

# V&V Reference Report

## L2 ASCDS Version : 8.4.4

Observation 7587 - L2 Version 5  
Chandra X-Ray Center

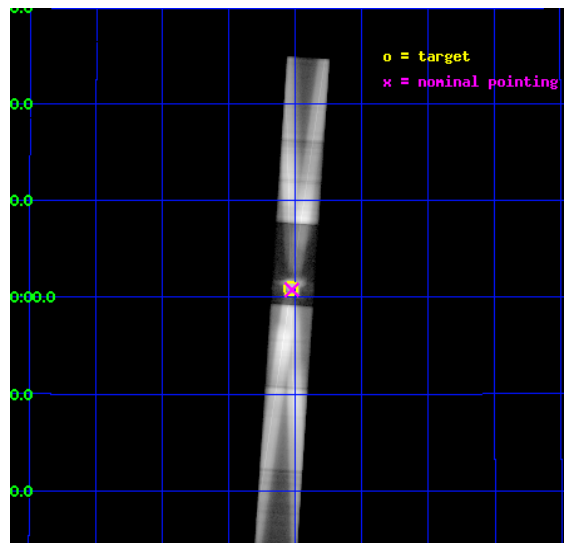
L2 Processing Date : May 1 2012

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# 1 Front

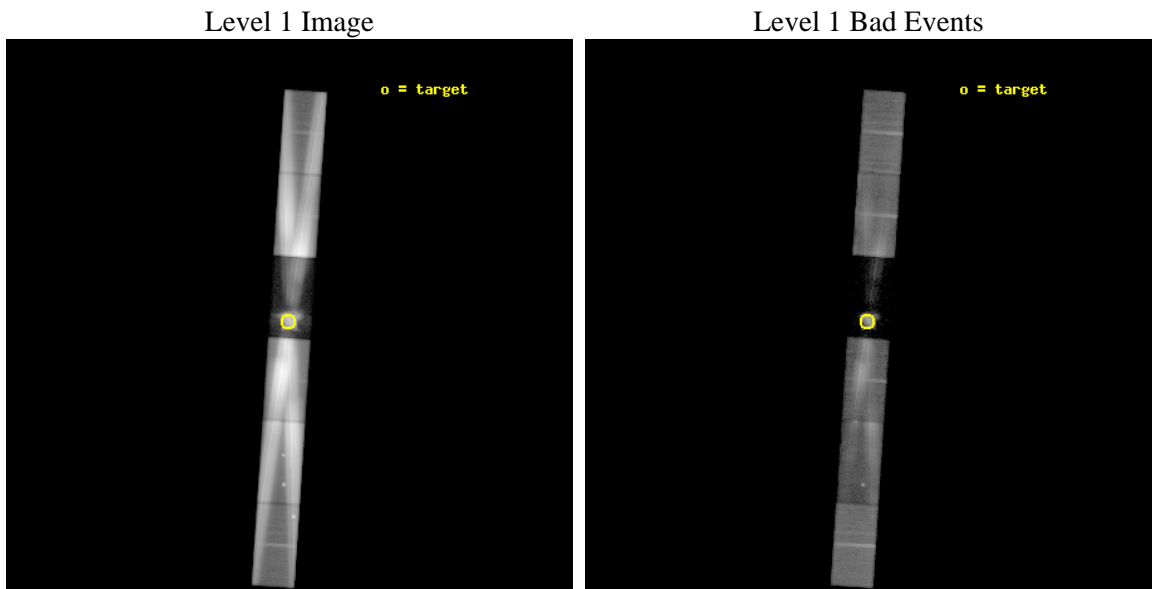
seq_num	500719	Sequence number
obs_id	7587	Observation id
title	HETG Spectroscopy of the Crab Pulsar and the Interstellar Medium	P
observer	Prof Claude Canizares	Principal investigator
object	Crab Pulsar	Source name
dtcycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	83.632917	Observer's specified target RA [deg]
dec_targ	22.014472	Observer's specified target Dec [deg]
ra_nom	83.631273482677	Nominal RA [deg]
dec_nom	22.013045741399	Nominal Dec [deg]
roll_nom	273.81053493403	Nominal Roll [deg]
revision	5	Processing version of data
ontime	12606.870547891	Sum of GTIs [s]
livetime	12309.699910062	Livetime [s]
ontime4	46177.017645895	Sum of GTIs [s]
ontime5	46180.499676228	Sum of GTIs [s]
ontime6	22584.763803899	Sum of GTIs [s]
ontime7	12606.870547891	Sum of GTIs [s]
ontime8	36619.208964467	Sum of GTIs [s]
ontime9	46171.794525743	Sum of GTIs [s]
l2events	15501698	Number of level 2 events



## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



### 2.1.2 Parameters

obi_num	0	Obi number	sched_exp_time	46000.000000	[s] Scheduled observation exposure time
ascdsver	8.4.4	Processing system revision	ontime	12606.870547891	Sum of GTIs [s]
caldbver	4.4.9	&#160	ontime4	46177.017645895	Sum of GTIs [s]
date	2012-04-19T16:46:19	Date and time of file creation	ontime5	46180.499676228	Sum of GTIs [s]
revision	3	Processing version of data	ontime6	22584.763803899	Sum of GTIs [s]
			ontime7	12606.870547891	Sum of GTIs [s]
			ontime8	36619.208964467	Sum of GTIs [s]
			ontime9	46171.794525743	Sum of GTIs [s]
			l1events	17619241	Number of level 1 events

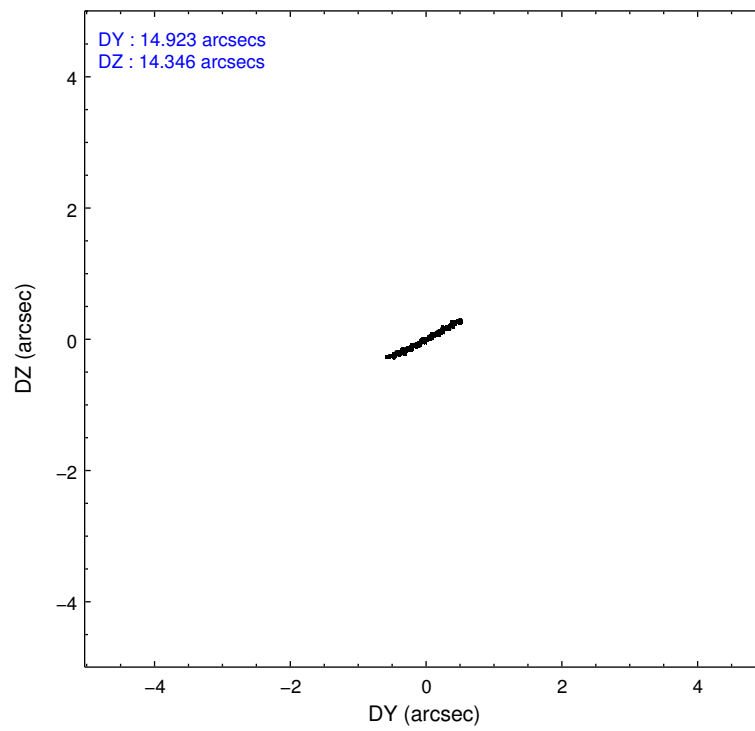
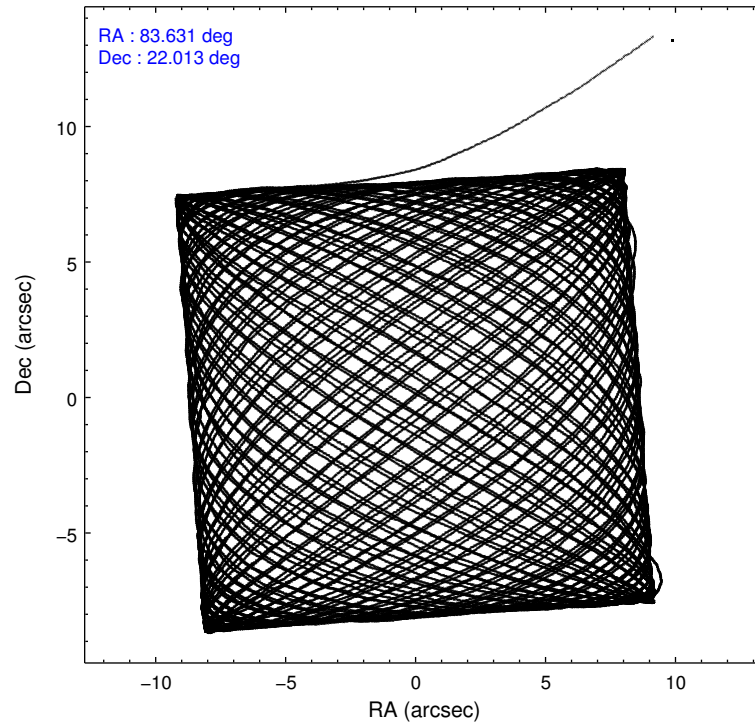
### 2.1.3 Events

