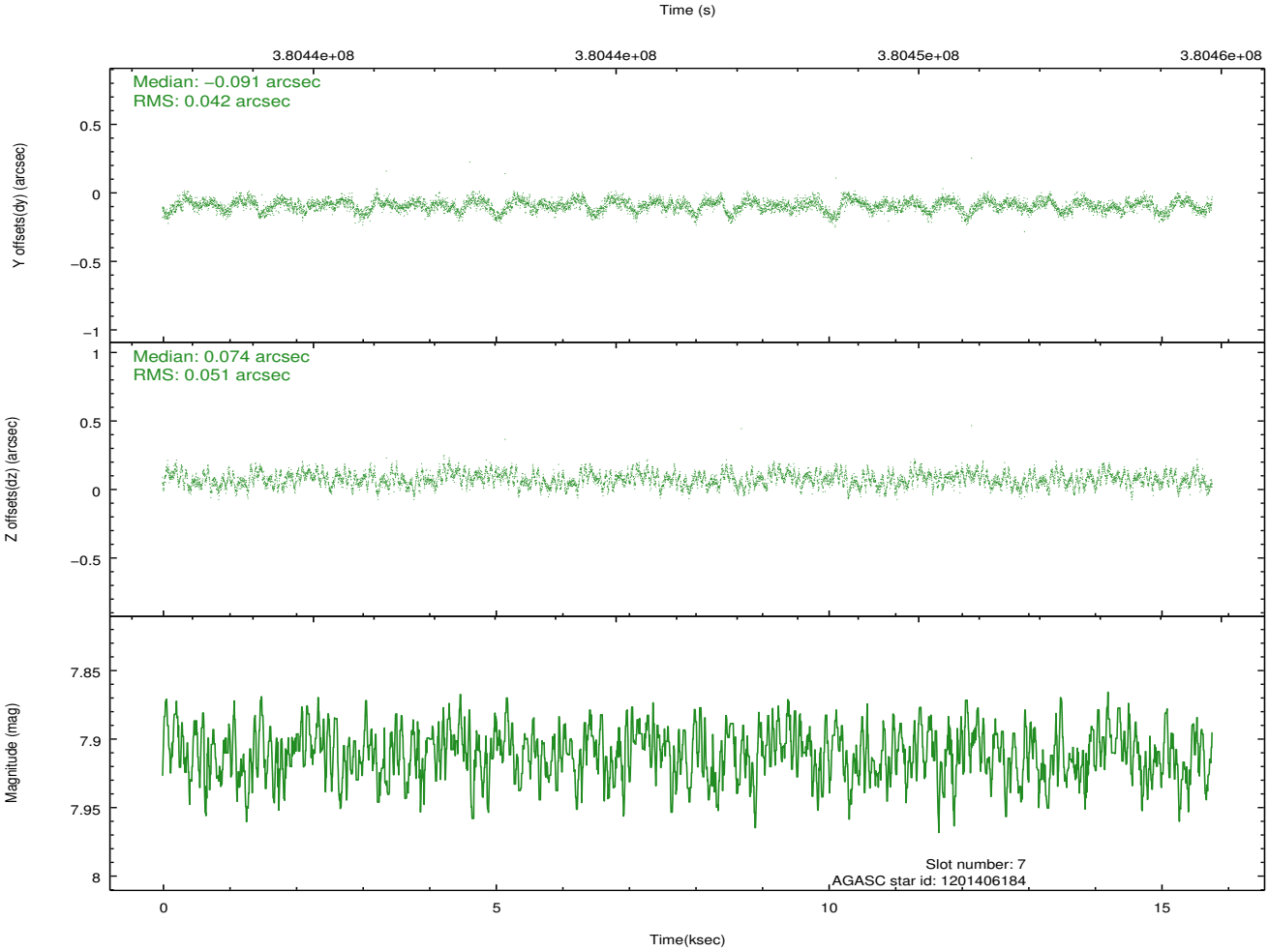

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.058 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 1201541752


Time (s)
Median: −0.048 arcsec
RMS: 0.035 arcsec
Y offsets(dy) (arcsec)
Median: 0.034 arcsec
RMS: 0.035 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 1201541752
Time(ksec)

2.4.5 Slot 7

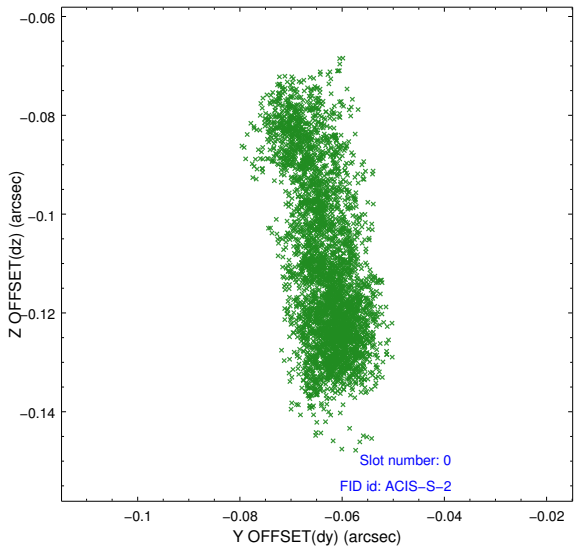

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 1201406184

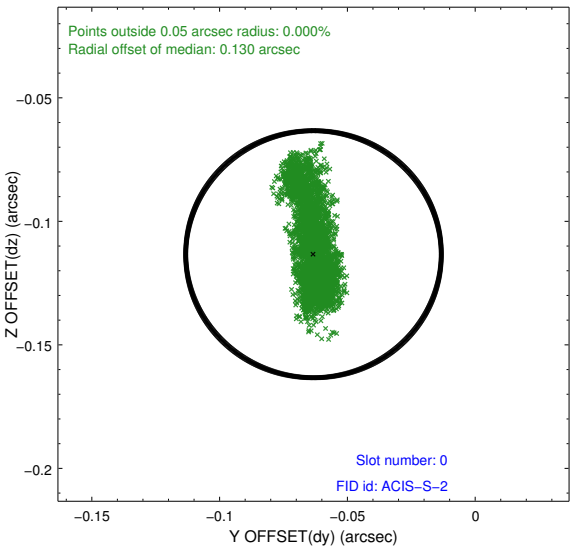

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.117 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 1201406184

