

# V&V Reference Report

## L2 ASCDS Version : 10.9.2

Observation 22997 - L2 Version 1  
Chandra X-Ray Center

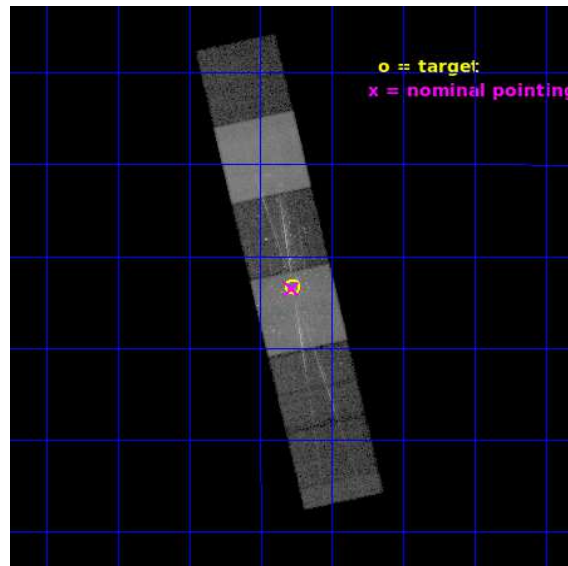
L2 Processing Date : Oct 16 2020

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# 1 Front

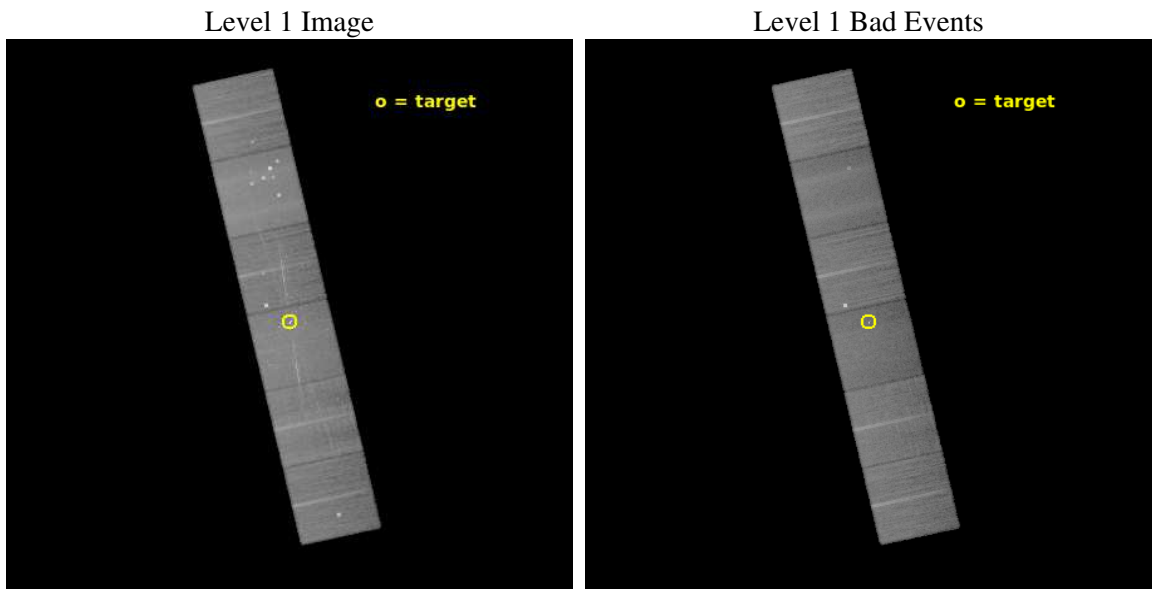
seq_num	201298	Sequence number
obs_id	22997	Observation id
title	THE TRUE NATURE OF X-RAYS FROM THE ORION TRAPEZIUM	Proposal title
observer	Norbert Schulz	Principal investigator
object	Orion Nebula Cluster	Source name
dtycycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	83.81875	Observer's specified target RA [deg]
dec_targ	-5.38975	Observer's specified target Dec [deg]
ra_nom	83.820042493585	Nominal RA [deg]
dec_nom	-5.3920504085564	Nominal Dec [deg]
roll_nom	77.155489433506	Nominal Roll [deg]
revision	1	Processing version of data
ontime	26943.837353945	Sum of GTIs [s]
livetime	26602.658261738	Livetime [s]
ontime4	26943.878393888	Sum of GTIs [s]
ontime5	26943.796313882	Sum of GTIs [s]
ontime6	26943.755273938	Sum of GTIs [s]
ontime7	26943.837353945	Sum of GTIs [s]
ontime8	26943.714233875	Sum of GTIs [s]
ontime9	26943.673193932	Sum of GTIs [s]
l2events	428159	Number of level 2 events



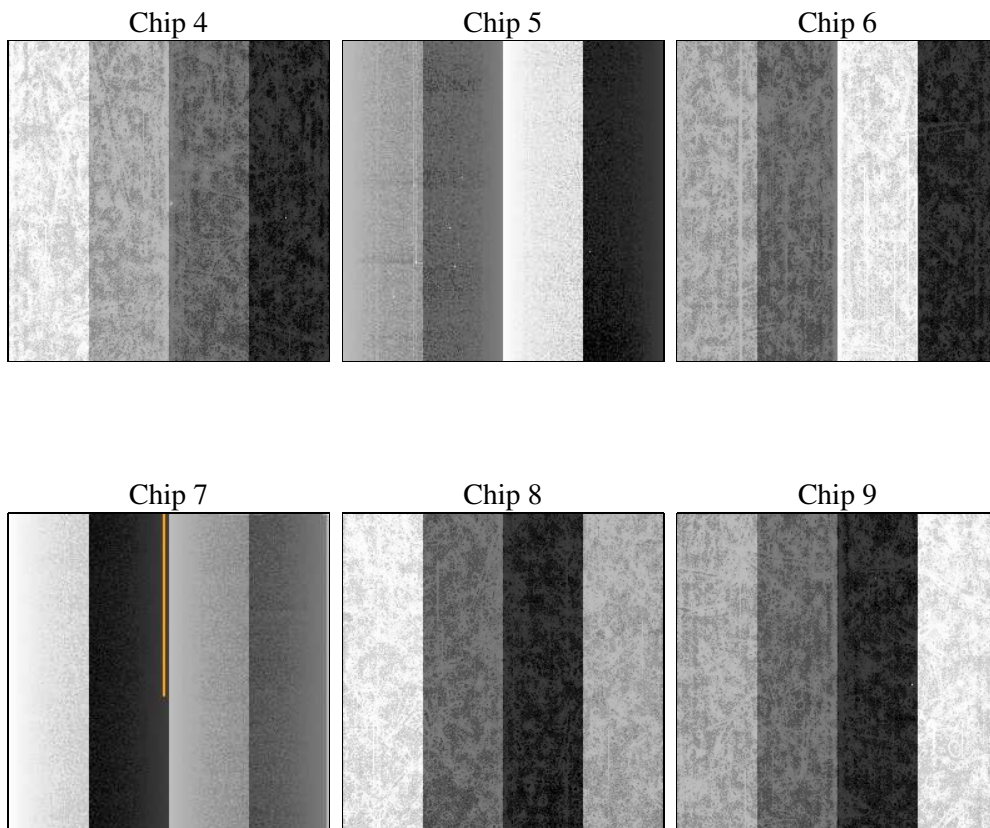
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

obi_num	1	Obi number	sched_exp_time	27000.000000	[s] Scheduled observation exposure time
ascdsver	10.9.2	Processing system revision	ontime	26943.837353945	Sum of GTIs [s]
caldbver	4.9.3	&#160	ontime4	26943.878393888	Sum of GTIs [s]
date	2020-10-16T15:27:11	Date and time of file creation	ontime5	26943.796313882	Sum of GTIs [s]
revision	1	Processing version of data	ontime6	26943.755273938	Sum of GTIs [s]
			ontime7	26943.837353945	Sum of GTIs [s]
			ontime8	26943.714233875	Sum of GTIs [s]
			ontime9	26943.673193932	Sum of GTIs [s]
			l1events	1730191	Number of level 1 events
			tgmethod	FINDZO	Method used to create src1a file
			z0_pos	(4105.76 4111.88)	grade 0 sky pixel position

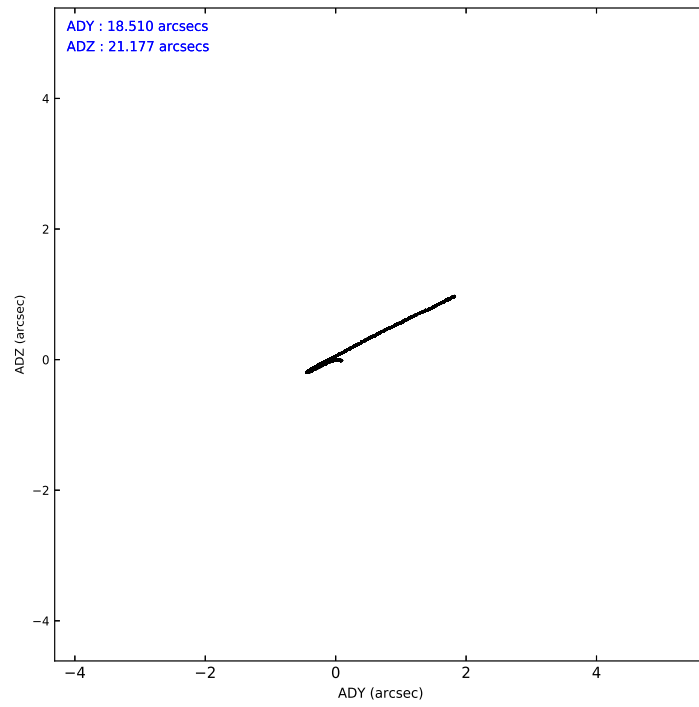
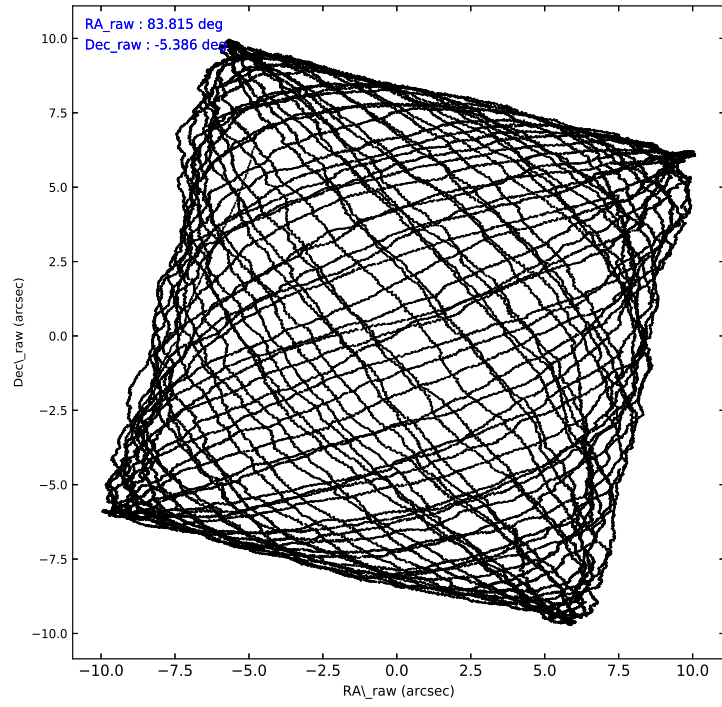
### 2.1.4 Events