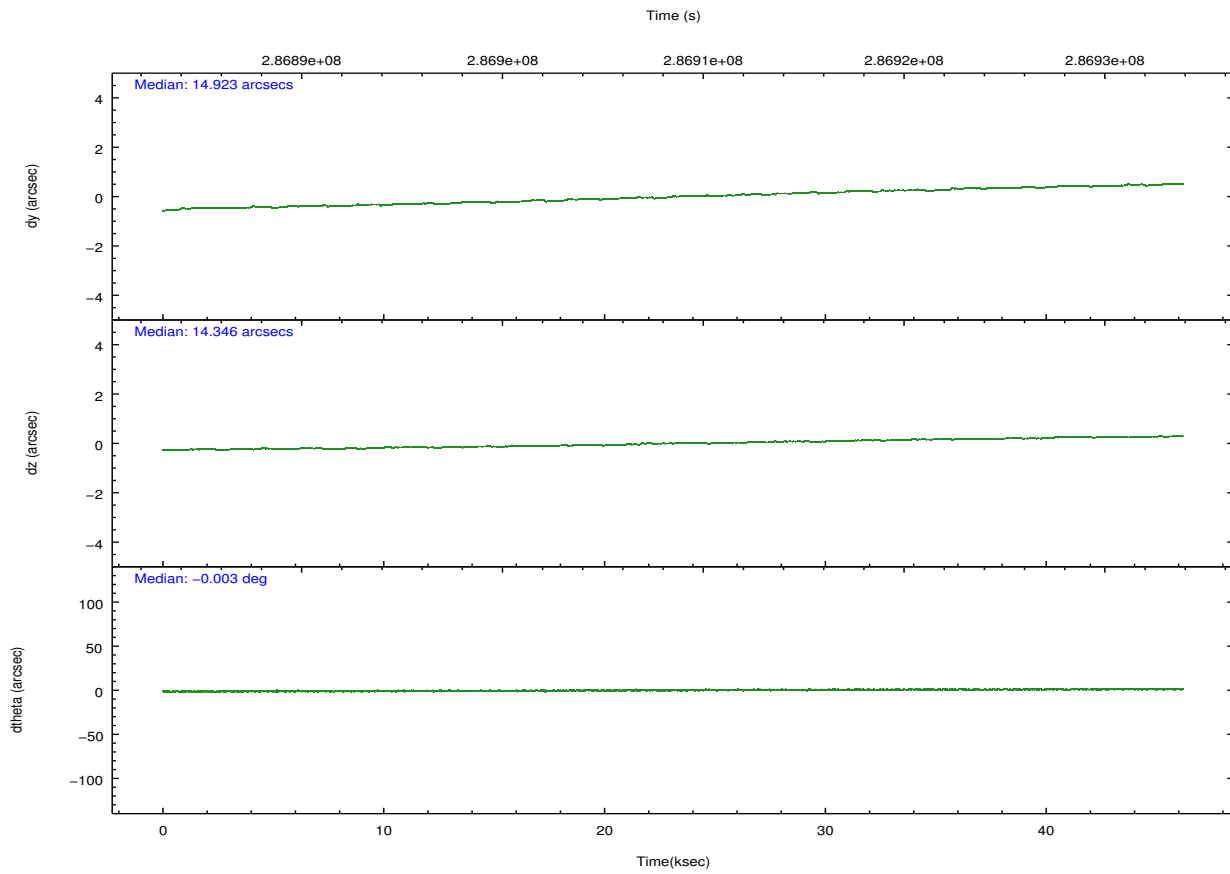
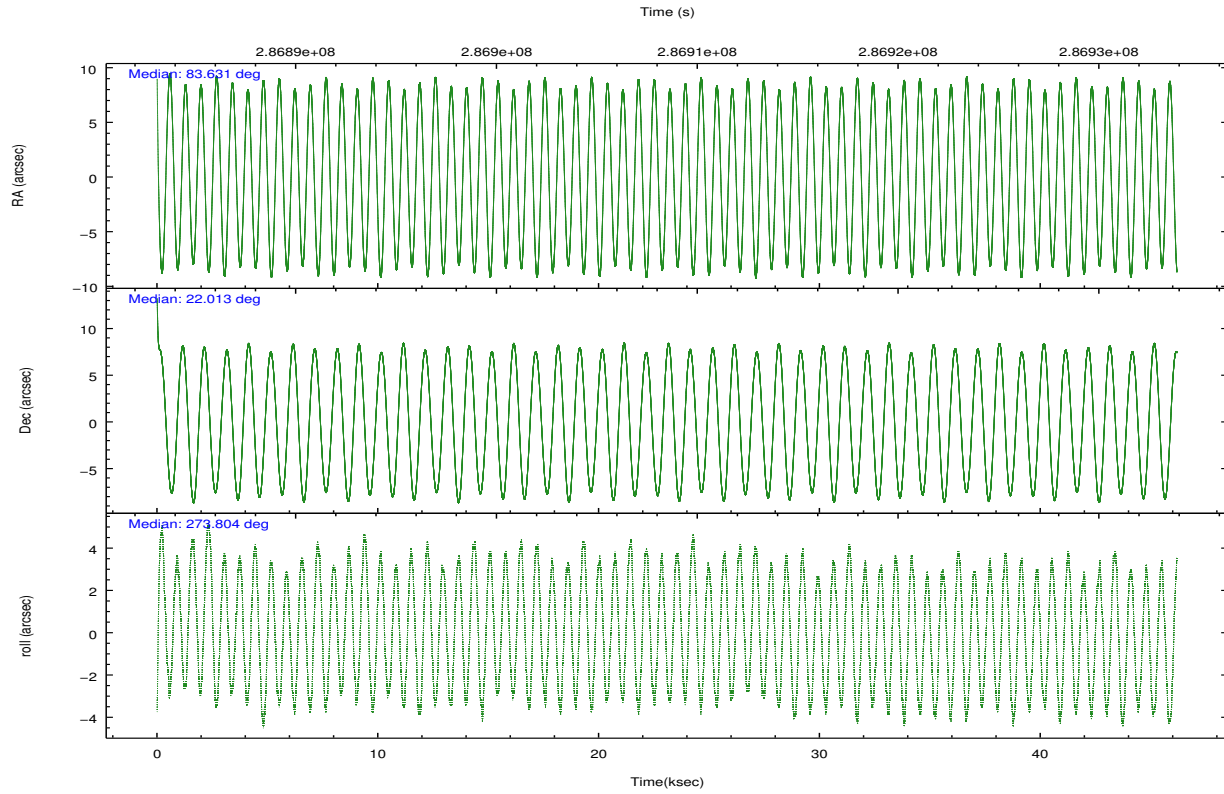
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9		ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	726996	3608105	6414907	420145	5232919	1216169	grade 0 events	435921	1111751	4810344	74503	4137236	860794
rejected events	189050	140235	241995	40067	233633	169595		59%	30%	74%	17%	79%	70%
rejected %	26%	3%	3%	9%	4%	13%	grade 1 events	1225	4293	41760	3469	20806	2364
								0%	0%	0%	0%	0%	0%
							grade 2 events	60315	1204625	738751	102321	503147	114322
								8%	33%	11%	24%	9%	9%
							grade 3 events	16435	290104	228017	40642	151969	33282
								2%	8%	3%	9%	2%	2%
							grade 4 events	16187	287274	227062	40061	150042	32935
								2%	7%	3%	9%	2%	2%
							grade 5 events	3818	40143	30057	11922	17533	5349
								0%	1%	0%	2%	0%	0%
							grade 6 events	11361	587010	205471	126496	98045	22437
								1%	16%	3%	30%	1%	1%
							grade 7 events	181734	82905	133445	20731	154141	144686
								24%	2%	2%	4%	2%	11%

## 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	GRADED	GRADED	Number of optional ACIS chips dropped	0	0
Observation mode	POINTING	POINTING	On-chip summing requested	N	N
[deg] Pointing RA	83.614527	83.63127348267705	Subarray requested	CUSTOM	1/2
[deg] Pointing Dec	22.035547	22.01304574139897	Subarray start row	1	1
[deg] Pointing Roll	273.660186	273.8105349340283	Subarray row count	512	512
[mm] SIM focus pos	-0.684267	-0.6828225247311905	Alternating exposures requested	N	N
[mm] SIM defocus	0	0.001444936568705701	[s] Primary exposure time	0.000000	1.7
[mm] SIM translation stage pos	-183.992523	-183.9875365069546			
[mm] SIM translation stage offset	-6.14	-6.144986076053243			
[s] Observation start time (MET)	286885600.184000	286884002.10443			
Observation start date	2007-02-03T10:25:35	2007-02-03T10:00:02			
[s] Observation end time (MET)	286931600.184000	286932240.14422			
Observation end date	2007-02-03T23:12:15	2007-02-03T23:24:00			
Read mode	TIMED	TIMED			

## 2.3 Aspect



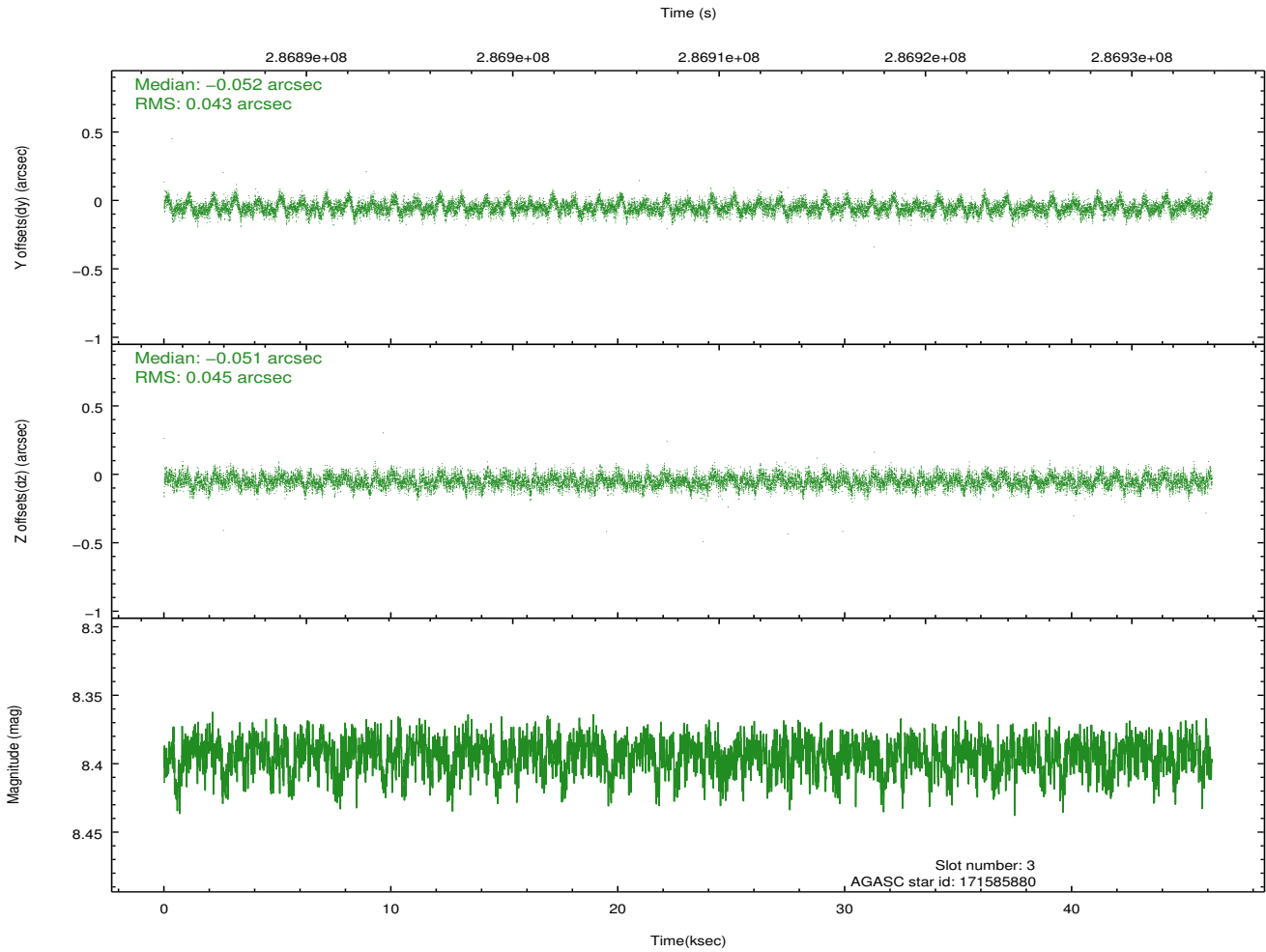
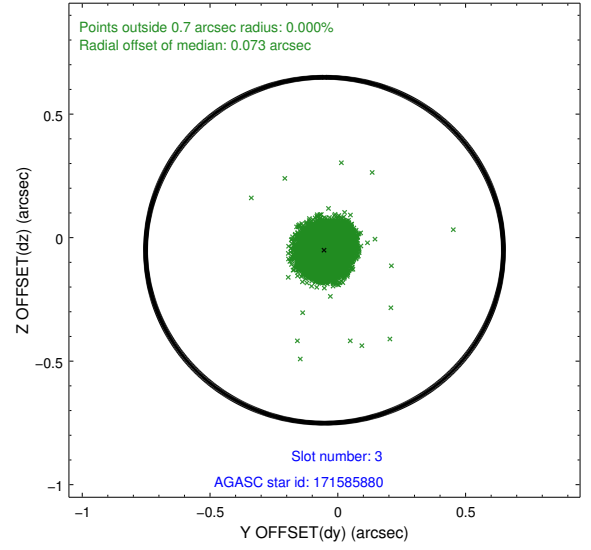
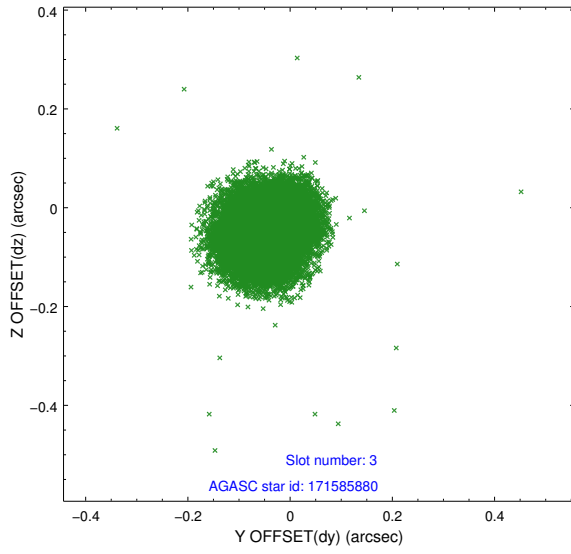