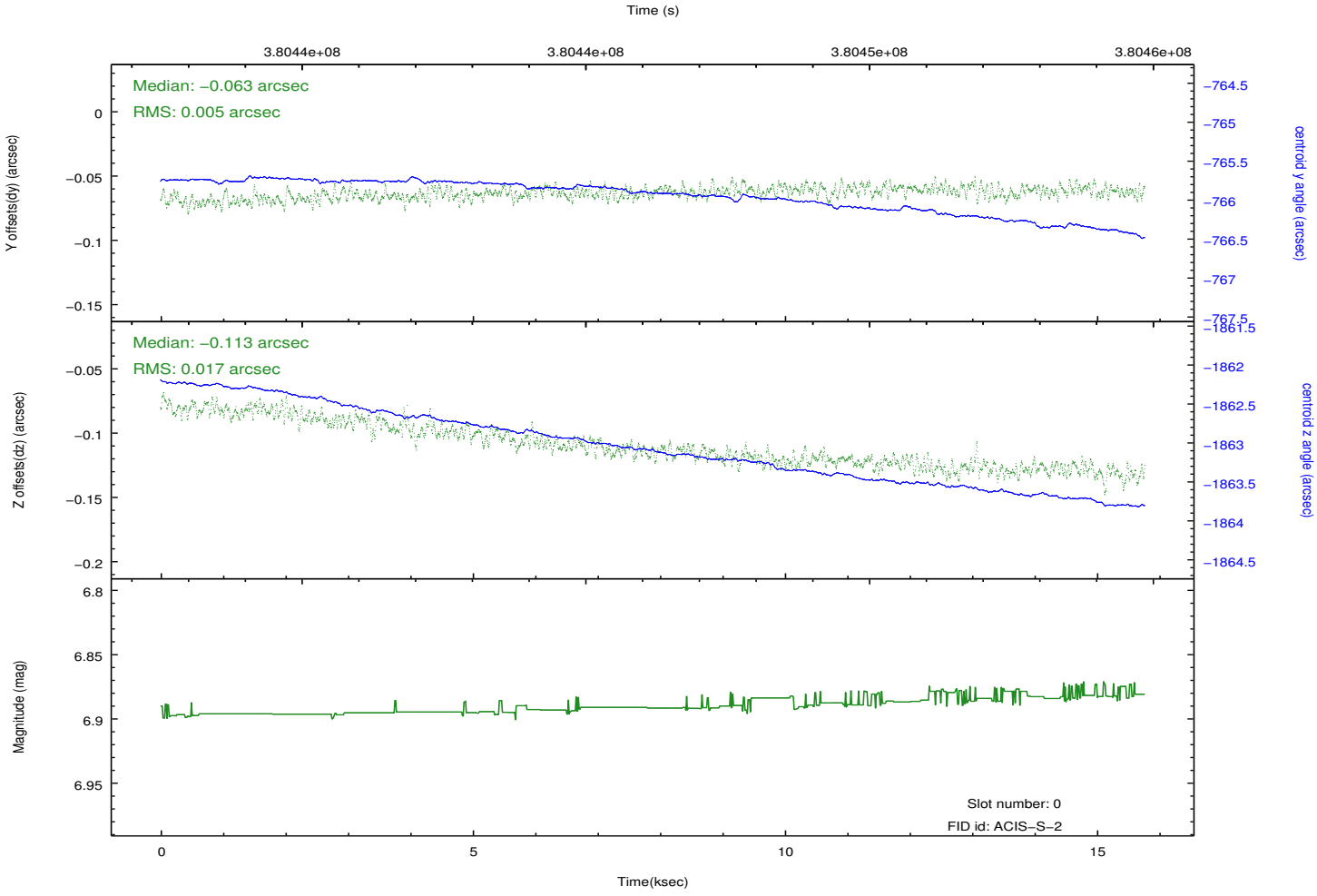

Time (s)
3.8044e+08
3.8044e+08
3.8045e+08
3.8046e+08
Median: −0.091 arcsec
RMS: 0.042 arcsec
Y offsets(dy) (arcsec)
Median: 0.074 arcsec
RMS: 0.051 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 1201406184
Time(ksec)