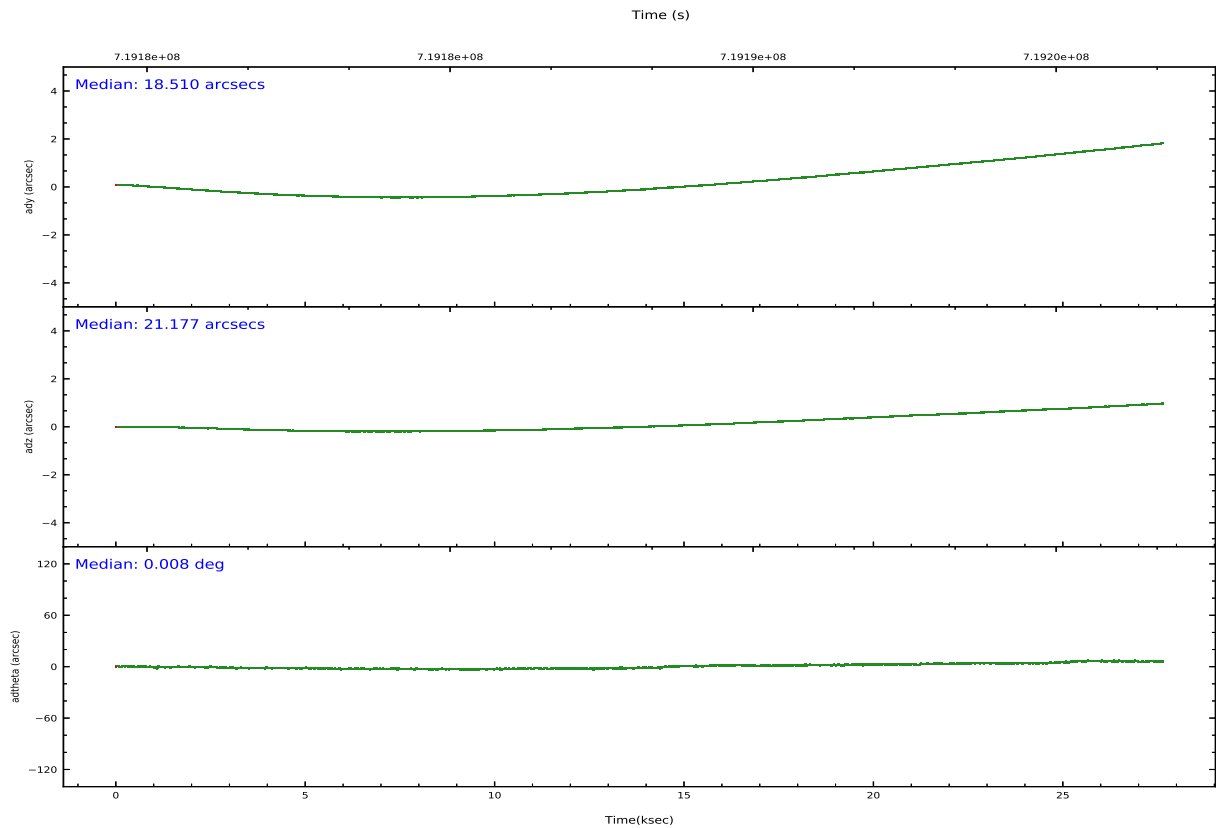
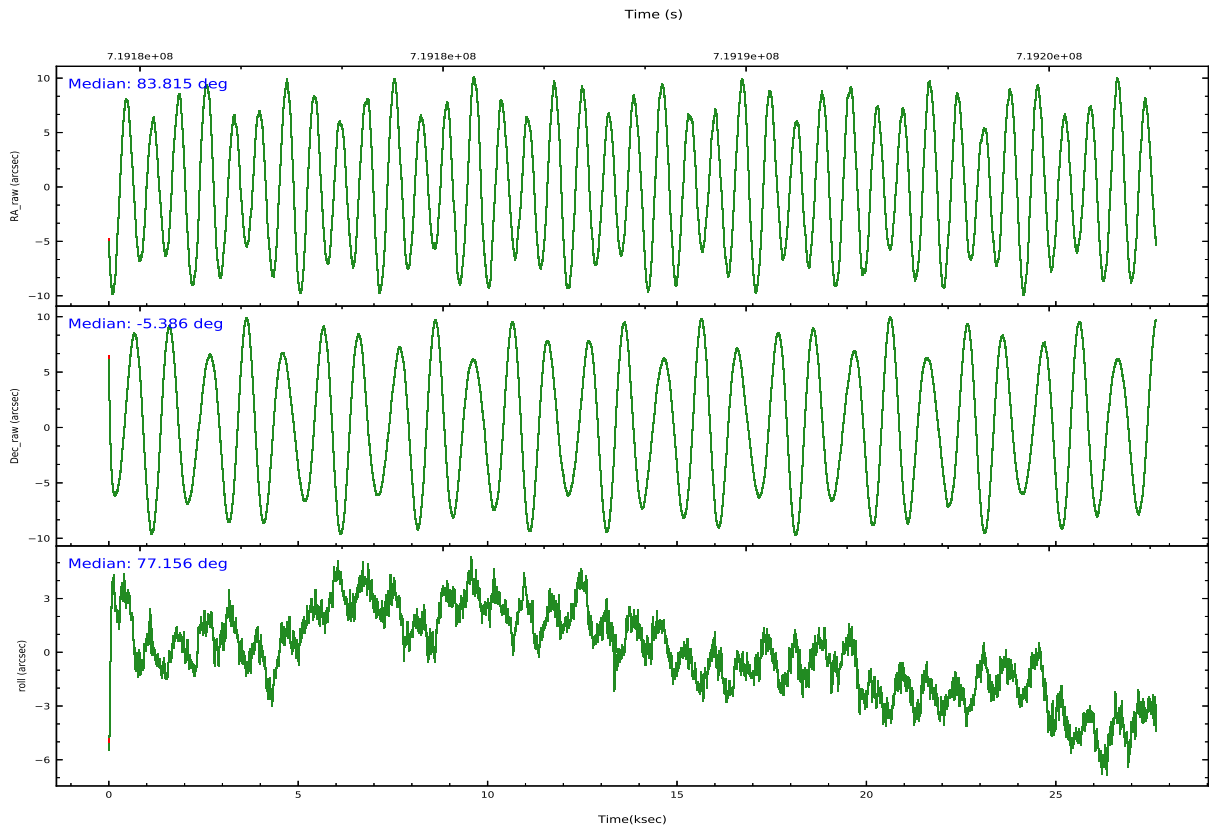
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9		ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	267277	377736	258600	315898	284071	226609	grade 0 events	10952	27788	21400	17526	24980	13600
rejected events	240727	188145	211908	161575	207347	194752		4%	7%	8%	5%	8%	6%
rejected %	90%	49%	81%	51%	72%	85%	grade 1 events	289	1294	7927	562	236	148
								0%	0%	3%	0%	0%	0%
							grade 2 events	5766	57125	12392	34137	18334	7276
								2%	15%	4%	10%	6%	3%
							grade 3 events	2720	5376	2414	12683	6883	2182
								1%	1%	0%	4%	2%	0%
							grade 4 events	2563	5106	2346	12532	6482	2148
								0%	1%	0%	3%	2%	0%
							grade 5 events	9788	21308	8430	26860	13591	9860
								3%	5%	3%	8%	4%	4%
							grade 6 events	4559	94233	8148	77478	20054	6657
								1%	24%	3%	24%	7%	2%
							grade 7 events	230640	165506	195543	134120	193511	184738
								86%	43%	75%	42%	68%	81%

## 2.2 Compared Parameters

Parameter	Planned	Actual	Parameter	Planned	Actual
Instrument	ACIS	ACIS	Obspar version number	8	8
Detector	ACIS-456789	ACIS-456789	Obspar file type	PREDICTED	ACTUAL
Grating	HETG	HETG	Obspar update status	NONE	UPDATED
Data mode	FAINT	FAINT	CCD I0 on	N	N
Observation mode	POINTING	POINTING	CCD I1 on	N	N
[deg] Pointing RA	83.823629	83.82004249358501	CCD I2 on	N	N
[deg] Pointing Dec	-5.411358	-5.3920504085564	CCD I3 on	N	N
[deg] Pointing Roll	77.000457	77.15548943350601	CCD S0 on	O1	Y
[mm] SIM focus pos	-0.684267	-0.6828225247311905	CCD S1 on	Y	Y
[mm] SIM defocus	0	0.001444936568705701	CCD S2 on	Y	Y
[mm] SIM translation stage pos	-190.132523	-190.1400660498719	CCD S3 on	Y	Y
[mm] SIM translation stage offset	0	0.00754346686406393	CCD S4 on	Y	Y
[s] Observation start time (MET)	719175825.184000	719174485.22062	CCD S5 on	O2	Y
Observation start date	2020-10-15T19:02:36	2020-10-15T18:41:25	Number of optional ACIS chips dropped	0	0
[s] Observation end time (MET)	719202825.184000	719203723.34741	On-chip summing requested	N	N
Observation end date	2020-10-16T02:32:36	2020-10-16T02:48:43	Subarray requested	NONE	NONE
Read mode	TIMED	TIMED	Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	3.2