### Slot Statistics

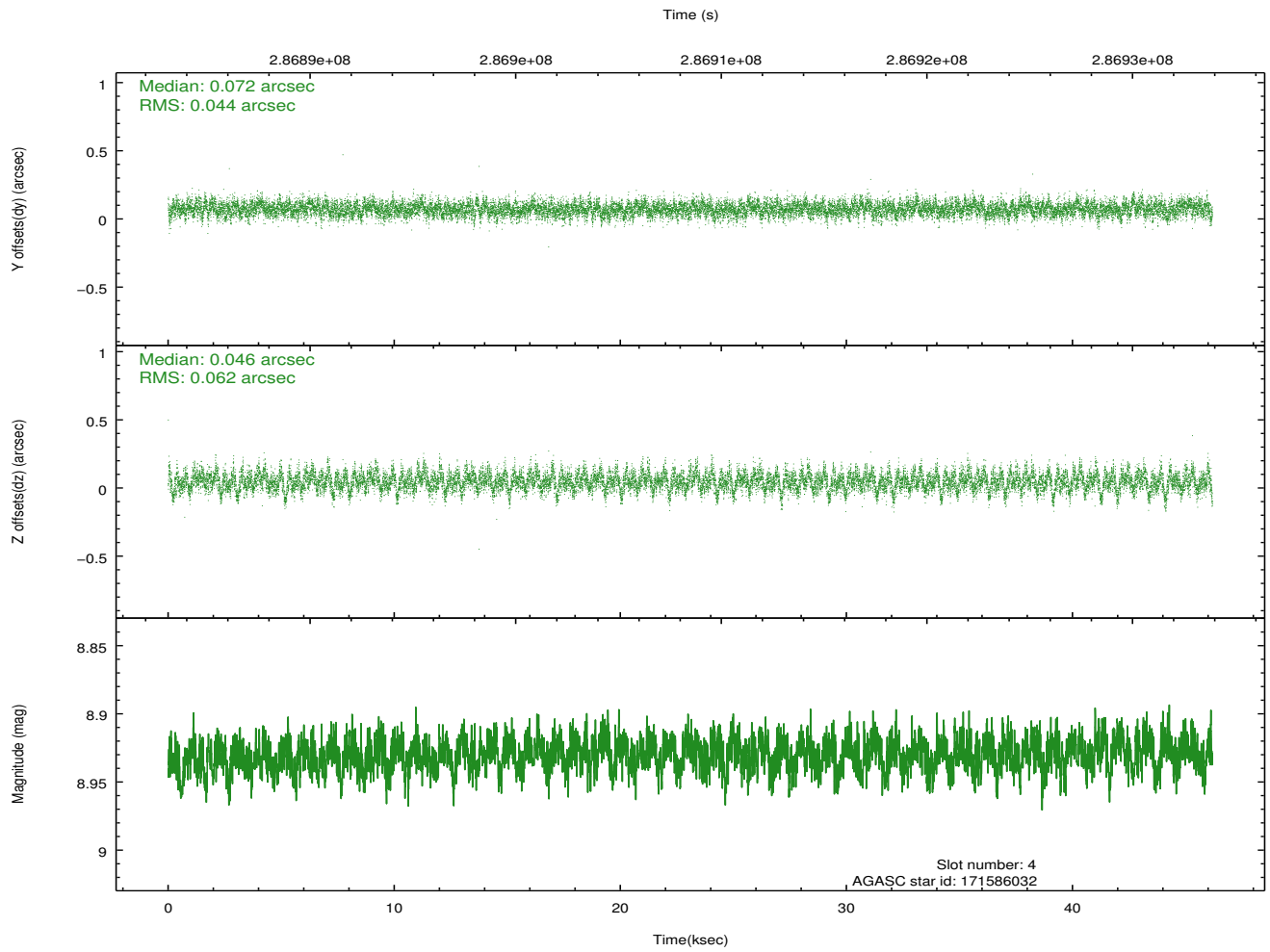
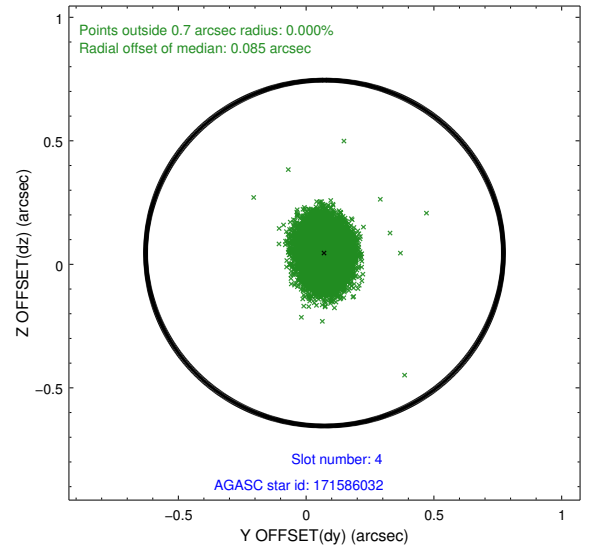
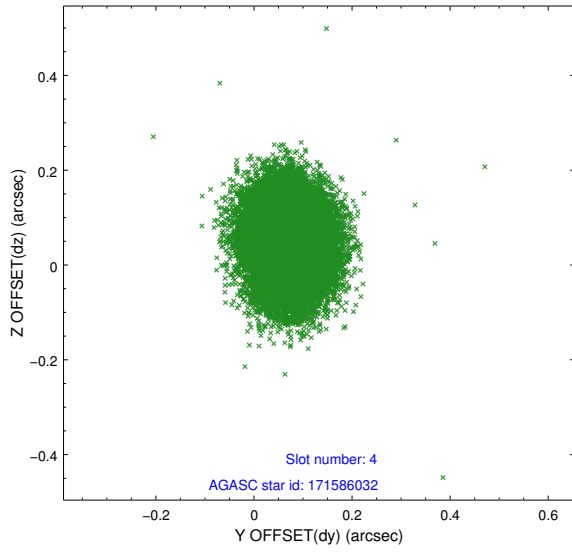
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-2	7.09	11264	-0.102	-0.144	0.015	0.024	0.000000	0.000000	-767.57	-1862.49
1	FID	ACIS-S-4	7.18	11263	0.229	0.087	0.012	0.020	0.000000	0.000000	2146.06	46.16
2	FID	ACIS-S-5	7.23	11263	-0.158	0.064	0.013	0.020	0.000000	0.000000	-1820.45	39.86
3	GUIDE	171585880	8.39	22519	-0.052	-0.051	0.066	0.105	83.676260	22.176319	-492.45	237.79
4	GUIDE	171586032	8.93	22508	0.072	0.046	0.080	0.133	83.950197	22.083225	-100.84	1128.72
5	GUIDE	171721904	9.19	22442	0.031	0.075	0.113	0.177	84.272676	22.116922	-156.90	2209.76
6	GUIDE	243941560	8.28	22523	-0.206	0.014	0.064	0.101	83.733264	22.568598	-1889.90	516.40
7	GUIDE	171597832	9.17	22508	0.153	-0.082	0.098	0.157	83.183230	21.366702	2309.19	-1596.31

## 2.4 Star Slots

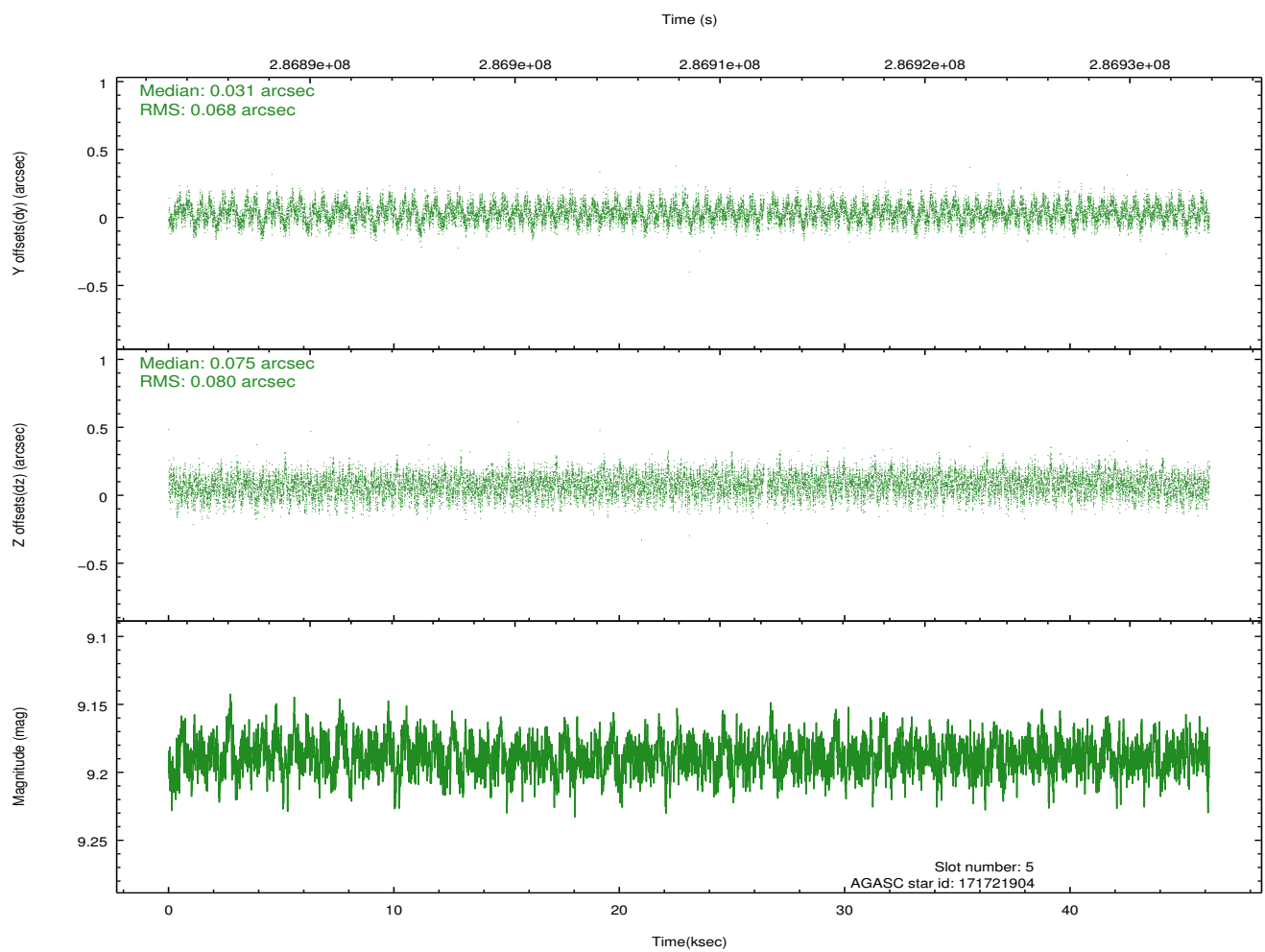
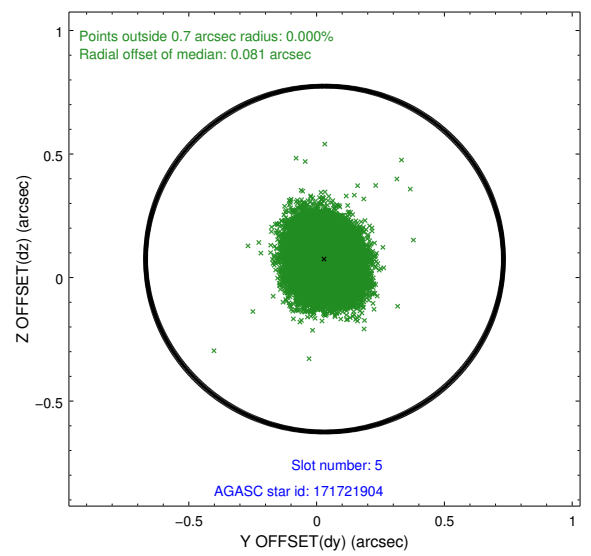
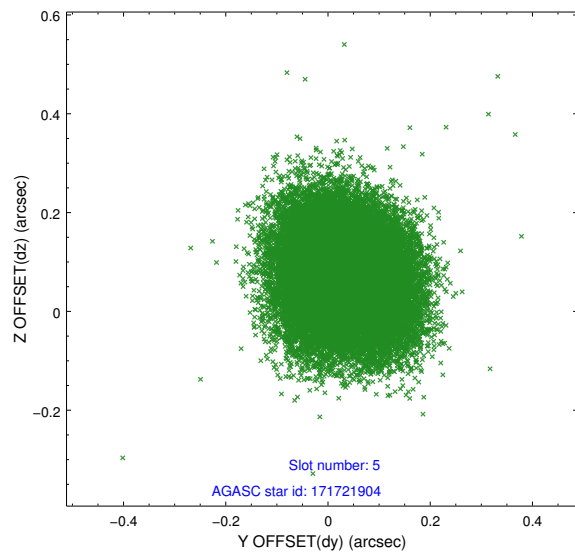
### 2.4.1 Slot 3