2.5 FID Slots

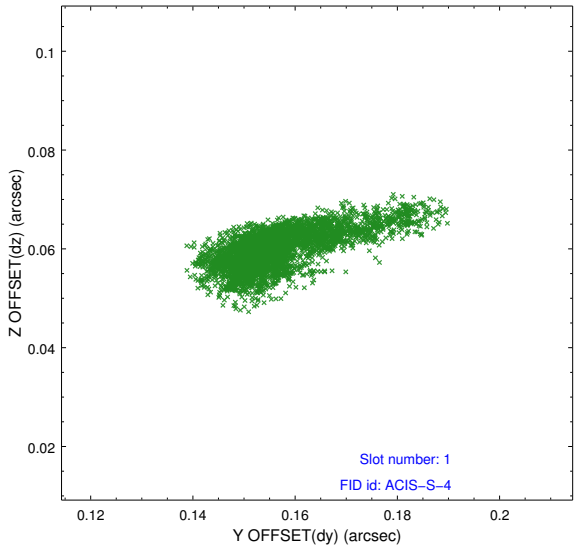
2.5.1 Slot 0

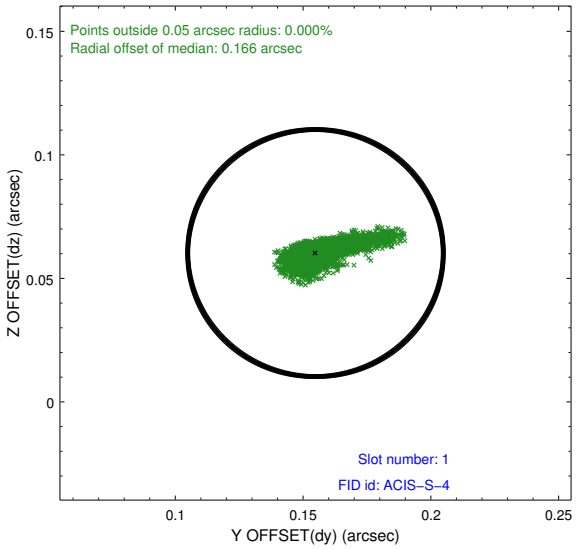


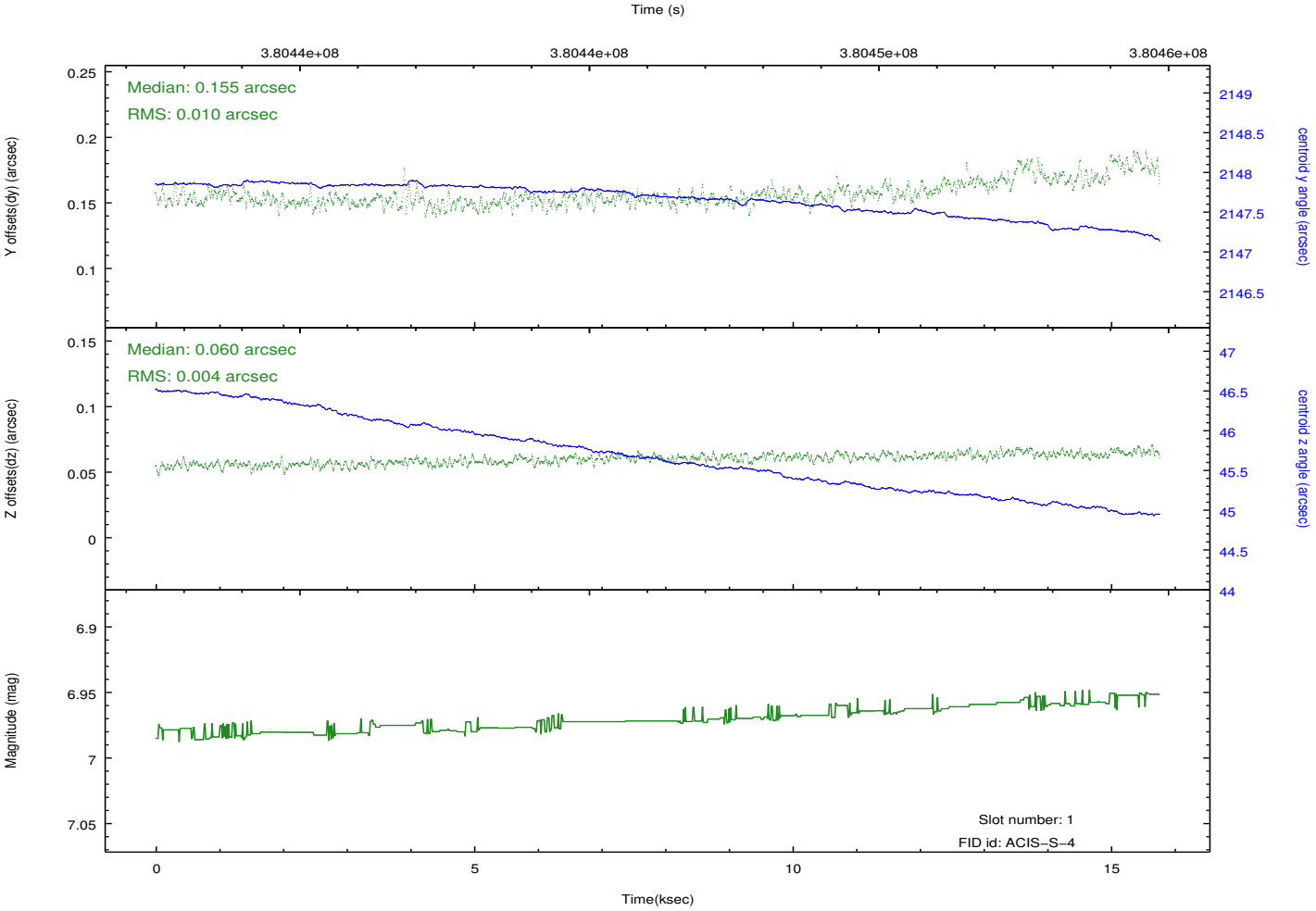




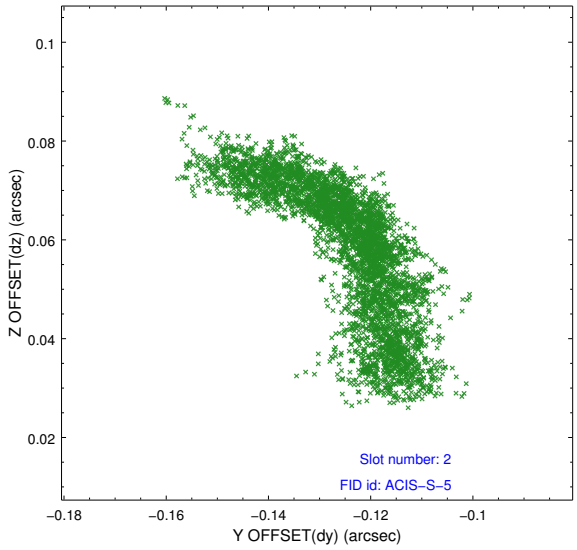
2.5.2 Slot 1

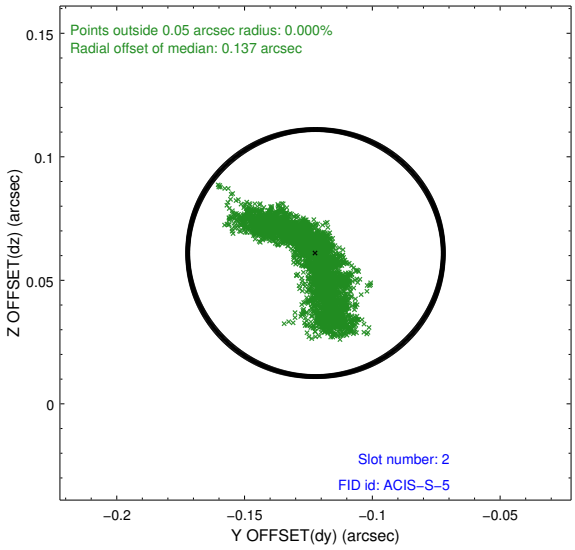

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

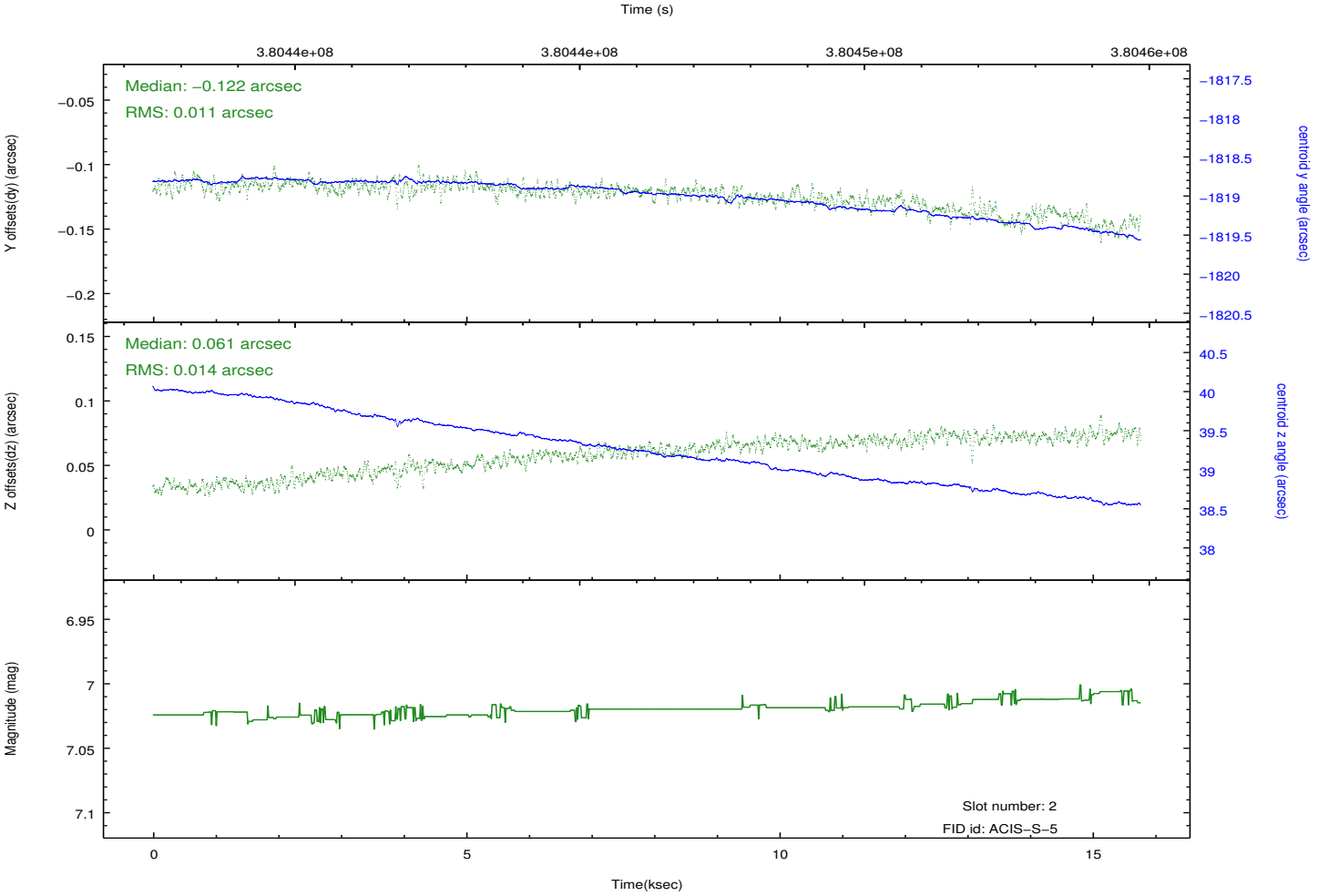

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.166 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.155 arcsec