## 2.3 Aspect



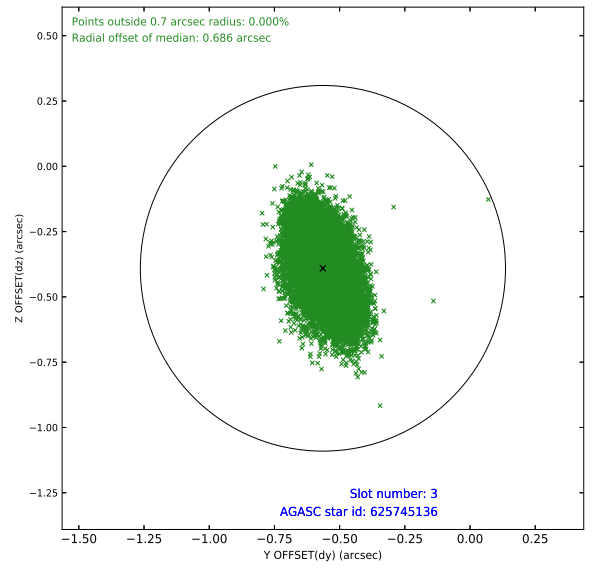
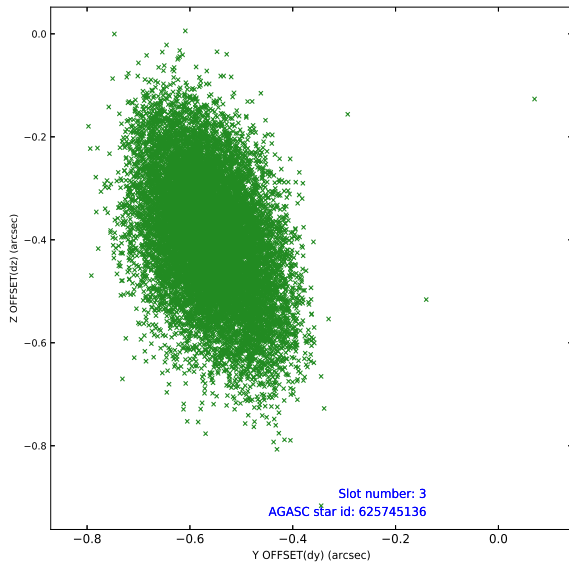


### Slot Statistics

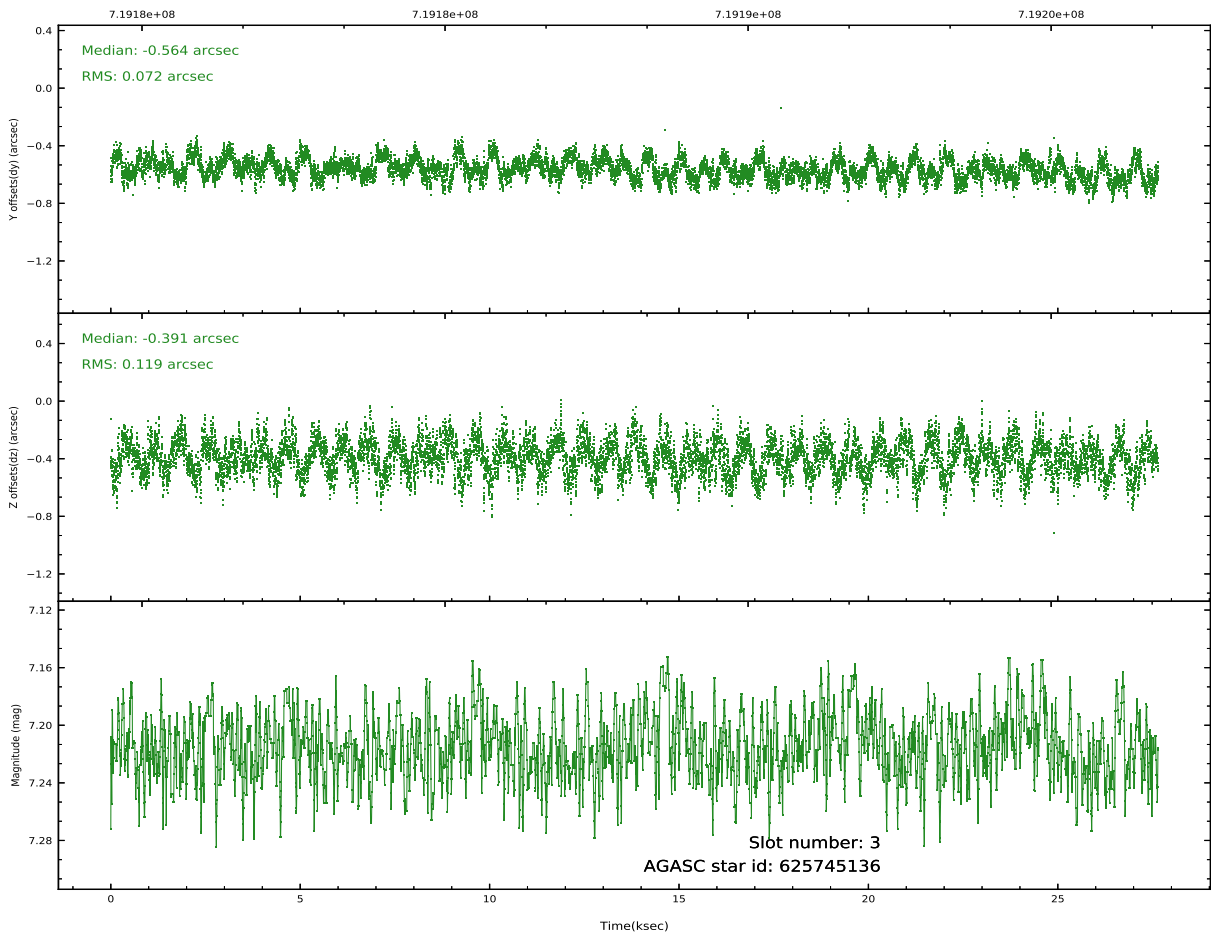
slot	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_x
0	FID		ACIS-S-2	7.21	6743	1.000	0.256	-0.140	0.016	0.031	0.000000	0.000000	-771.97	-1742
1	FID		ACIS-S-4	7.33	6744	1.000	0.081	-0.086	0.030	0.075	0.000000	0.000000	2141.50	164
2	FID		ACIS-S-5	7.31	6742	1.000	-0.364	0.234	0.027	0.046	0.000000	0.000000	-1824.89	159
3	GUIDE	used	625745136	7.21	13487	1.000	-0.564	-0.391	0.146	0.248	83.600341	-4.804339	1949.57	1271
4	GUIDE	used	625874672	7.70	13483	1.000	0.241	-0.051	0.147	0.258	84.403143	-4.934124	2141.61	-1638
5	GUIDE	used	626272760	6.63	13485	1.000	0.269	0.077	0.149	0.241	84.363987	-5.938389	-1413.51	-2311
6	GUIDE	used	626272880	7.65	13484	1.000	0.077	0.220	0.191	0.285	83.815609	-6.032748	-2185.46	-474
7	GUIDE	used	626272976	7.96	13483	1.000	-0.015	0.147	0.136	0.218	83.795875	-5.926912	-1830.24	-319

## 2.4 Star Slots

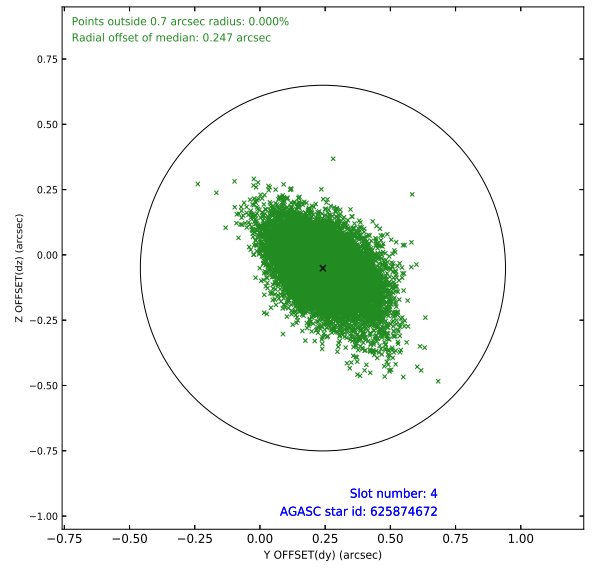
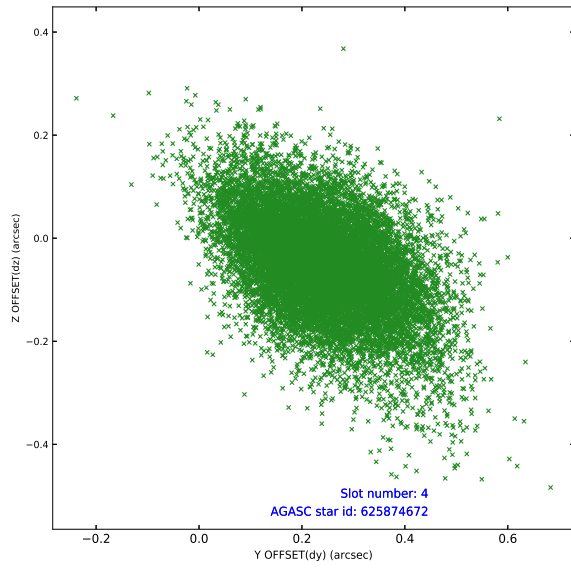
### 2.4.1 Slot 3