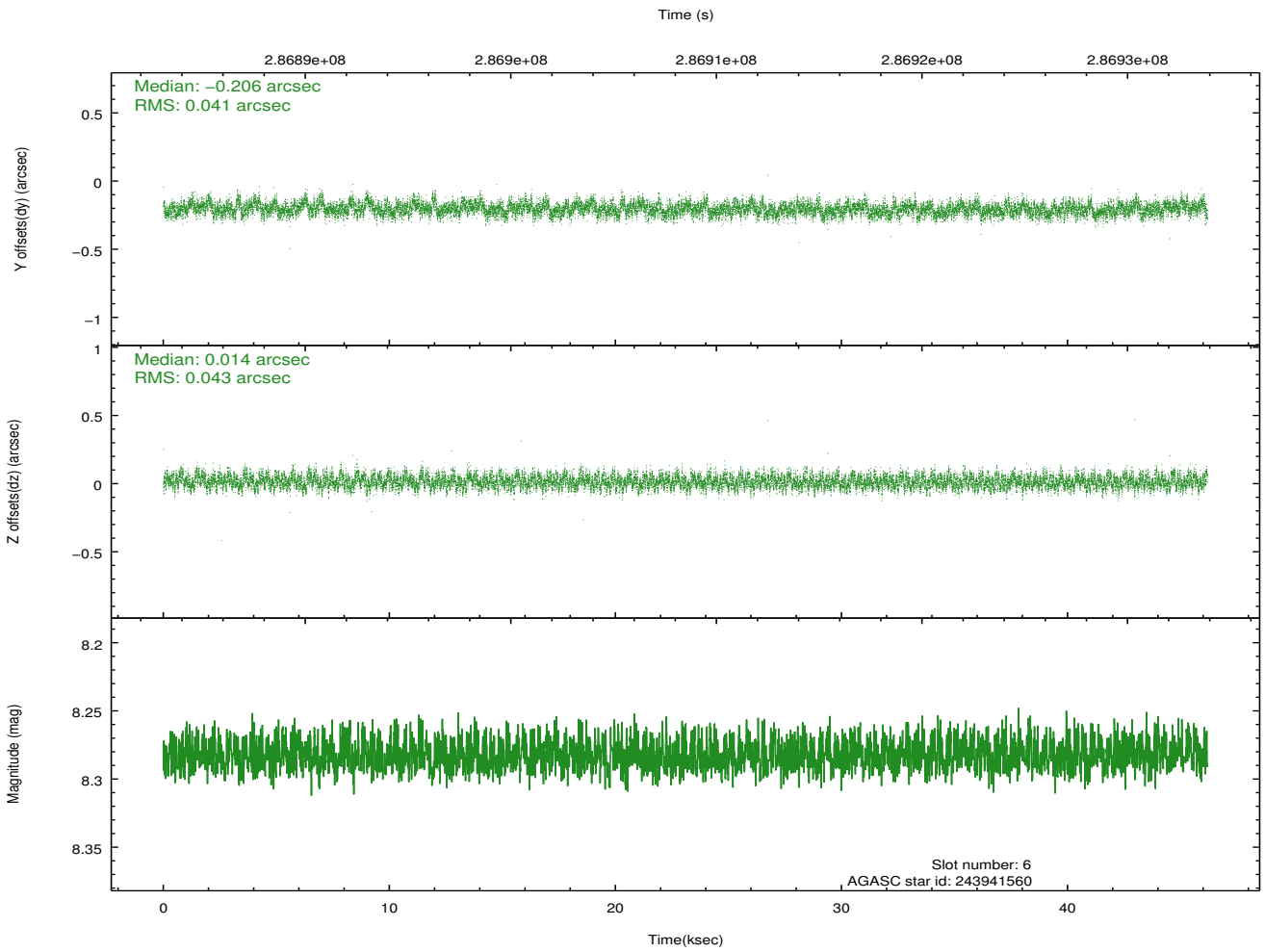
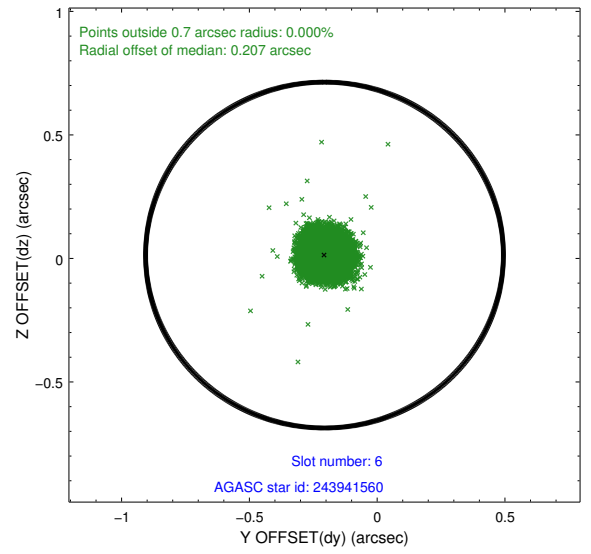
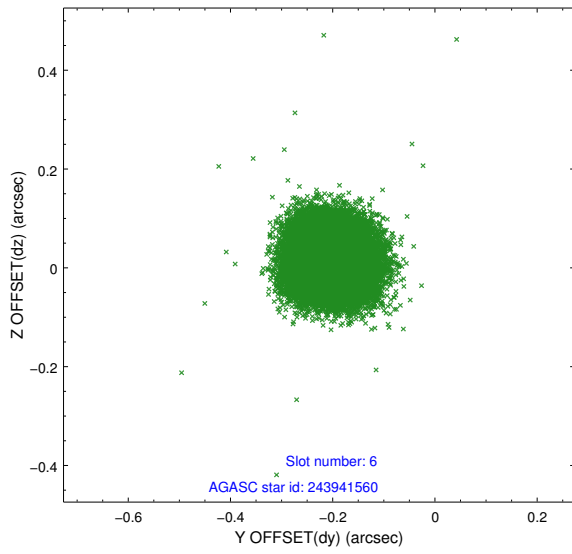
### 2.4.2 Slot 4