RMS: 0.010 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.060 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

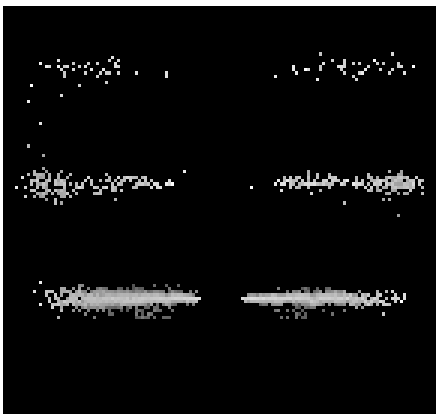

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.137 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5

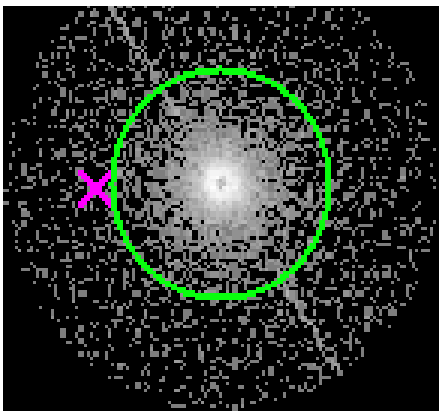

Time (s)
Median: −0.122 arcsec
RMS: 0.011 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.061 arcsec
RMS: 0.014 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−5
Time(ksec)