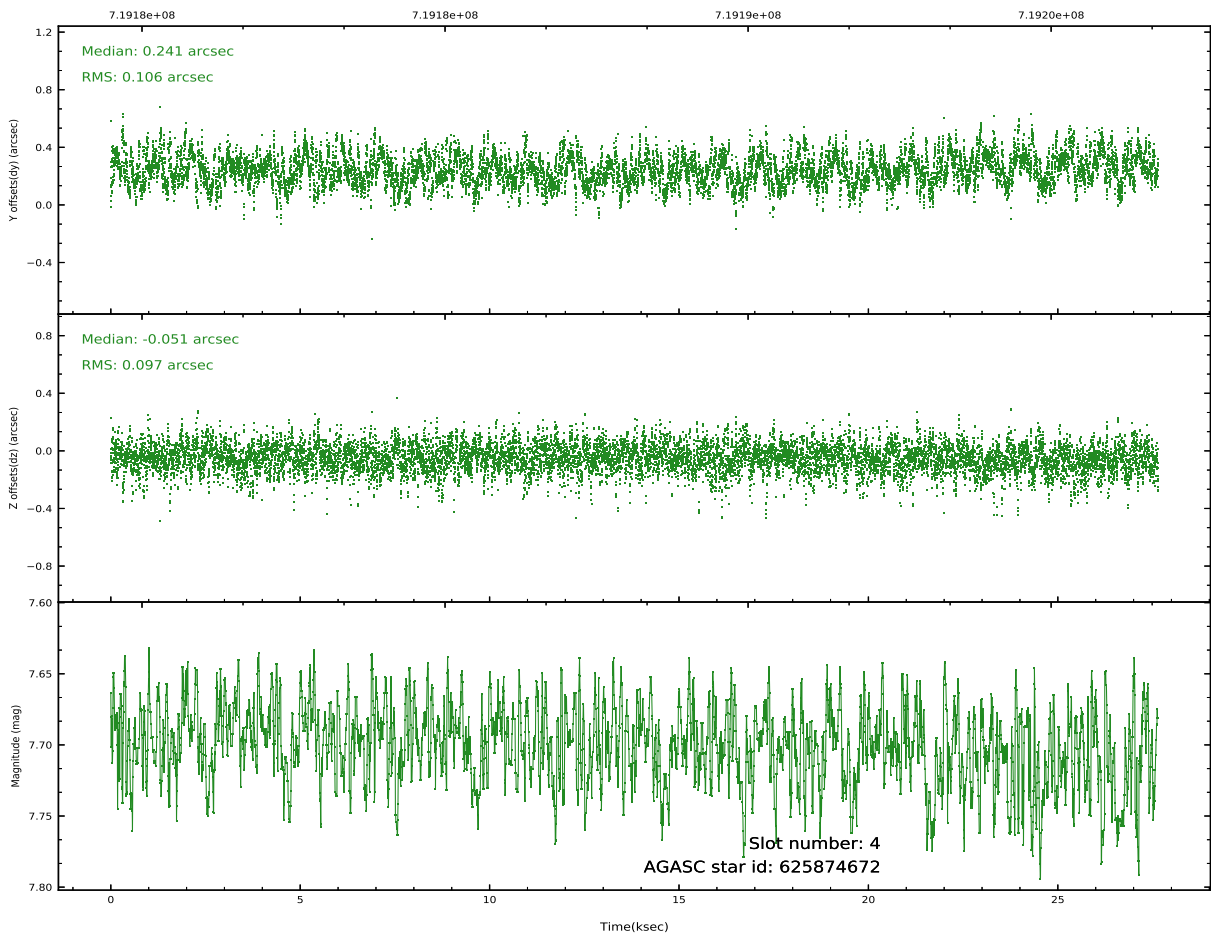
Time (s)



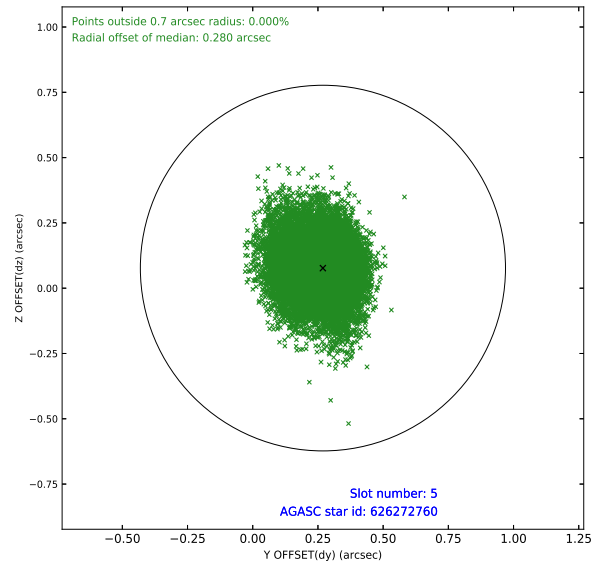
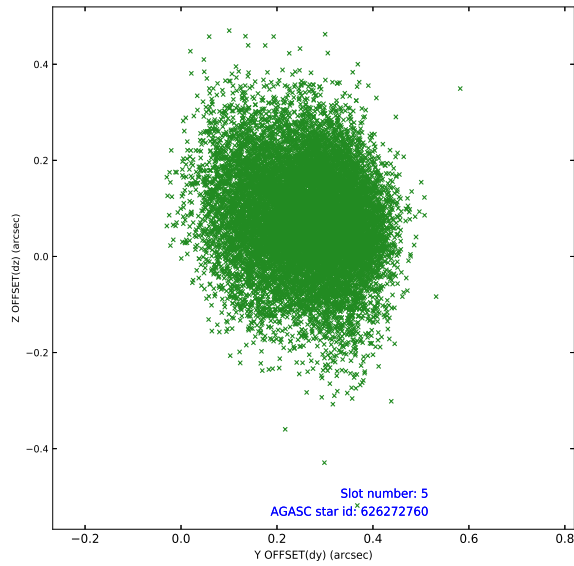
## 2.4.2 Slot 4



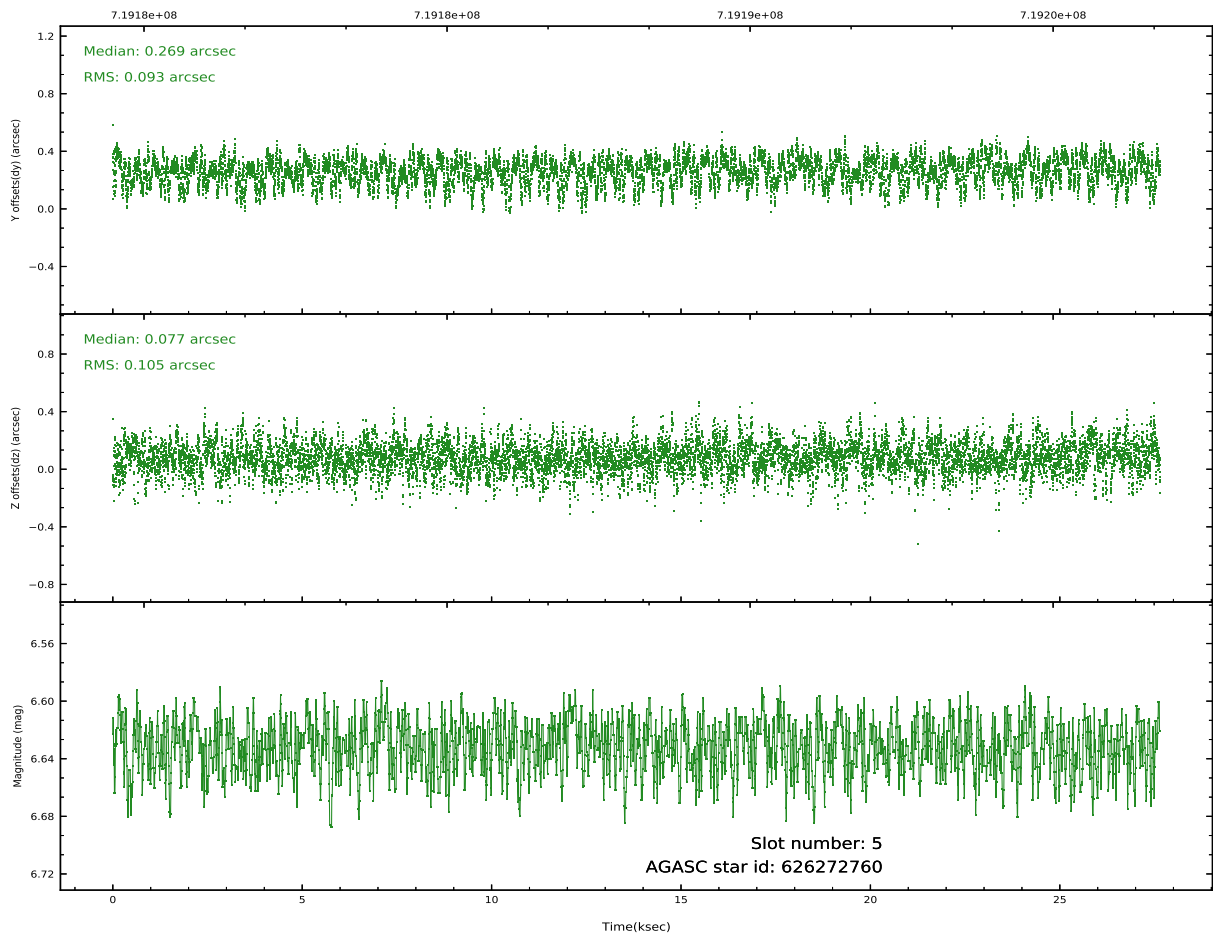
Time (s)



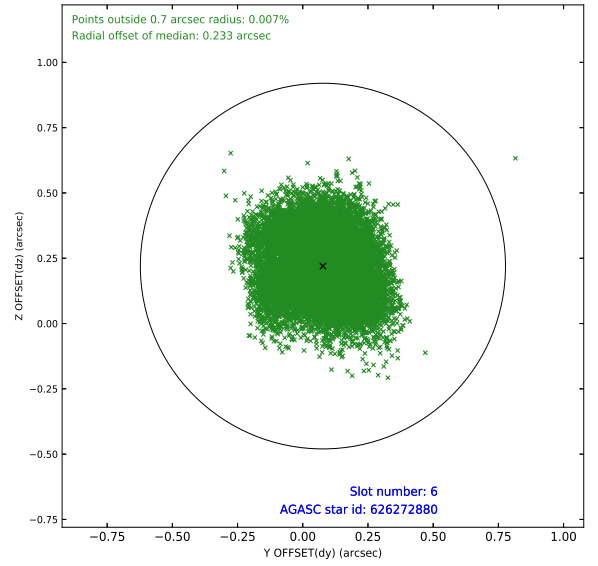
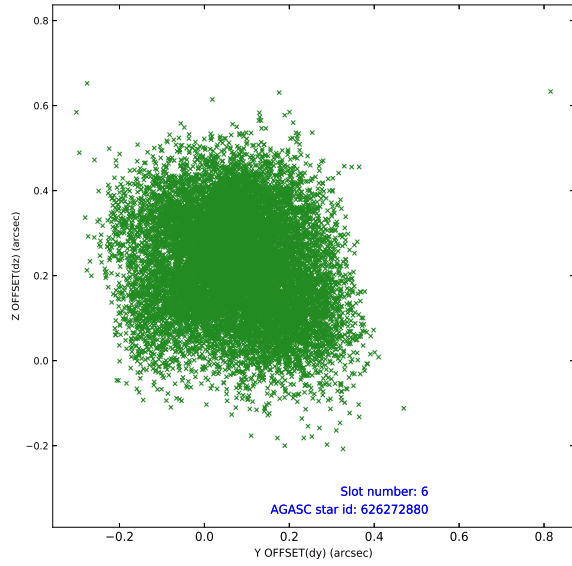
### 2.4.3 Slot 5