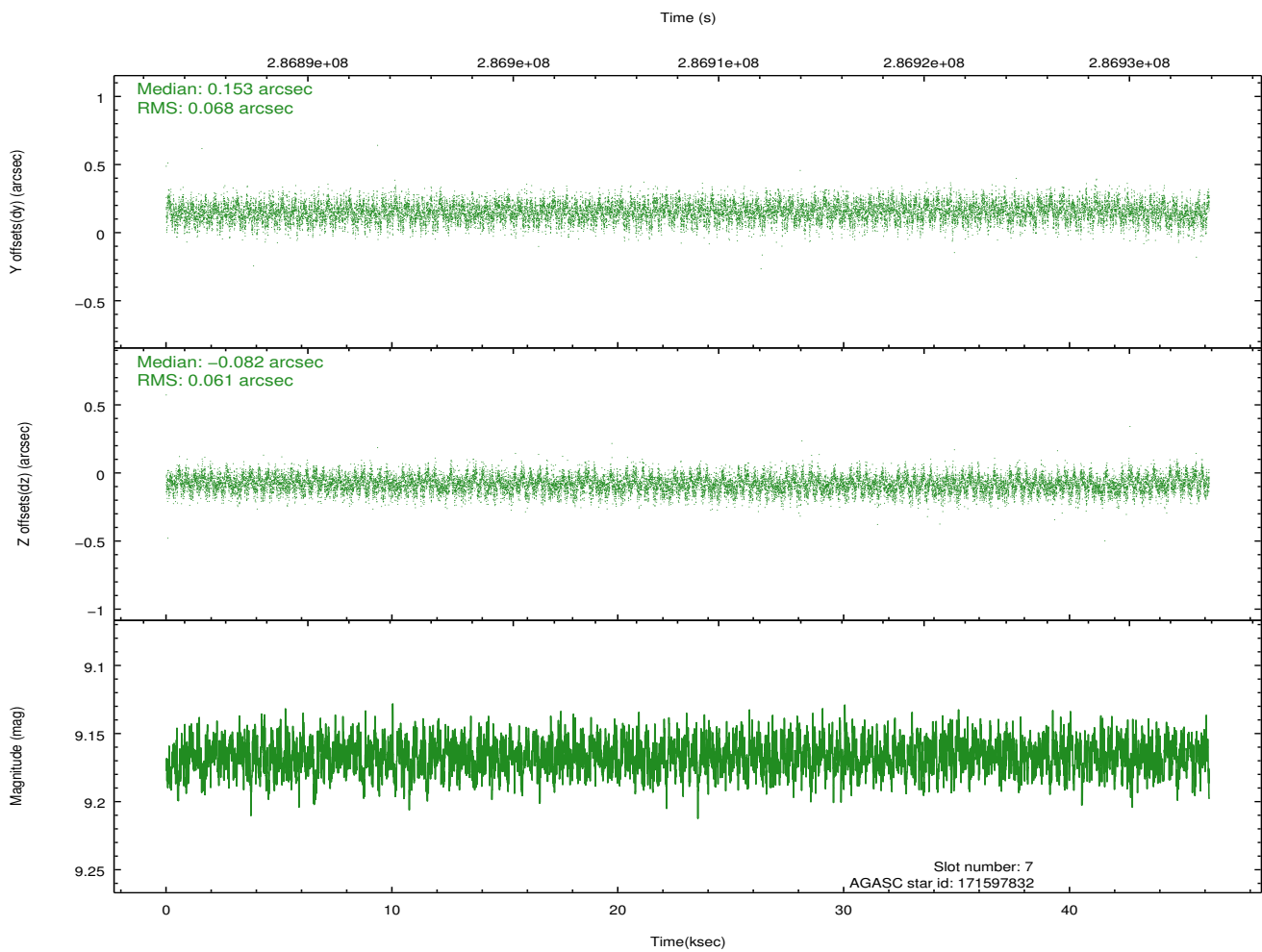
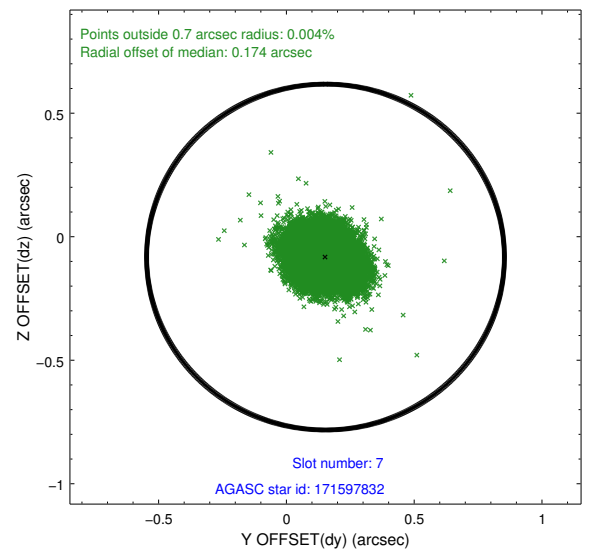
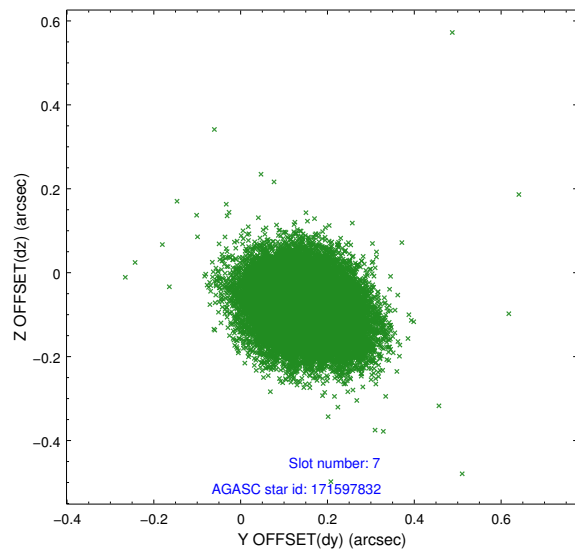
### 2.4.3 Slot 5



### 2.4.4 Slot 6

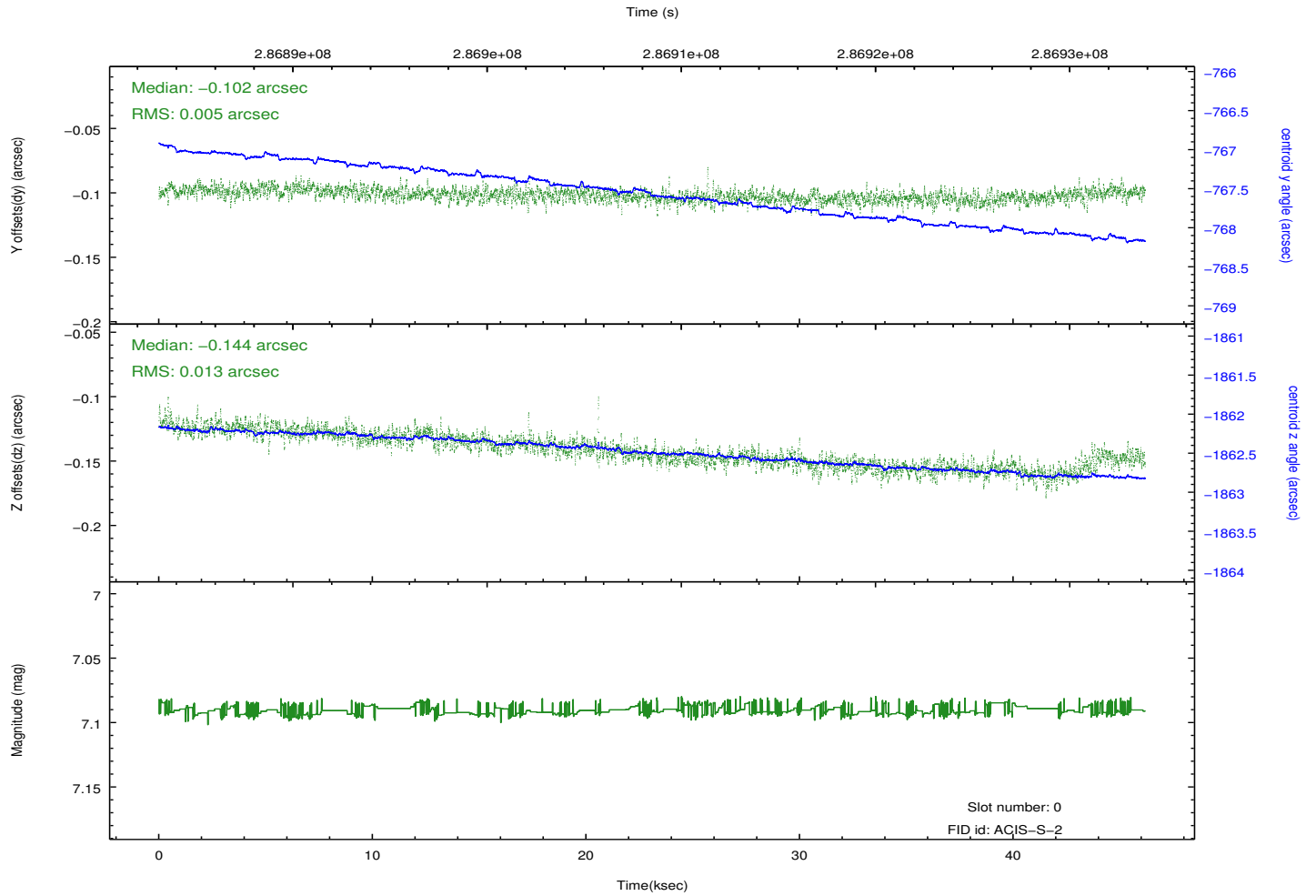
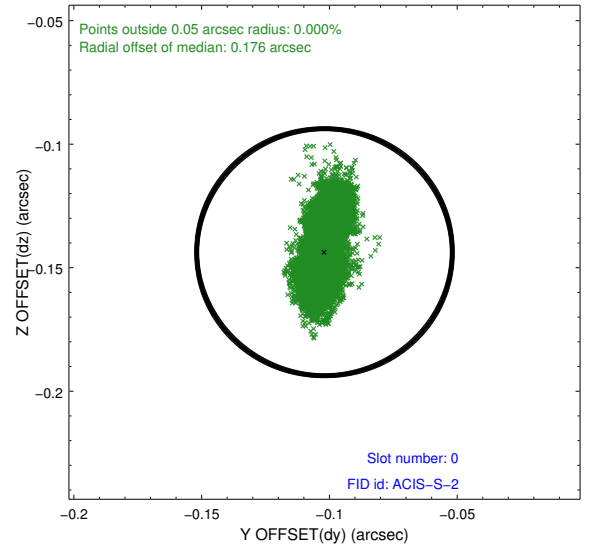
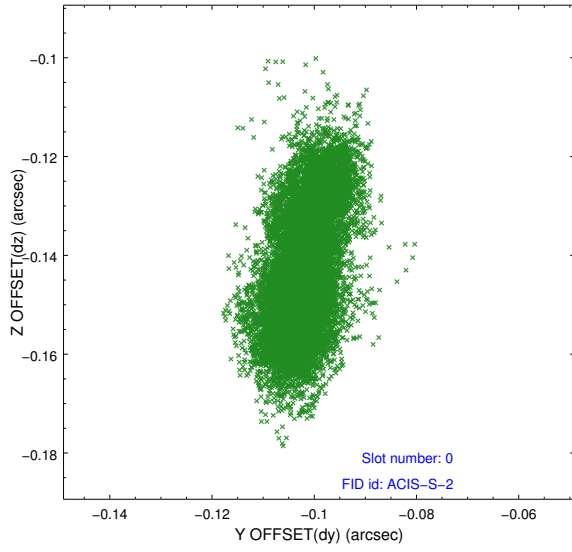