3 Gratings

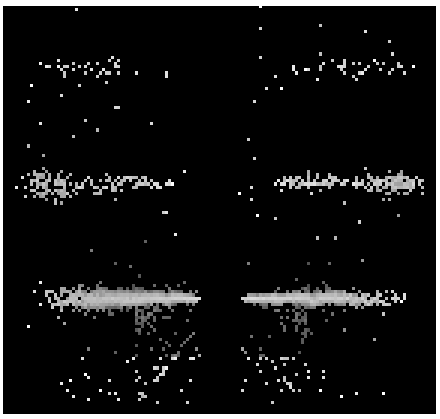
3.1 HEG Arm



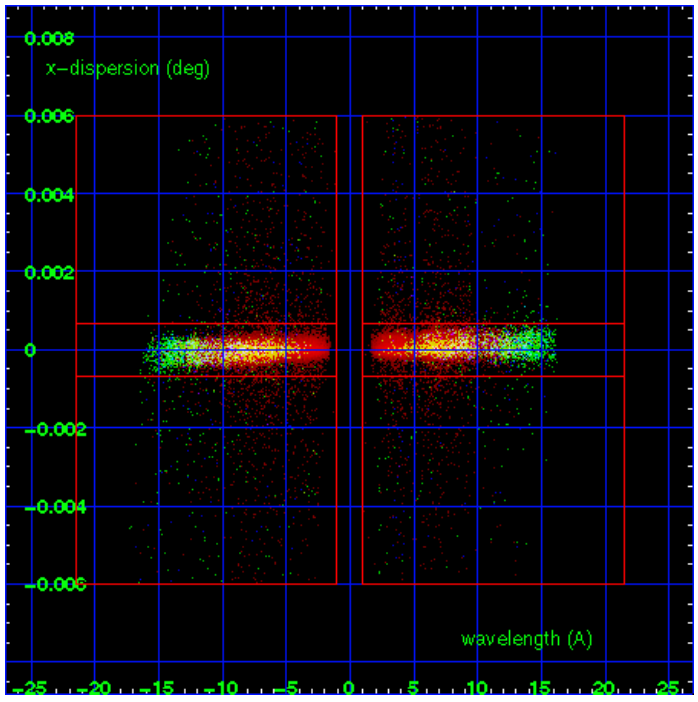
HEG Order Sort 123



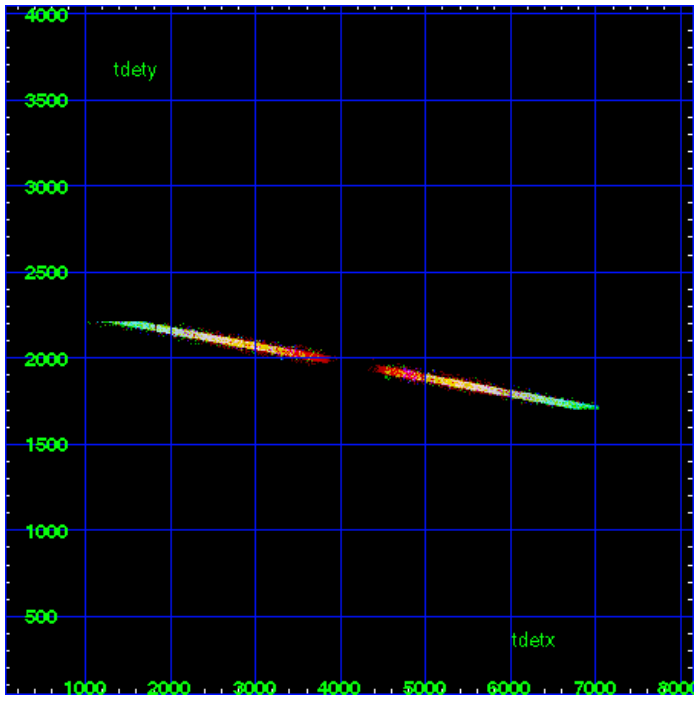
HEG Zero Order



HEG Order Sort ALL

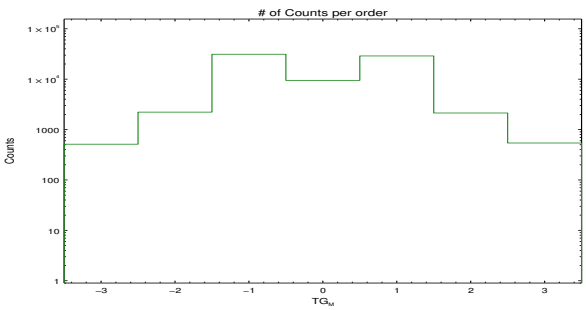