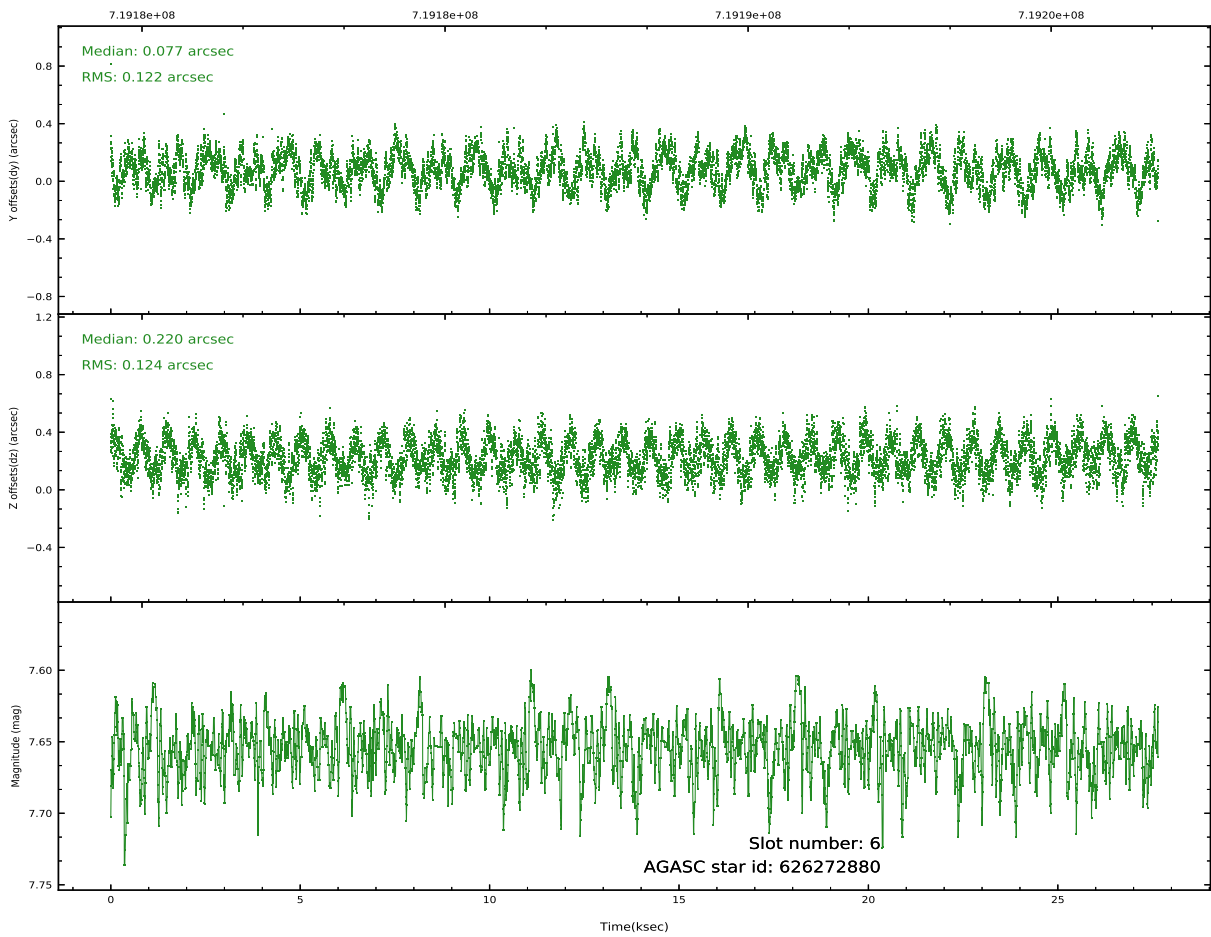
Time (s)



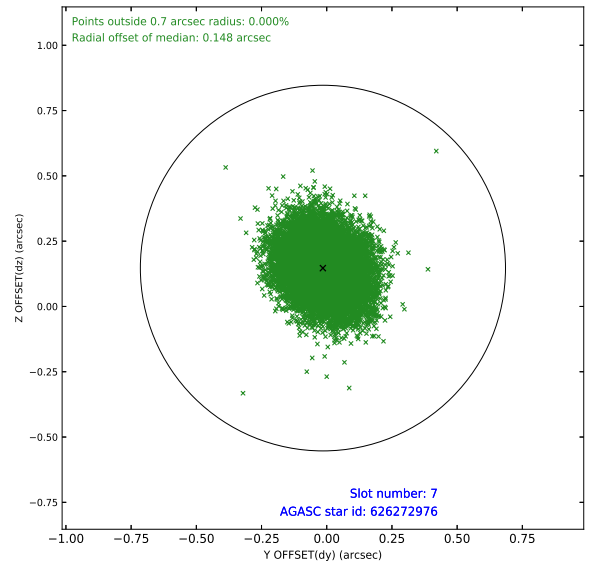
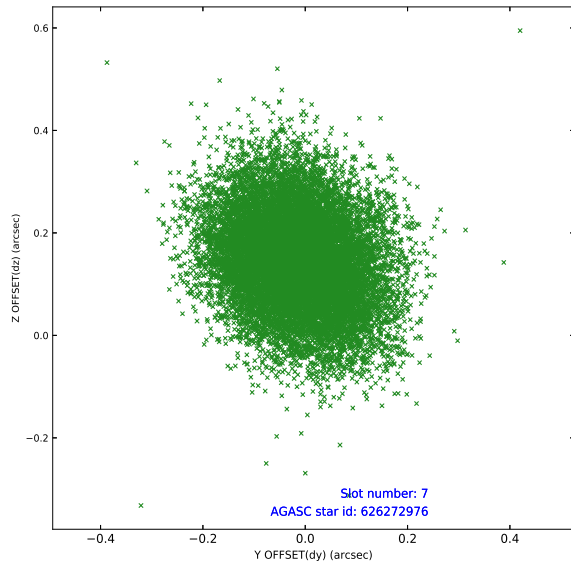
## 2.4.4 Slot 6



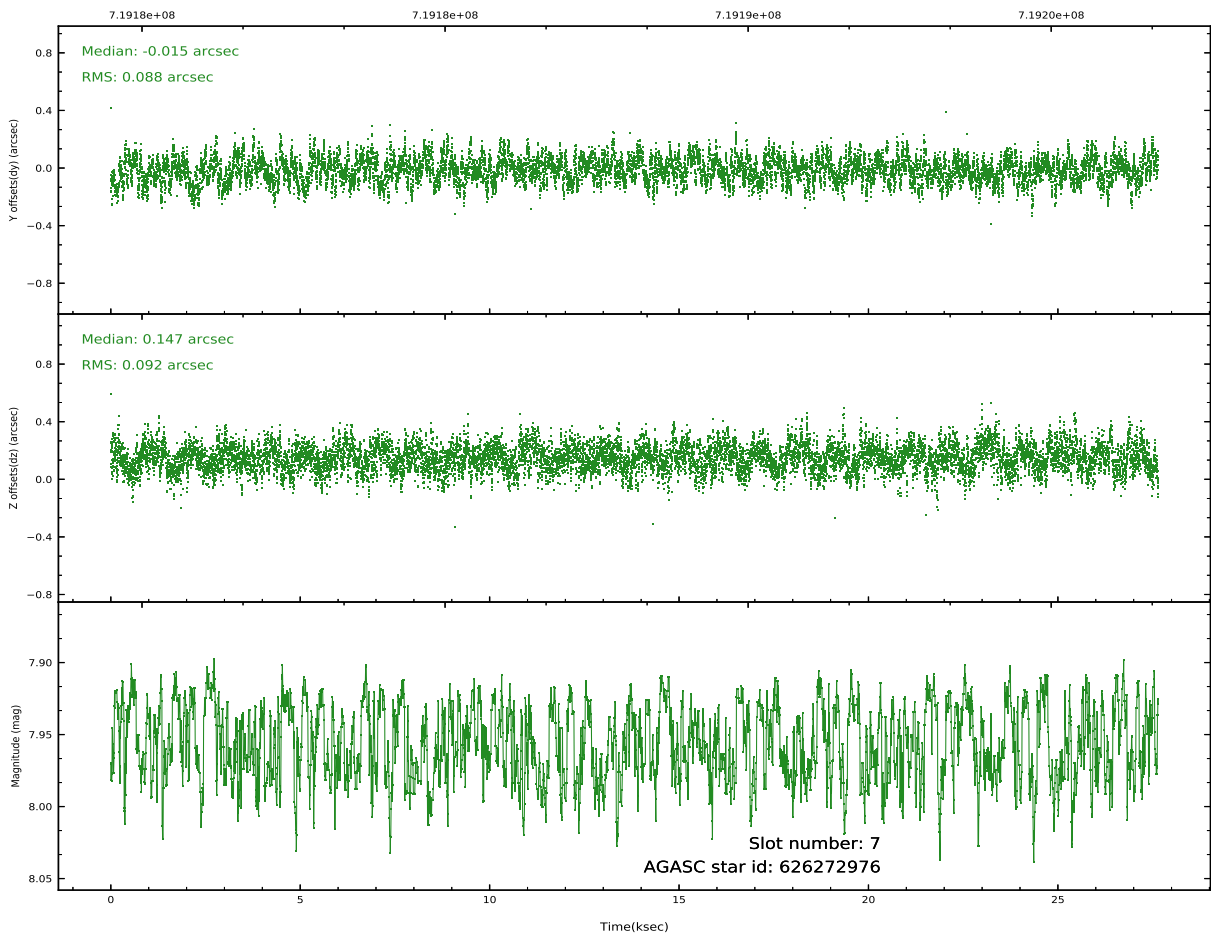
Time (s)