## 2.4.5 Slot 7

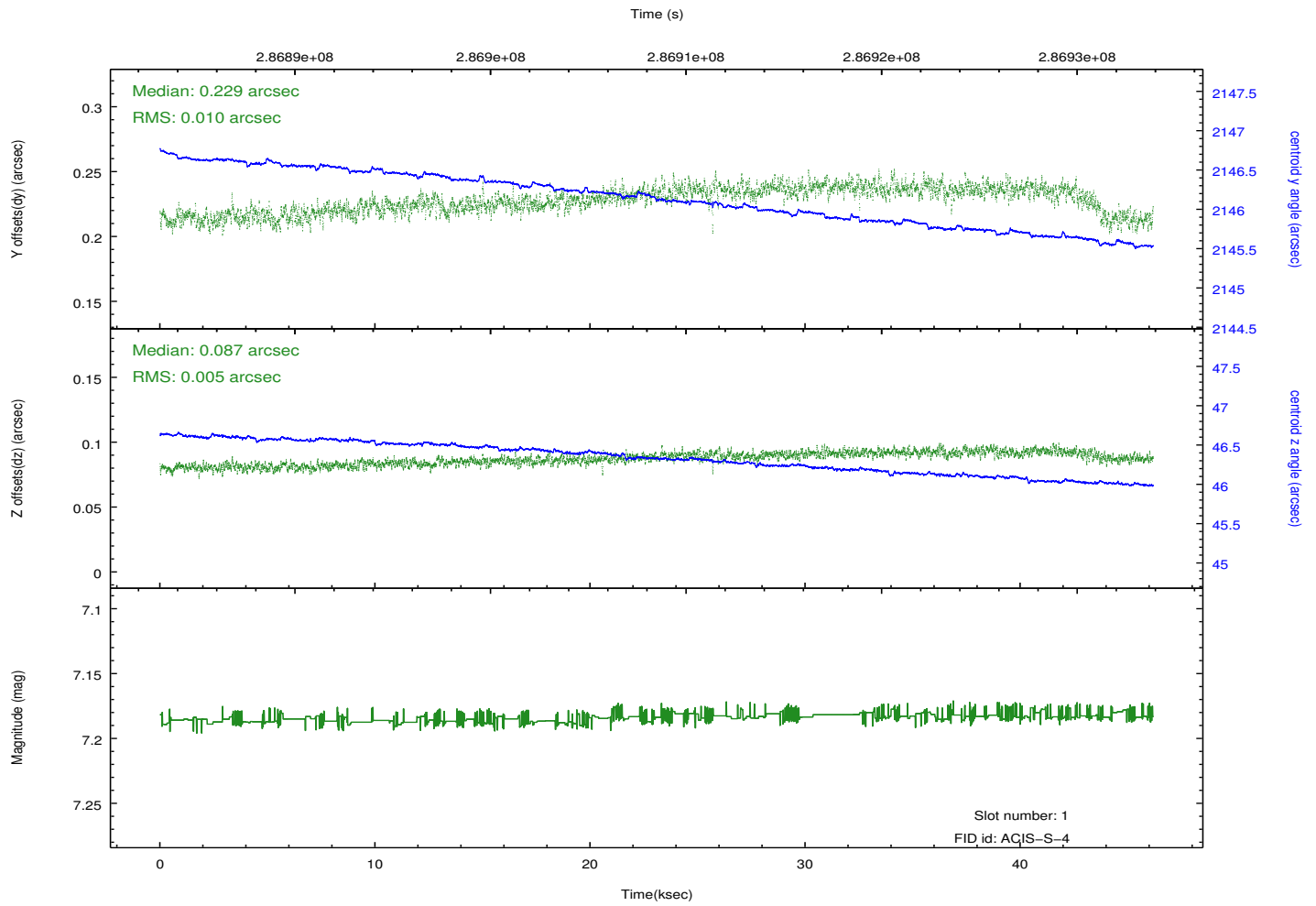
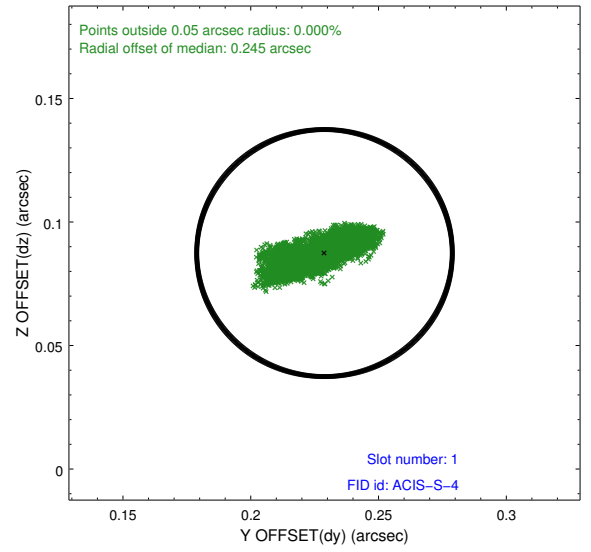
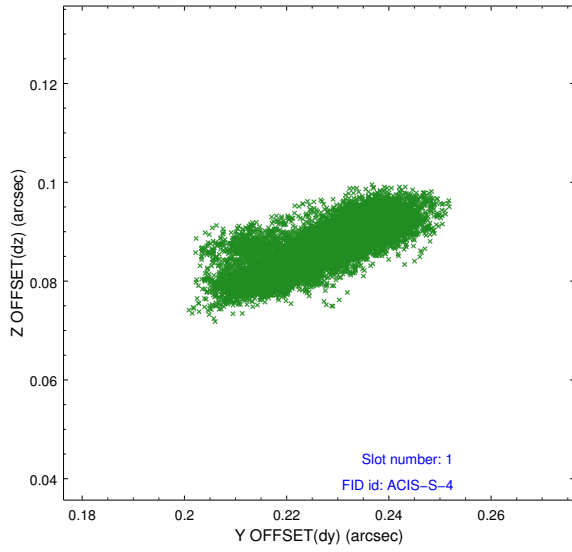


## 2.5 FID Slots

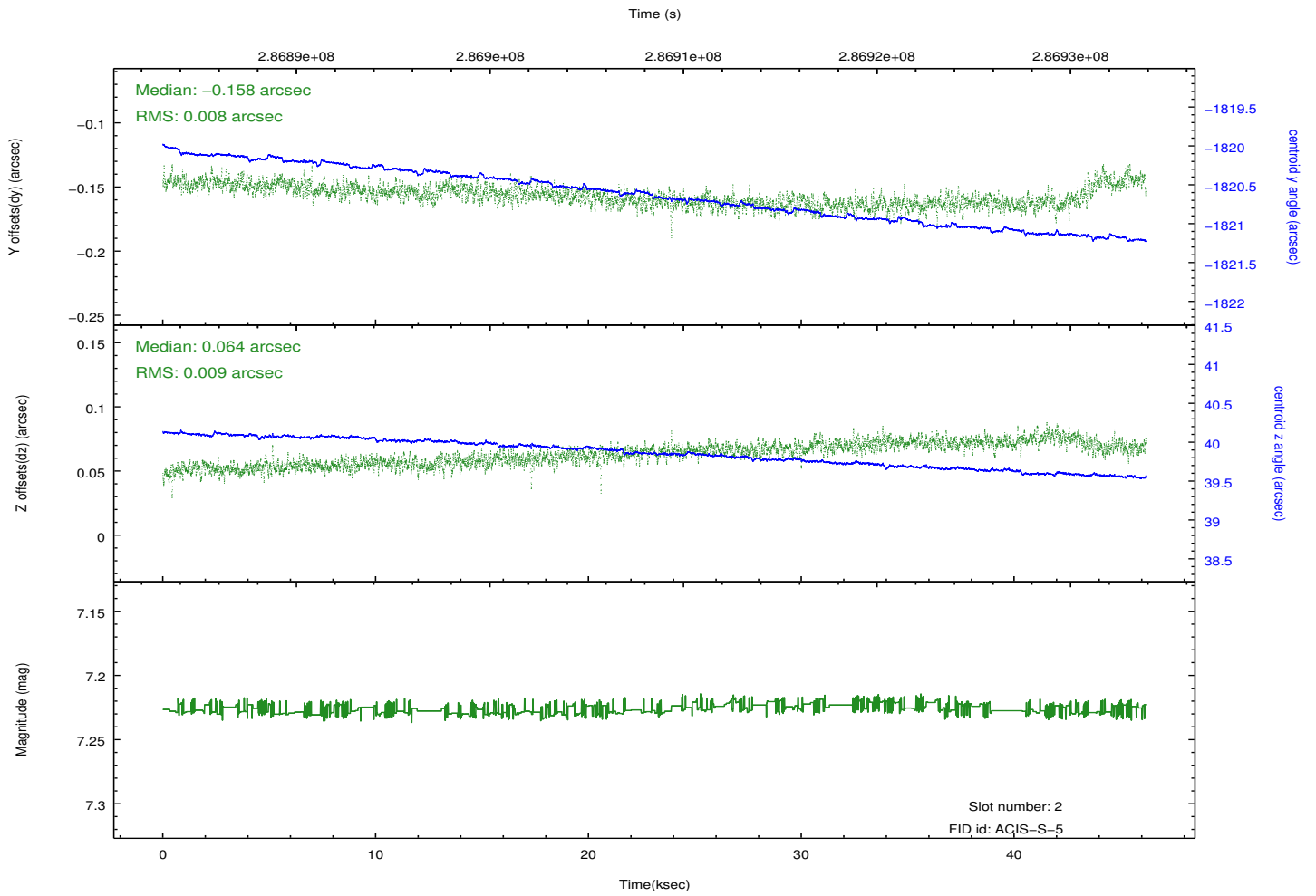
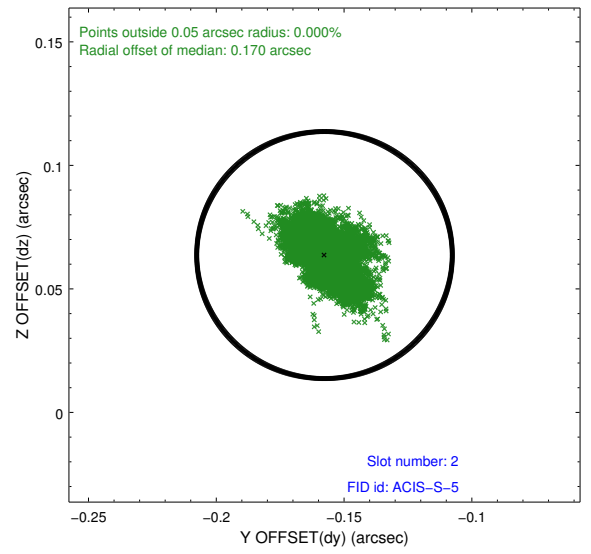
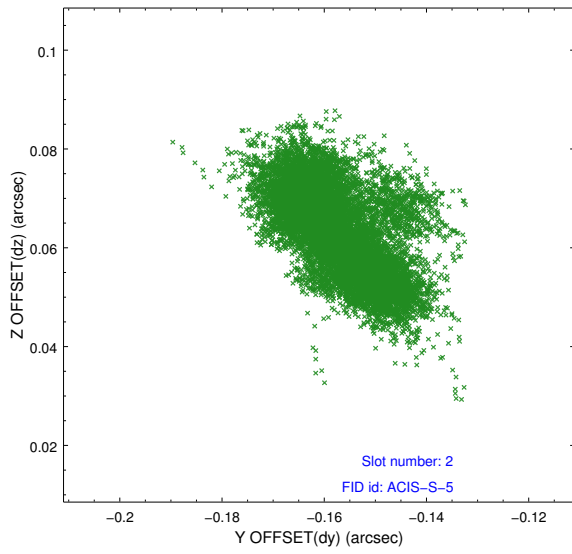
### 2.5.1 Slot 0