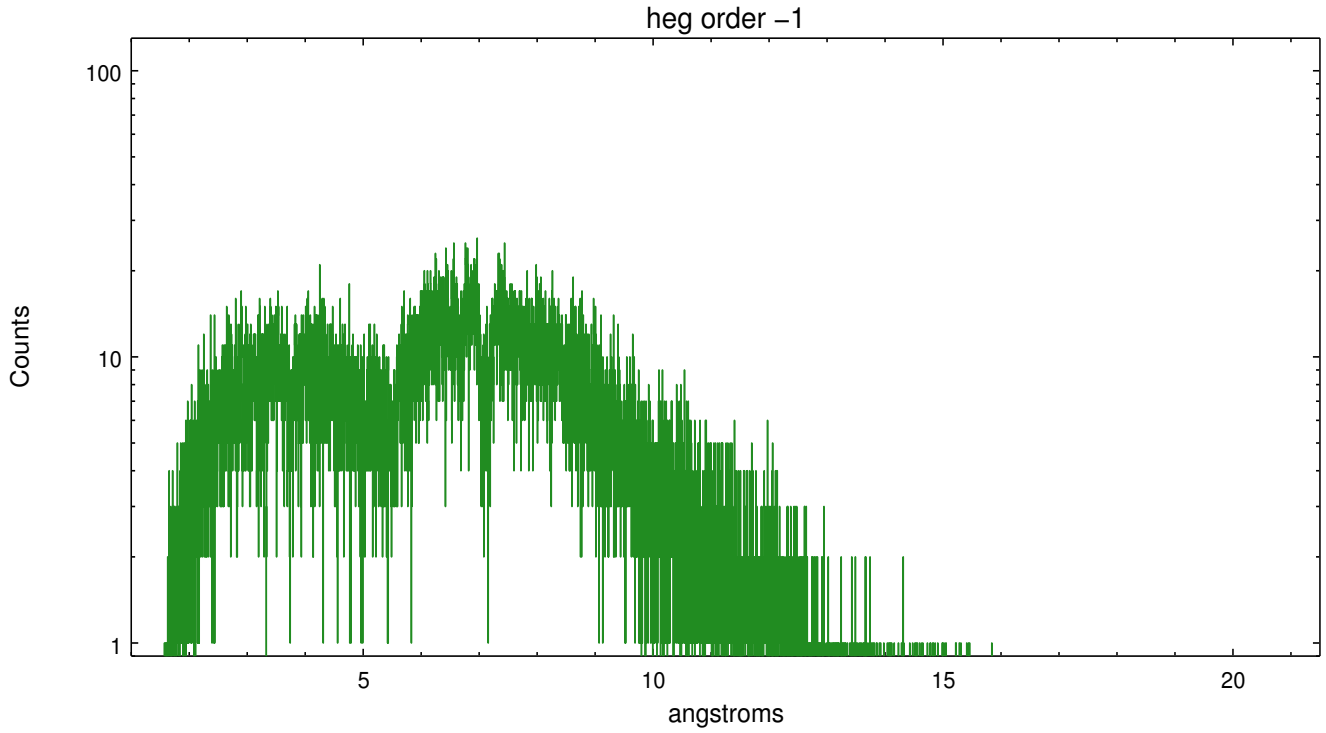
Spot Image HEG

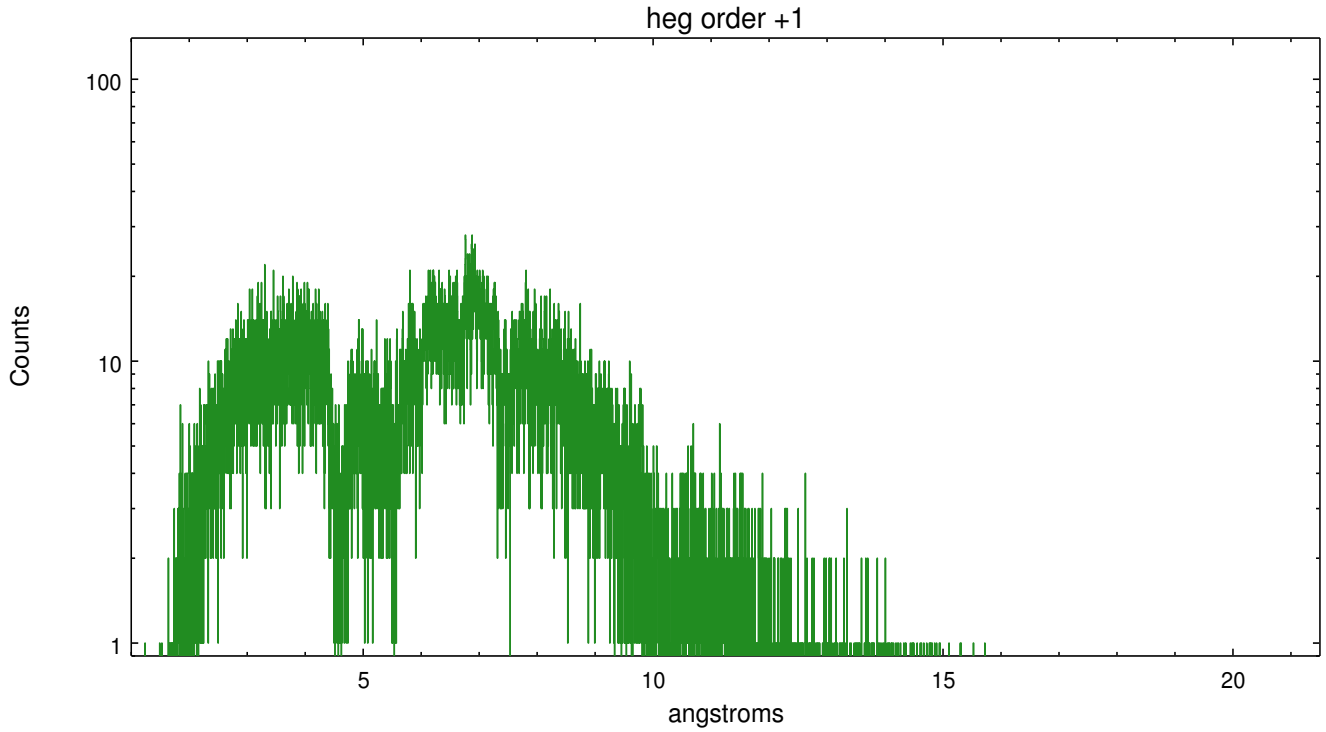


Full Detector HEG

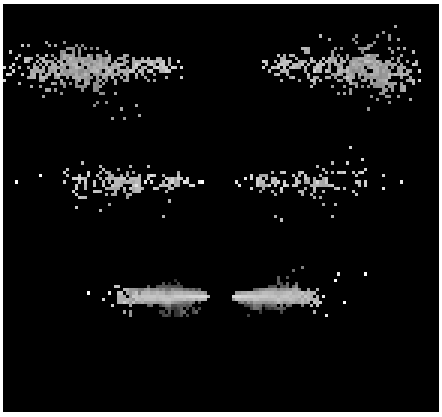
	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	512	2217	31201	9464	28904	2132	541