## 2.4.5 Slot 7

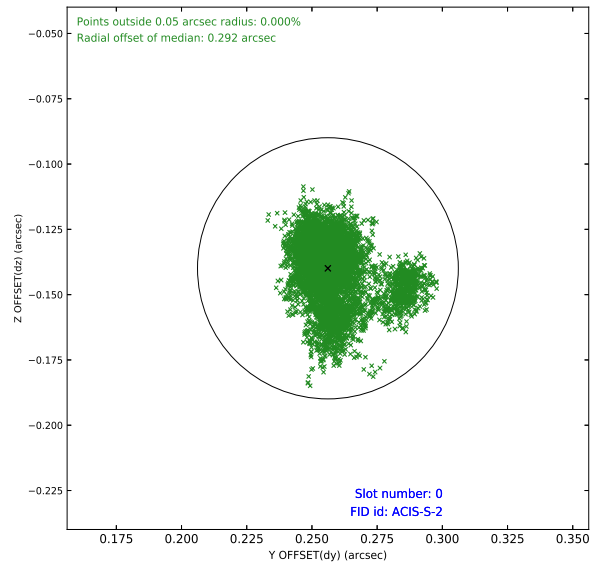
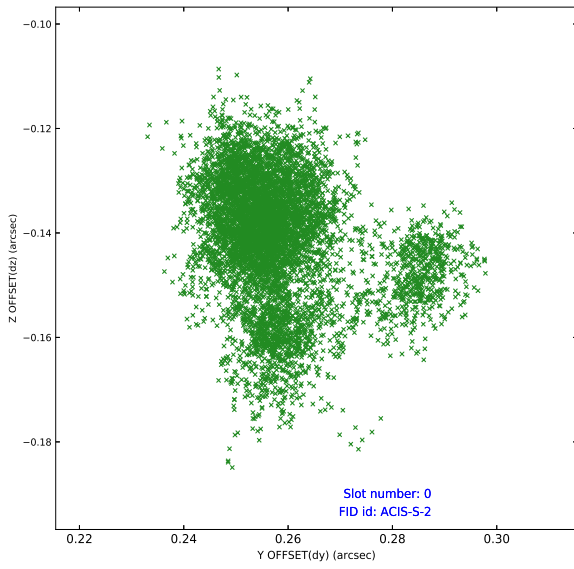


Time (s)

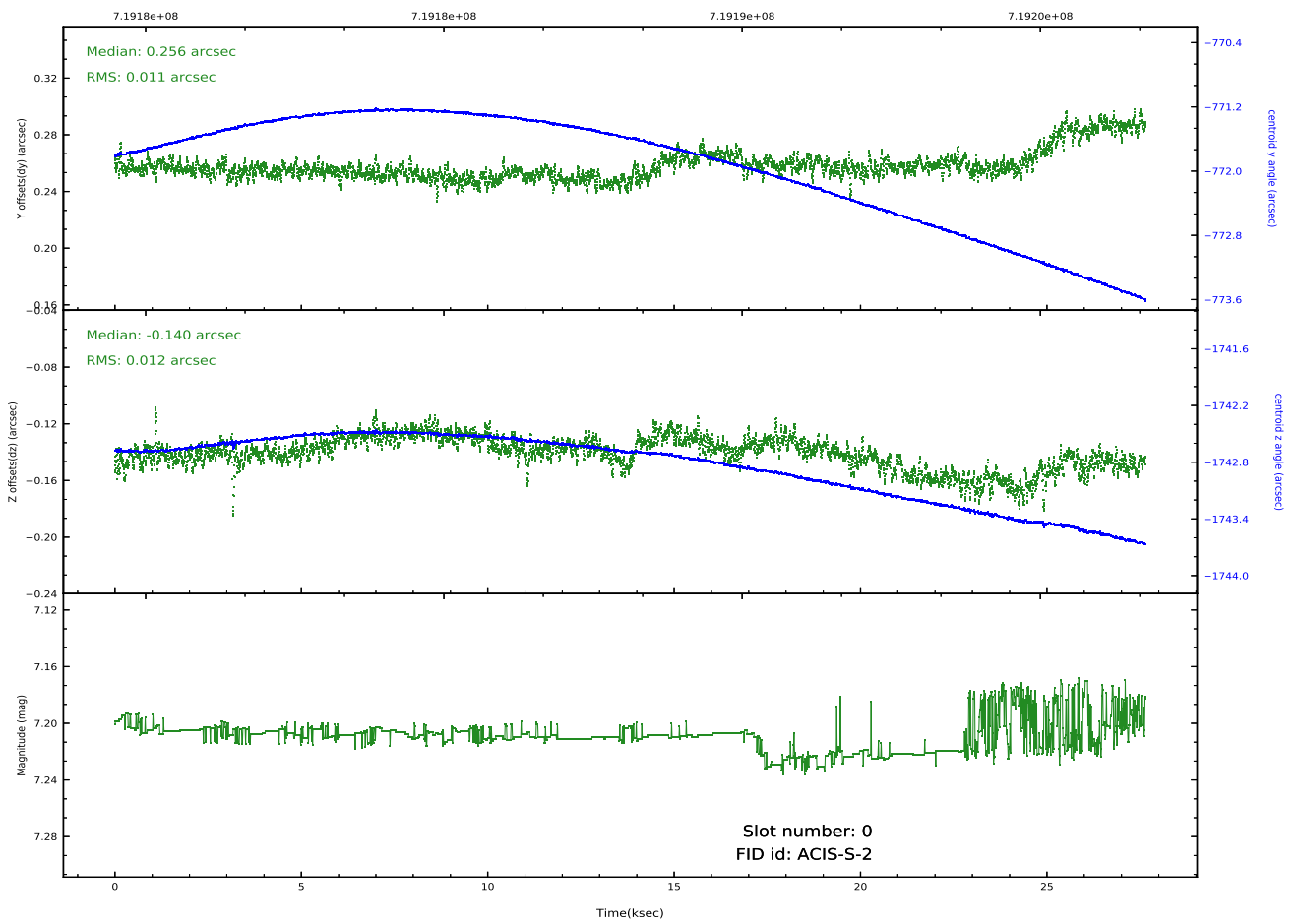


## 2.5 FID Slots

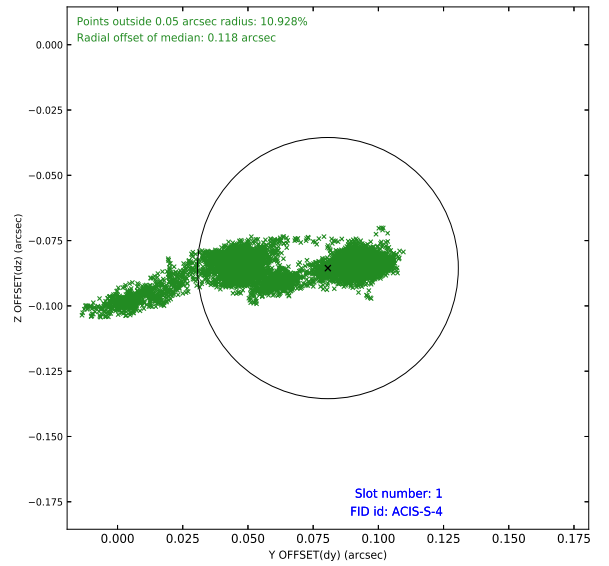
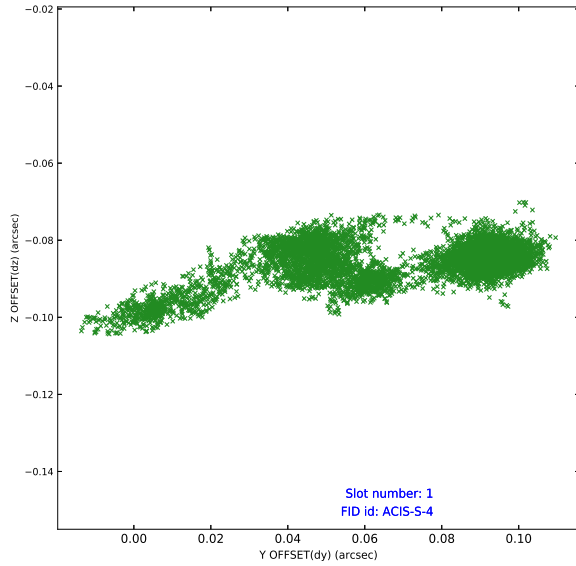
### 2.5.1 Slot 0