## 2.5.2 Slot 1

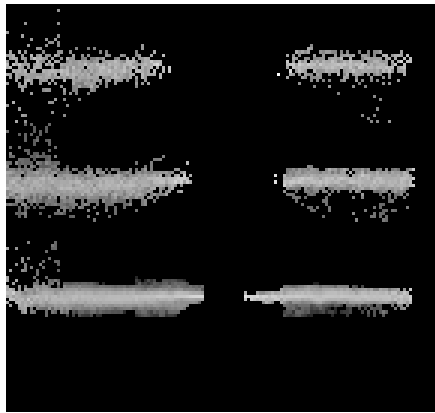


### 2.5.3 Slot 2

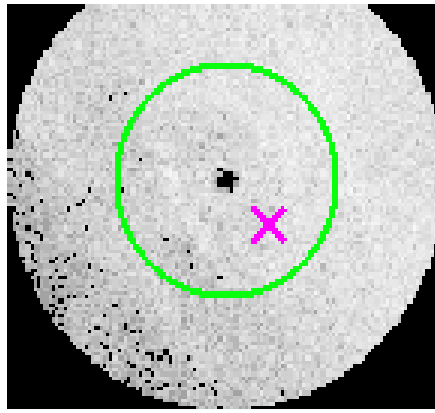


### 3 Gratings

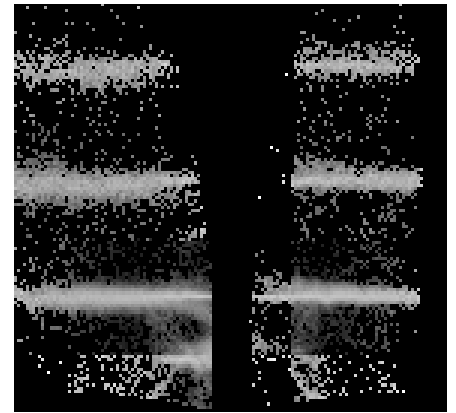
#### 3.1 HEG Arm



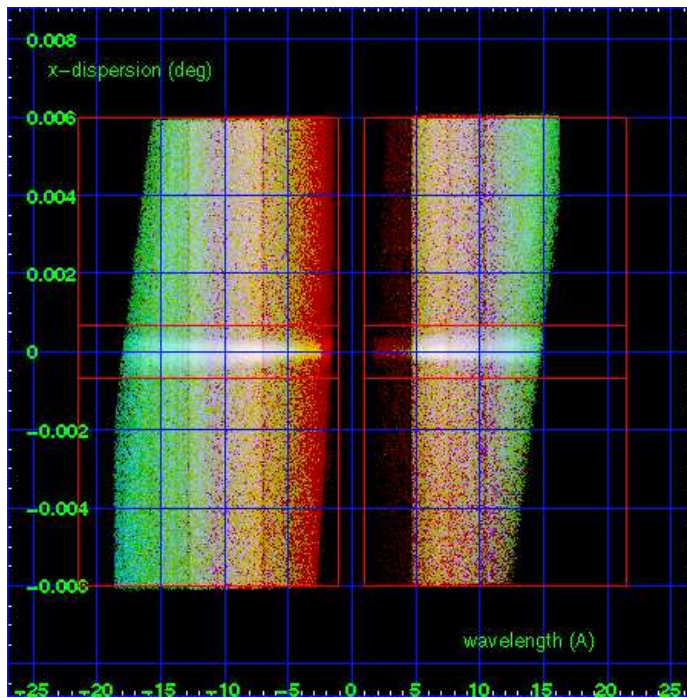
HEG Order Sort 123



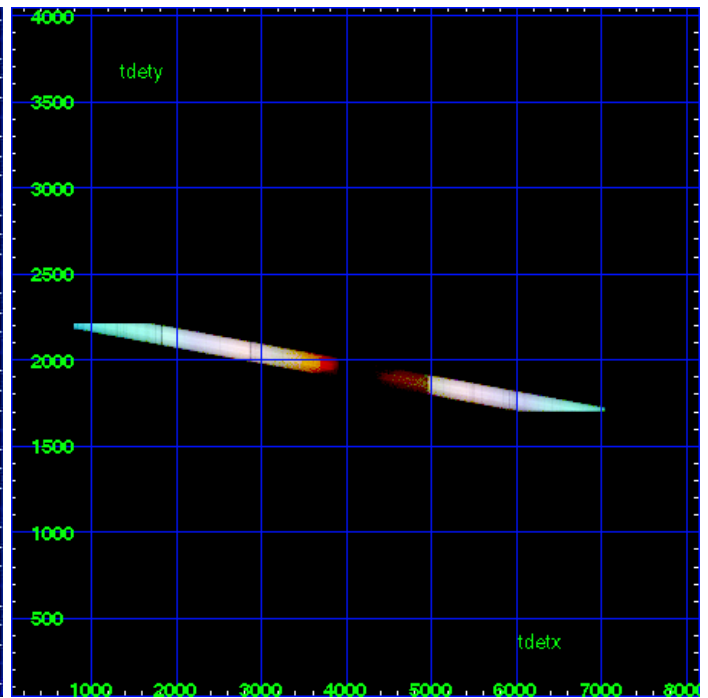
HEG Zero Order



HEG Order Sort ALL

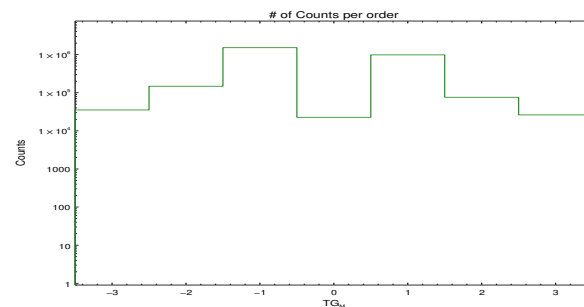


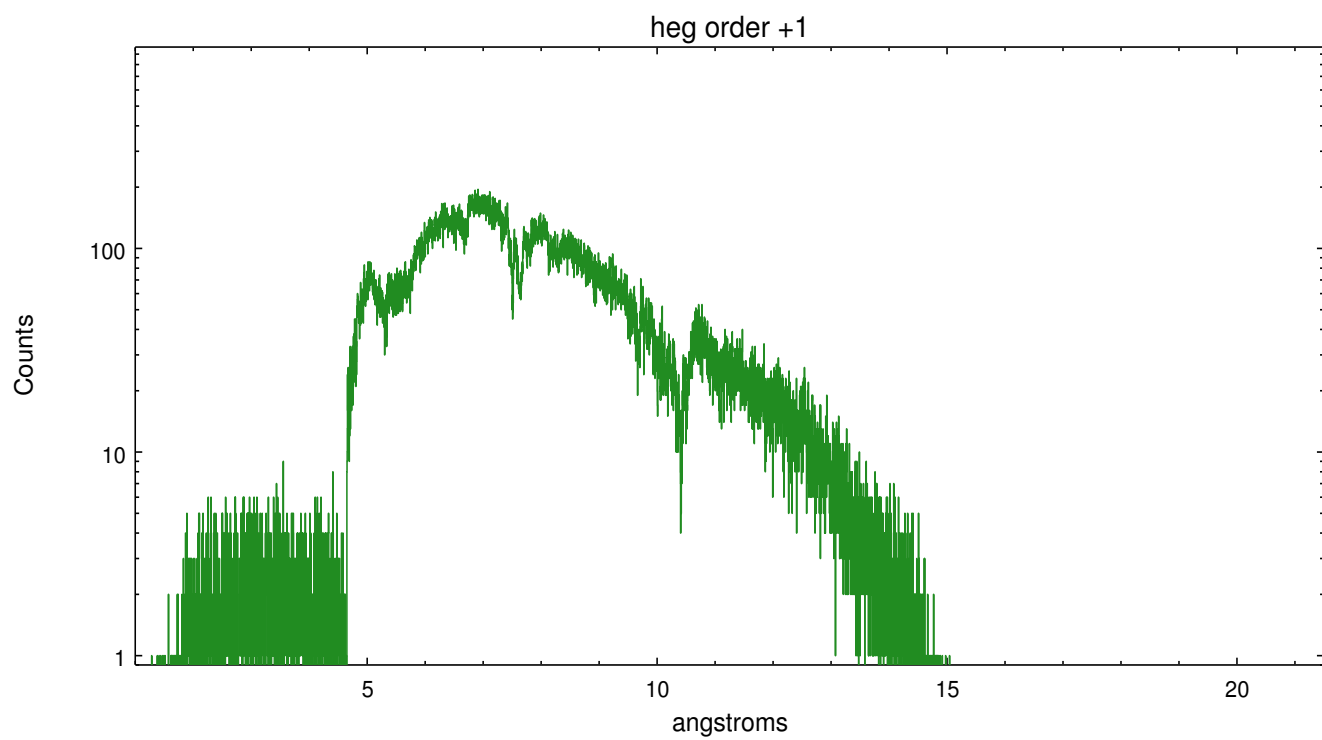
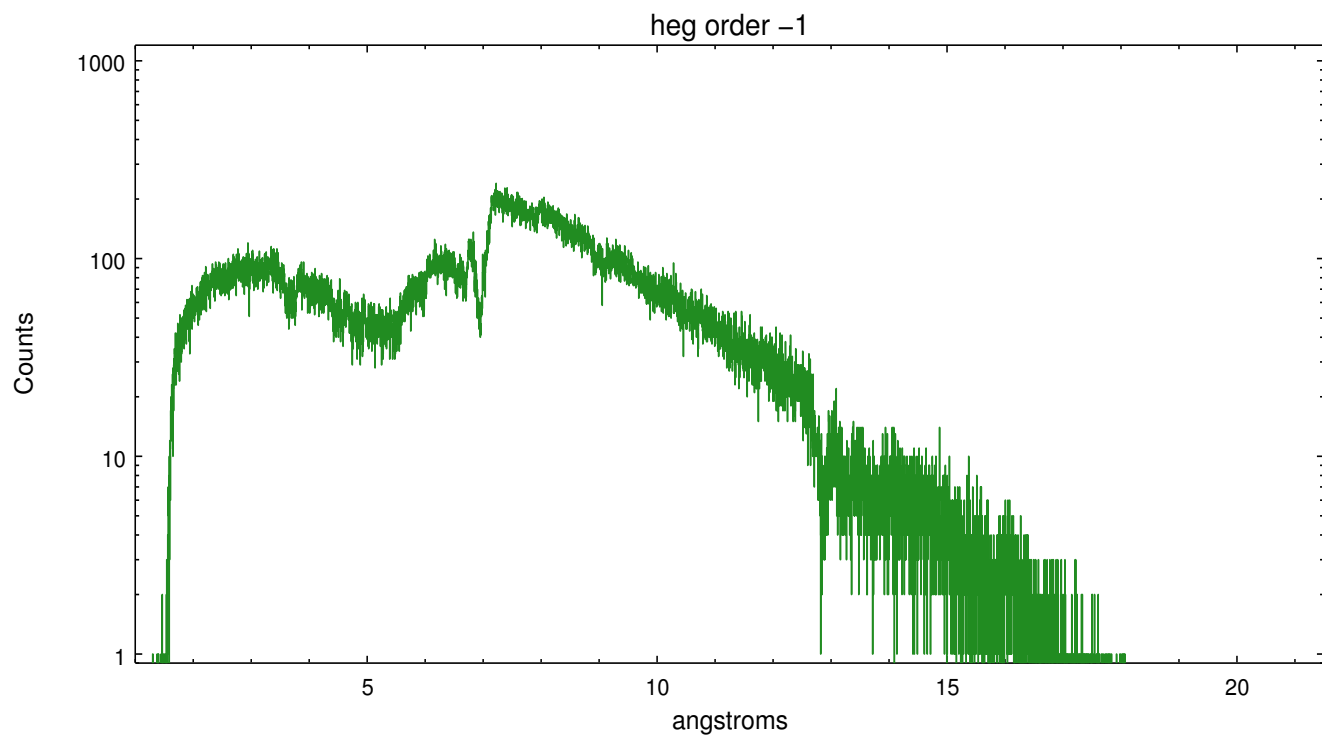
Spot Image HEG



Full Detector HEG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	35272	147745	1516635	22635	983087	75881	26163