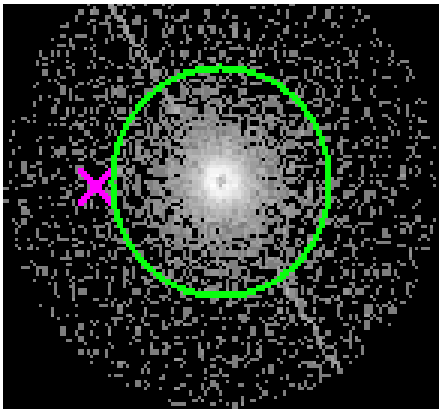

heg order −1
100
10
1
Counts
5
10
15
20
angstroms


heg order +1
100
10
1
Counts
5
10
15
20
angstroms

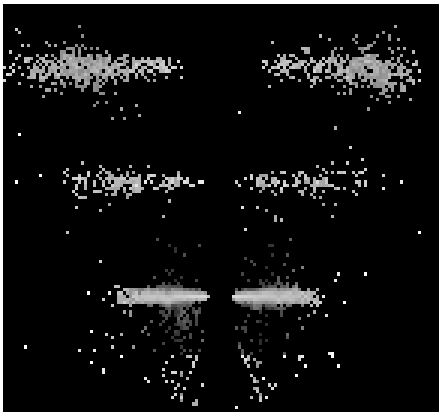
3.2 MEG Arm



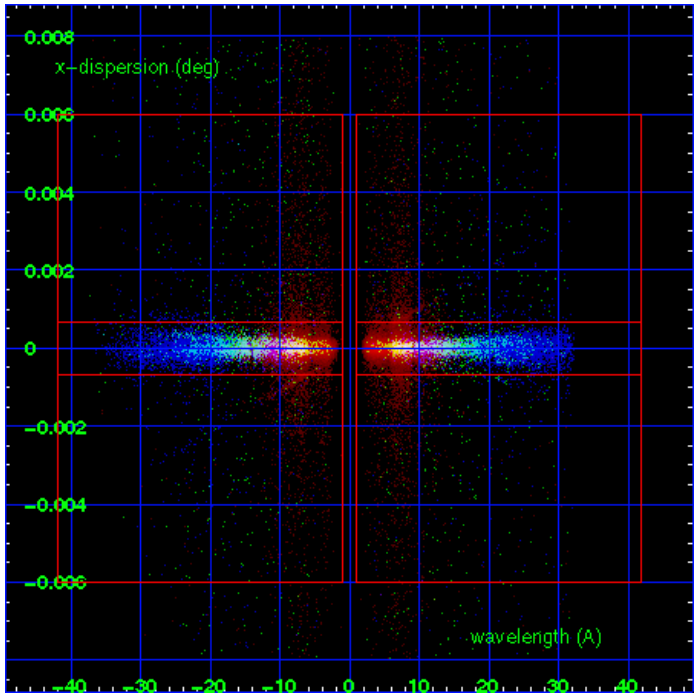
MEG Order Sort 123



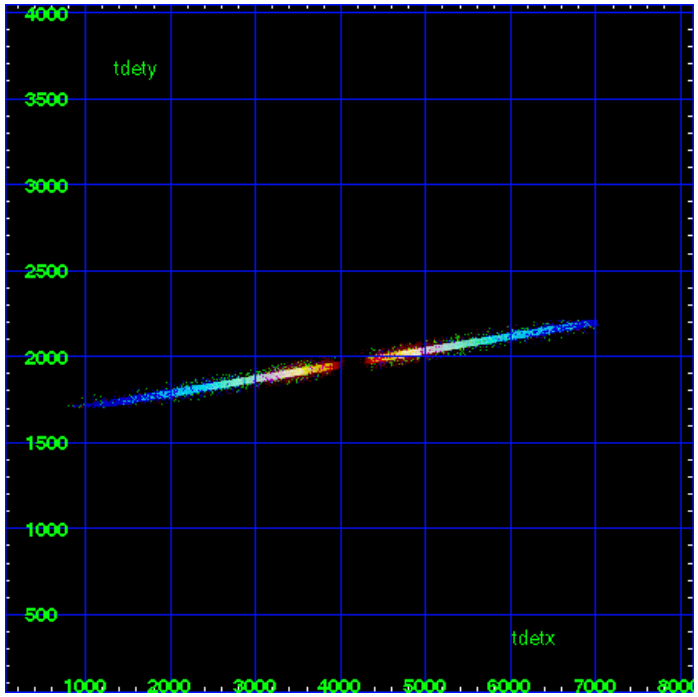
MEG Zero Order



MEG Order Sort ALL

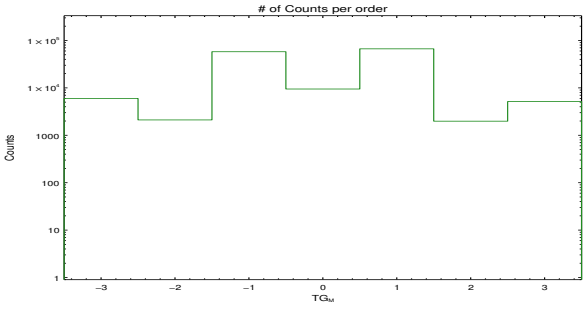


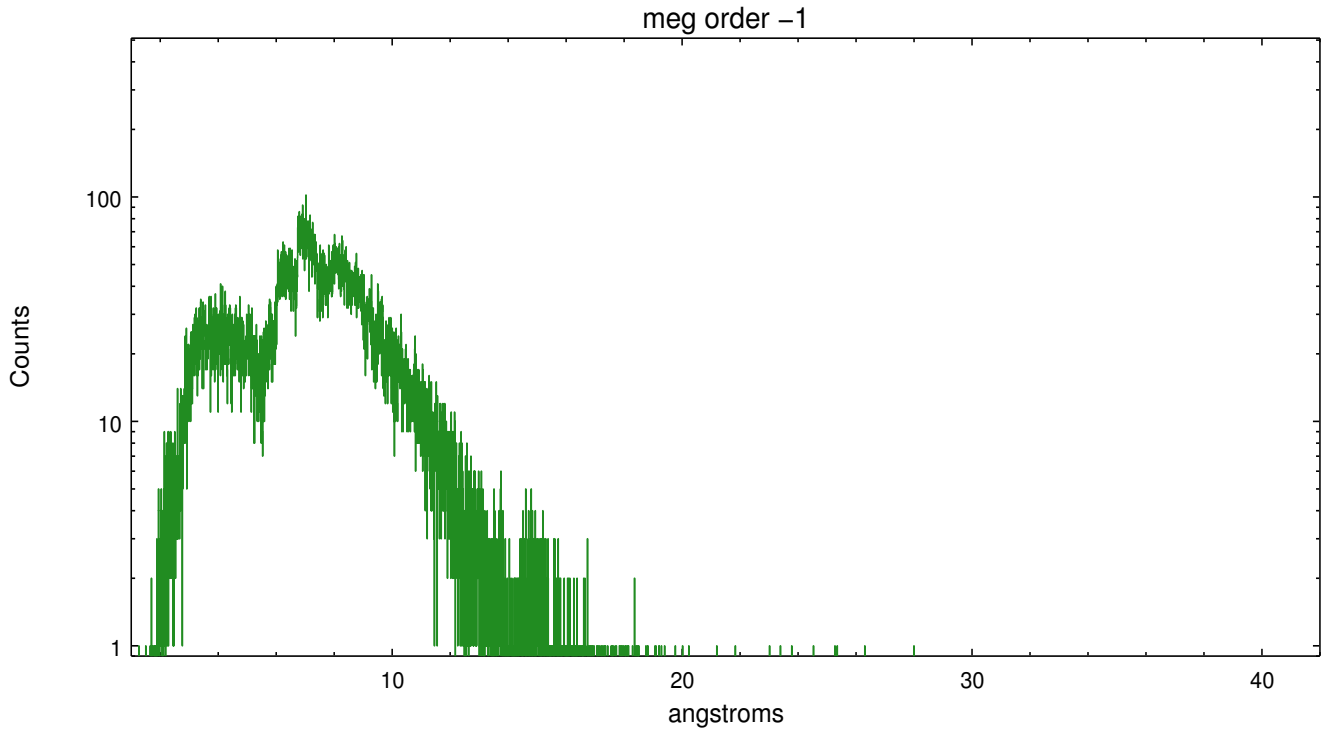
Spot Image MEG

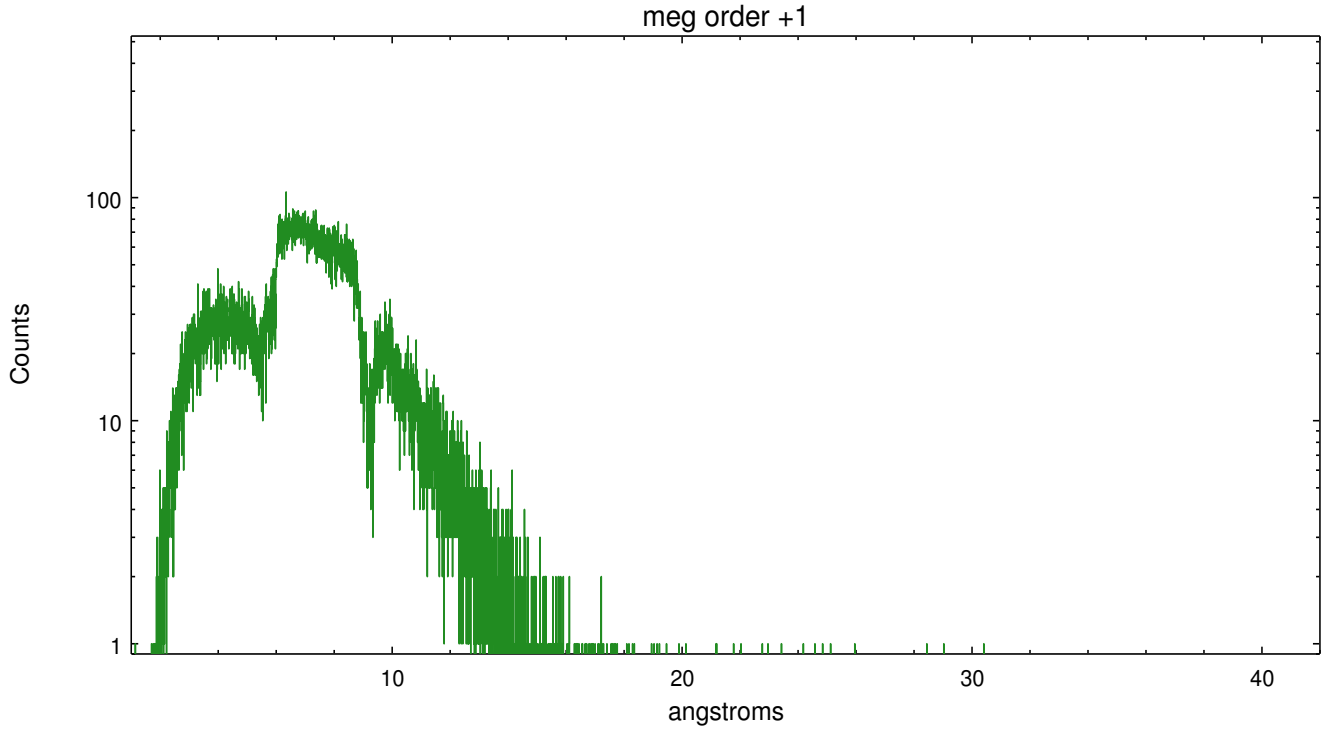


Full Detector MEG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	5980	2109	57913	9464	66650	1983	5141




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


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

A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2012.06.25
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	15.06862920779

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=4131.31, y=4097.92) 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.