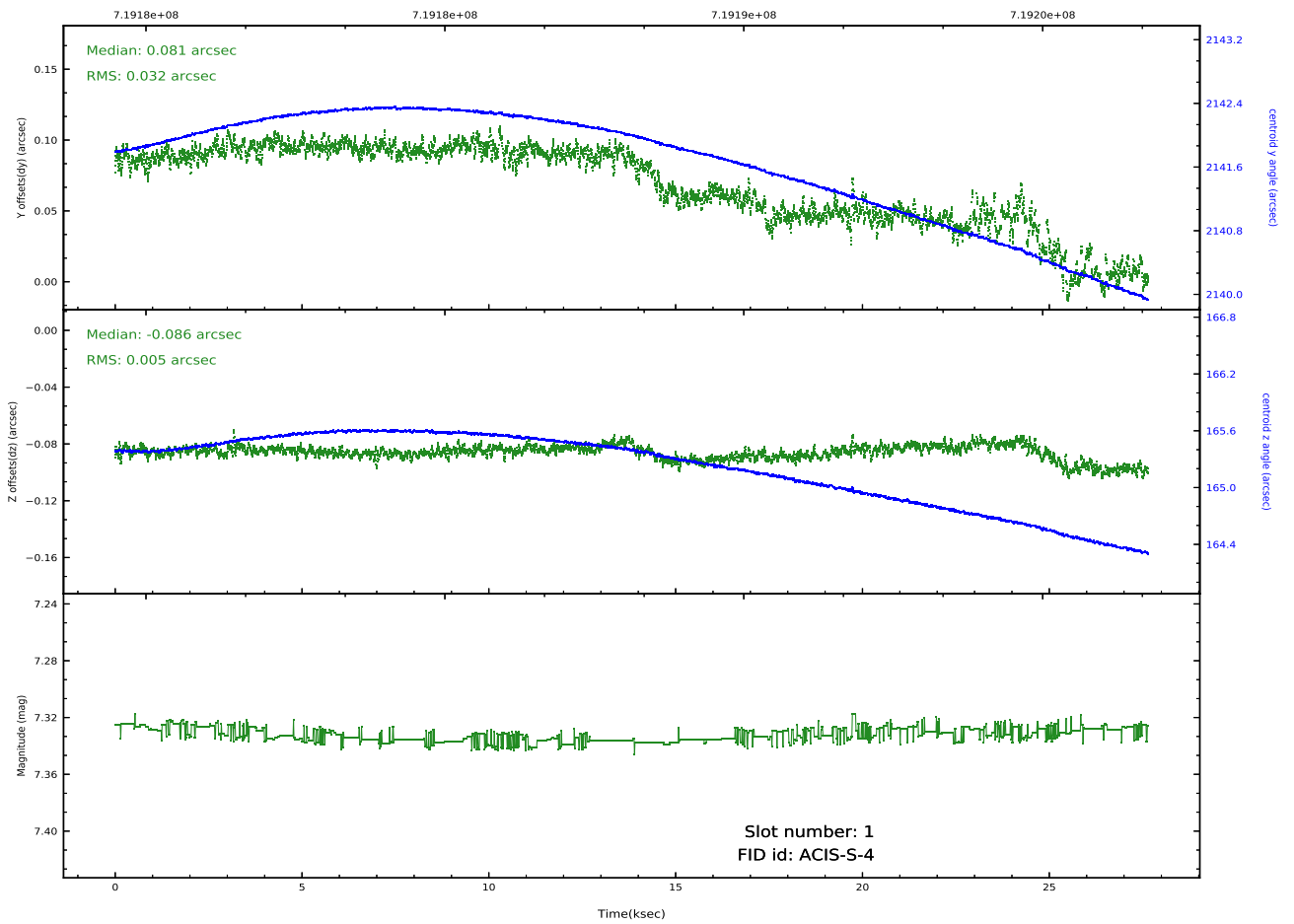
Time (s)



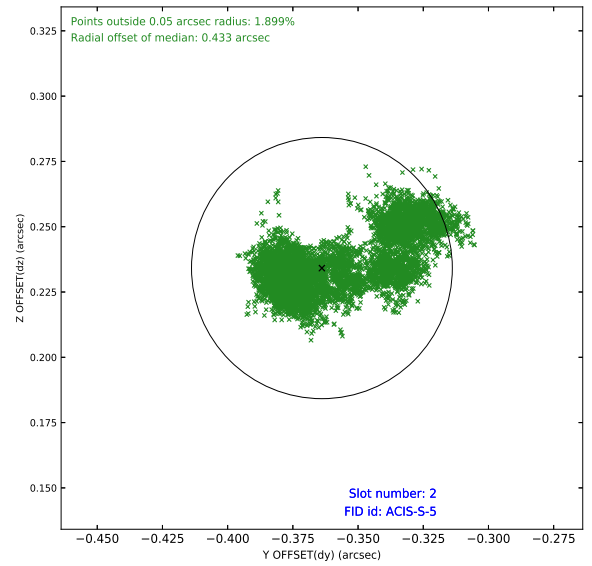
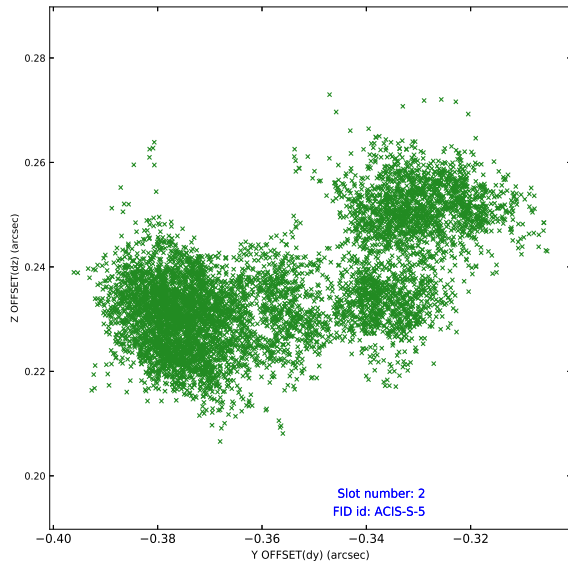
## 2.5.2 Slot 1



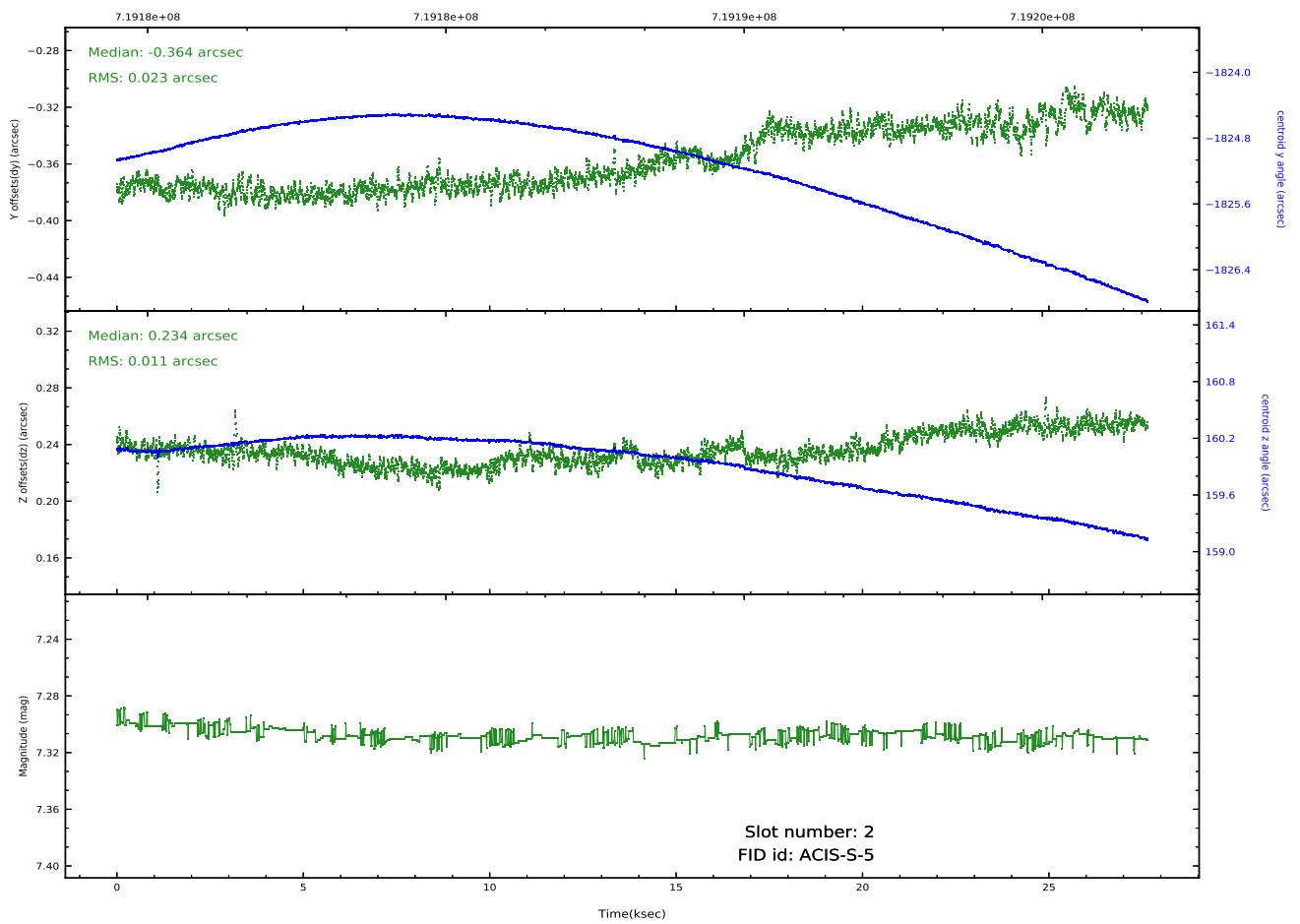
Time (s)



### 2.5.3 Slot 2



Time (s)