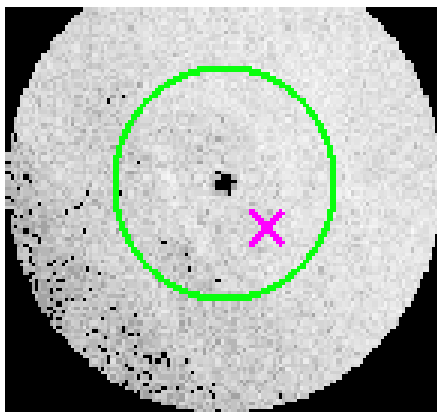




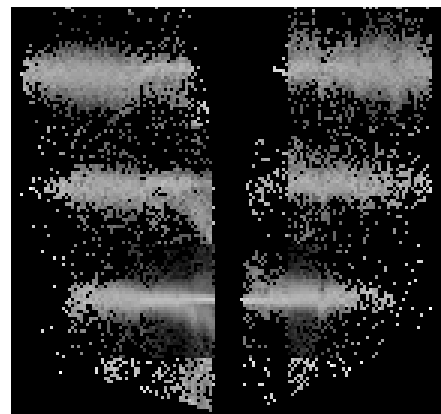
### 3.2 MEG Arm



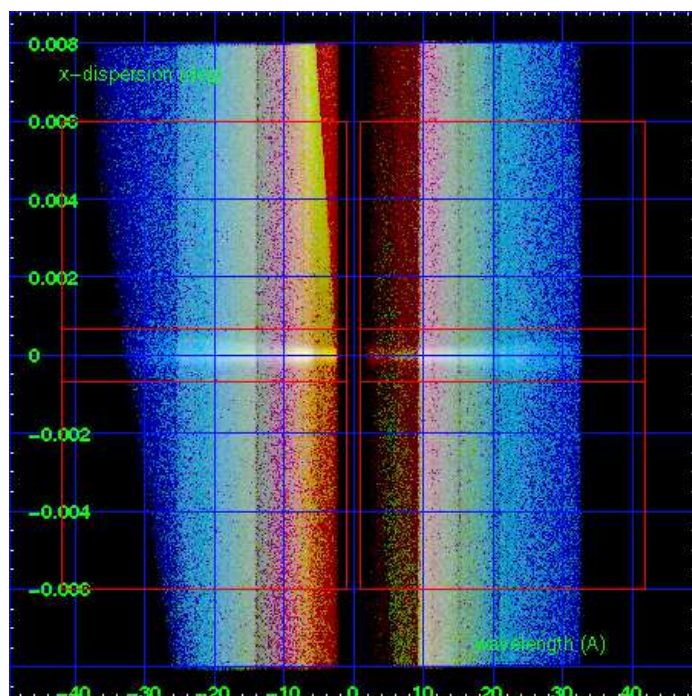
MEG Order Sort 123



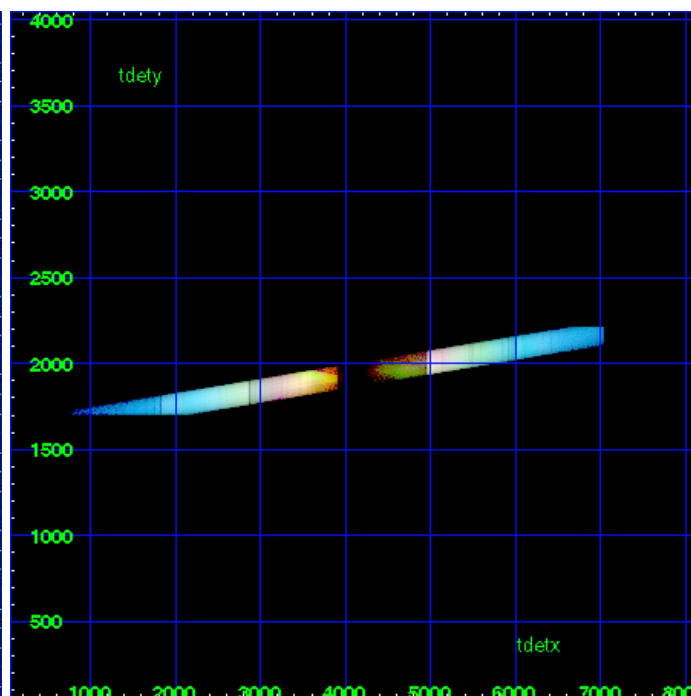
MEG Zero Order



MEG Order Sort ALL

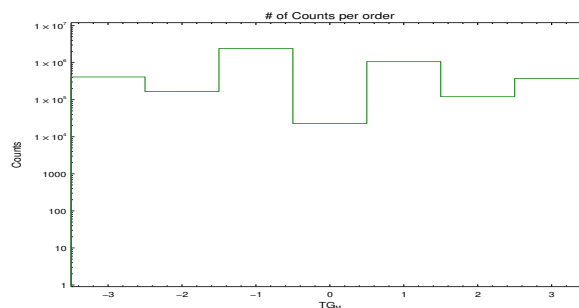


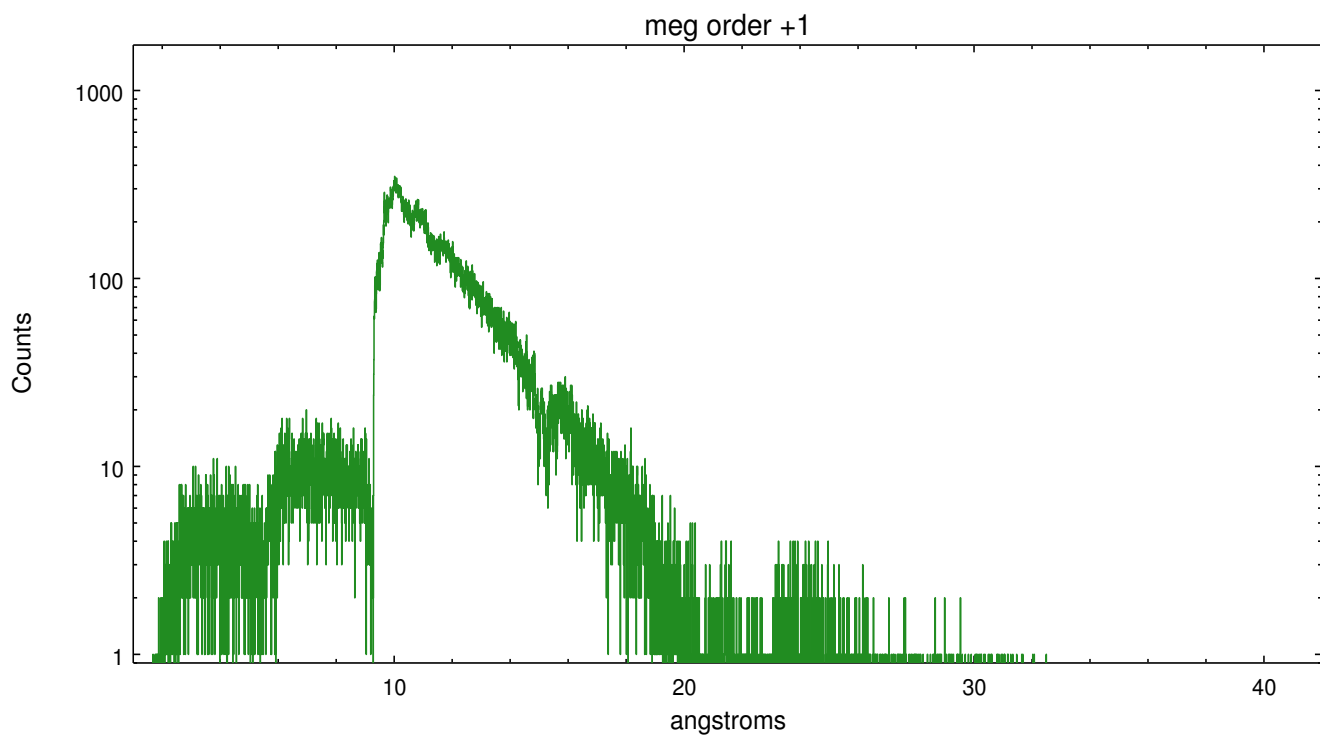
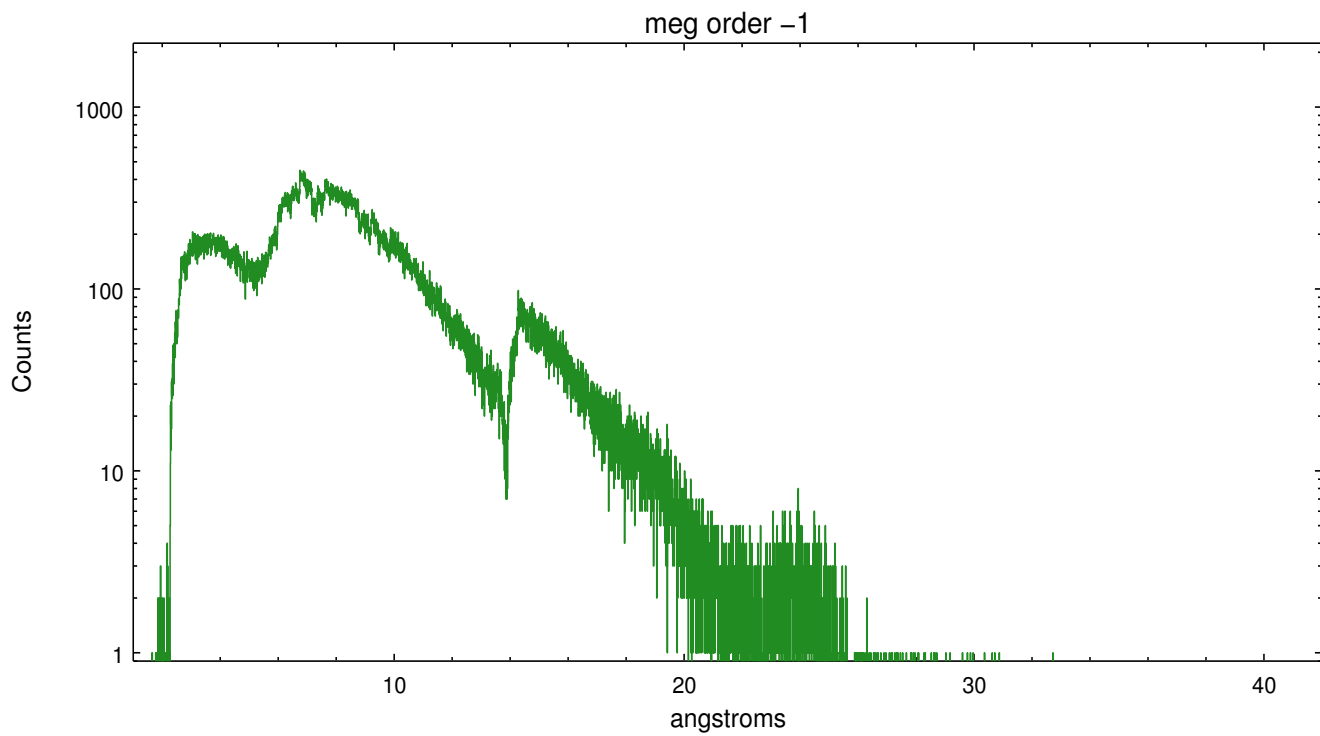
Spot Image MEG



Full Detector MEG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	410249	166142	2393454	22635	1064477	120619	373236





# A Summary

## A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2012.05.08
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	46.17

## A.2 Comments

Extended source: the wavelength solution is pertinent only to the crab pulsar position. For extended sources, there is no unique mapping from position to wavelength.

===

Source is severely piled up with extended emission. Standard software processing technique using the tool `tgdetect` could not locate the zeroth order. For this processing, coordinates for the zeroth order have been 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 newly determined zeroth order coordinates ( $x=4084.21$ ,  $y=4107.53$ ) were manually entered as user parameters for the tool `tg_create_mask`.

====

This observation was executed with an 1/20 sampling for CCD S-3. The result can be seen in the low count rate for the hard energies in the plus orders for both meg and heg. Telemetry saturation reduced the ontime for CCD chips 6, 7, and 8. There will be dropped exposures for these chips.

====

The charge time is based on `CCD_ID=5` (S1), which had few dropped frames and does reflect the requested exposure. Other chips have dropped frames due to telemetry saturation, and their effective exposures range from 12.6-46.2ks.

===

WARNING: there are no standard ciao tools for analysis of grating spectra from extended sources. The shape of an emission 'line' will be the shape of the zero order spatial structure convolved with the instrumental LSF. Grating extractions can be used, but need to be combined with custom spatial-spectral analysis, since wavelength is multi-valued at any particular diffraction angle.