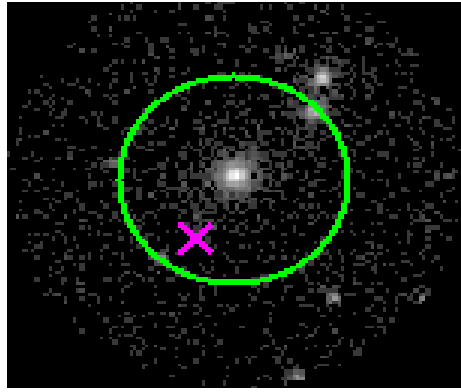


### 3 Gratings

#### 3.1 HEG Arm



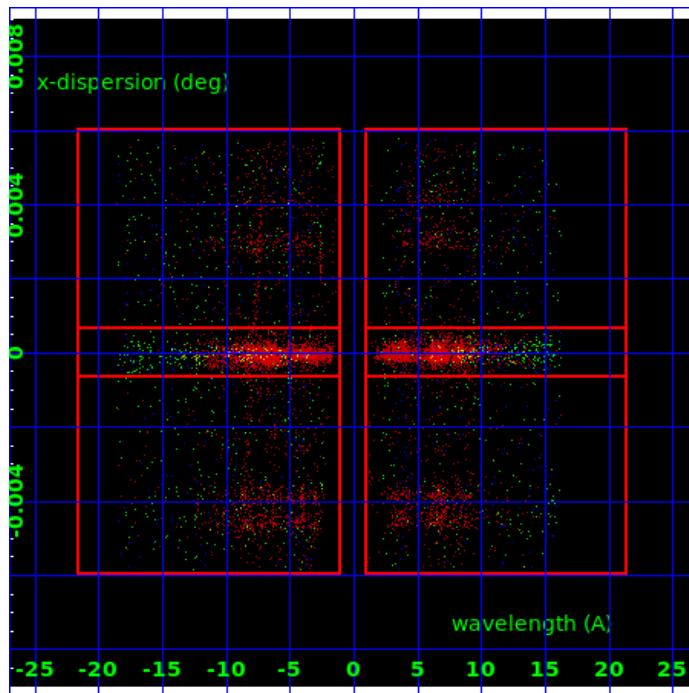
HEG Order Sort 123



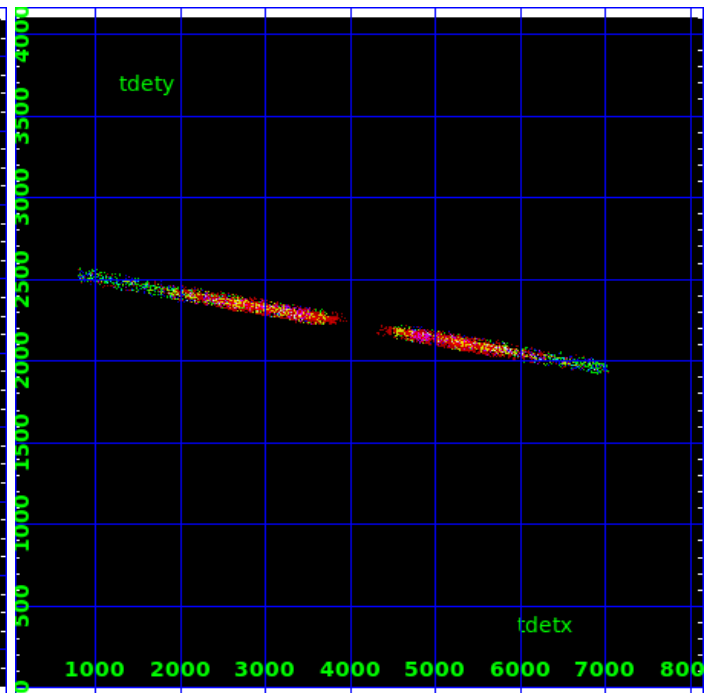
HEG Zero Order



HEG Order Sort ALL

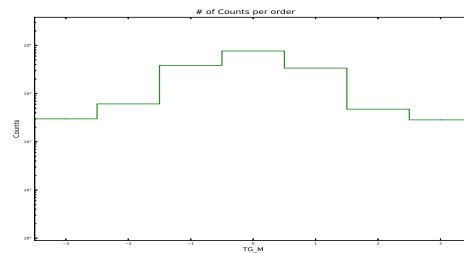


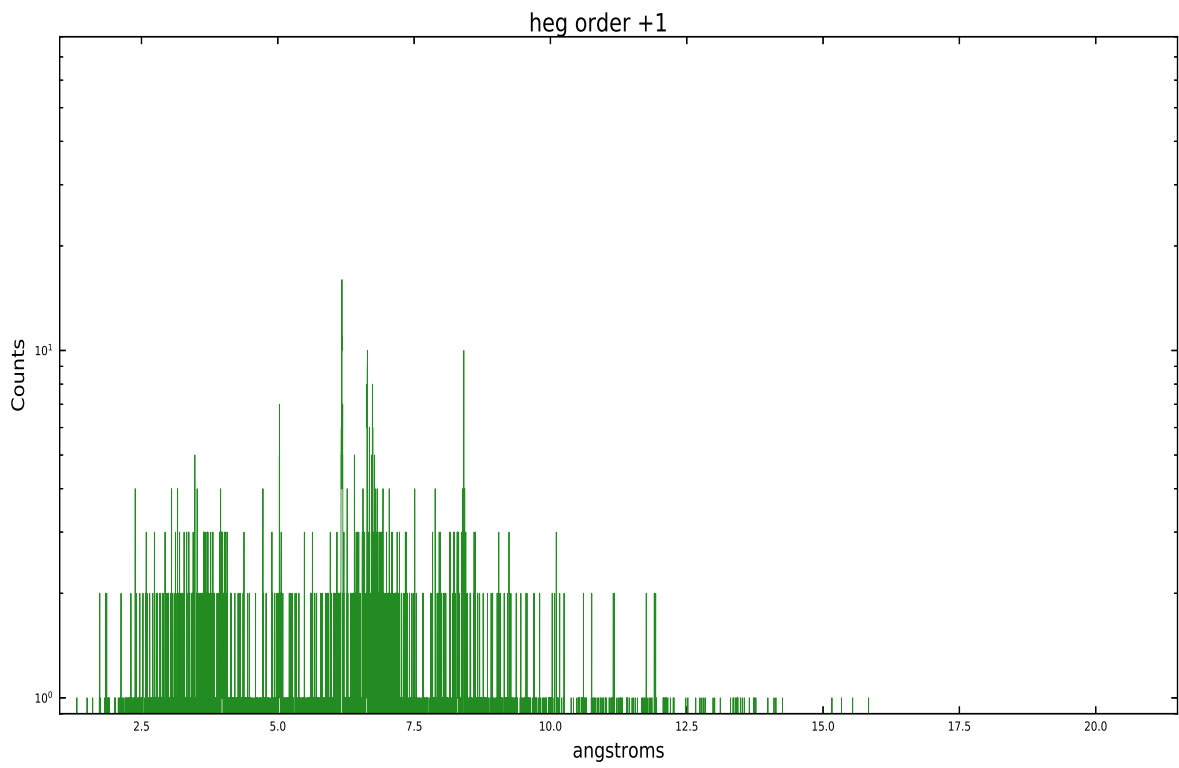
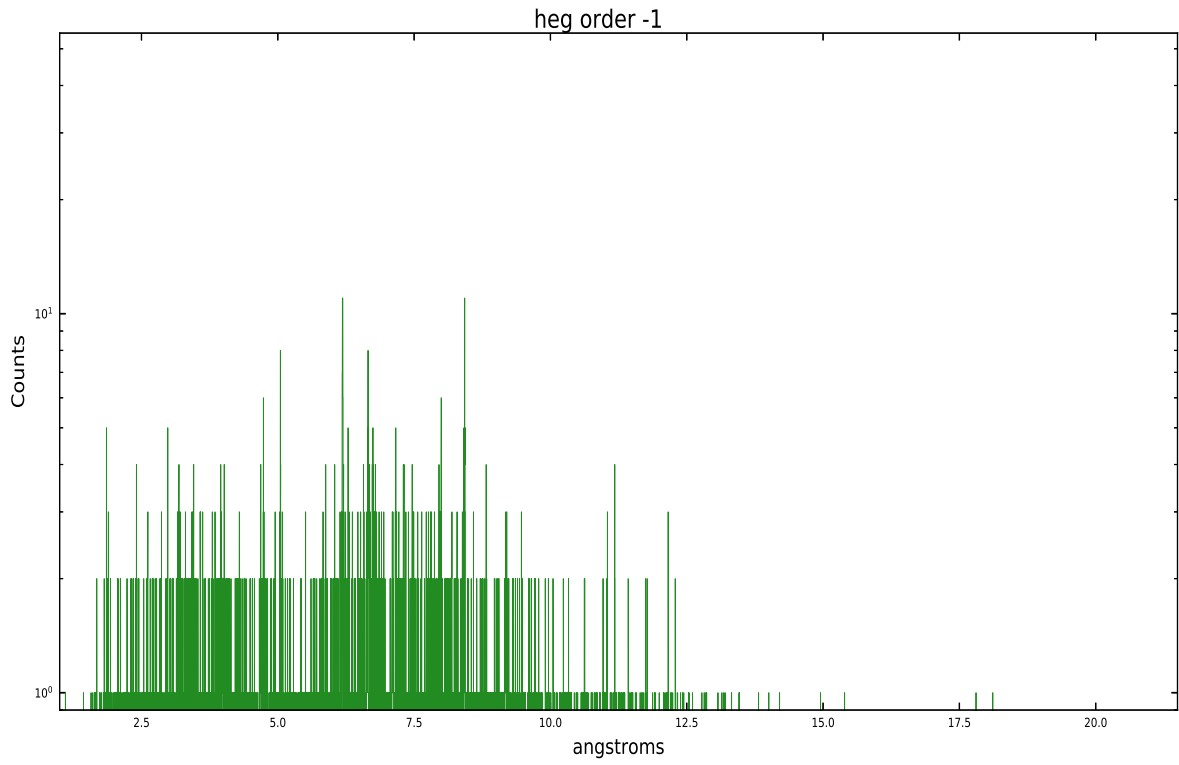
Spot Image HEG



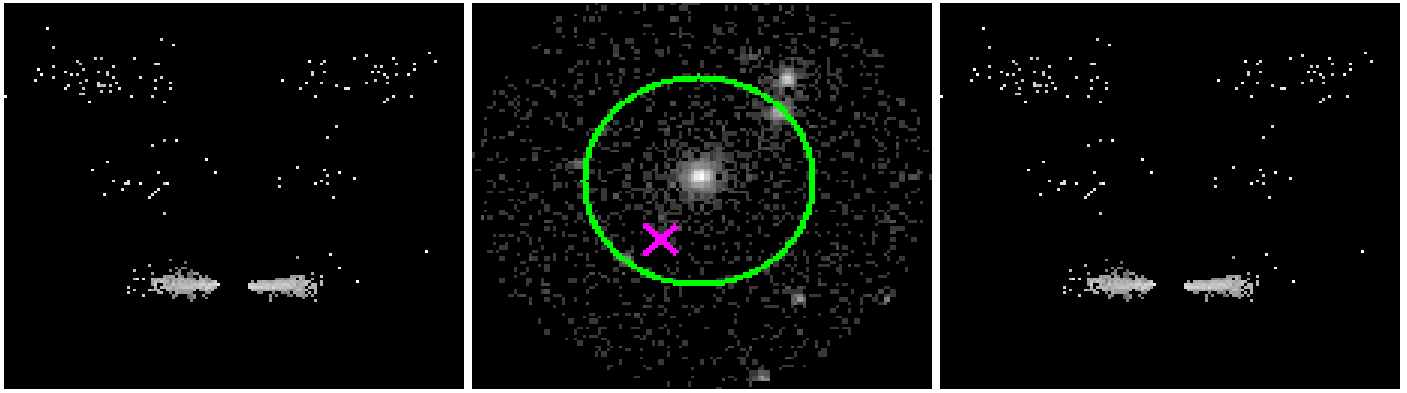
Full Detector HEG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	299	611	3845	7651	3380	475	285





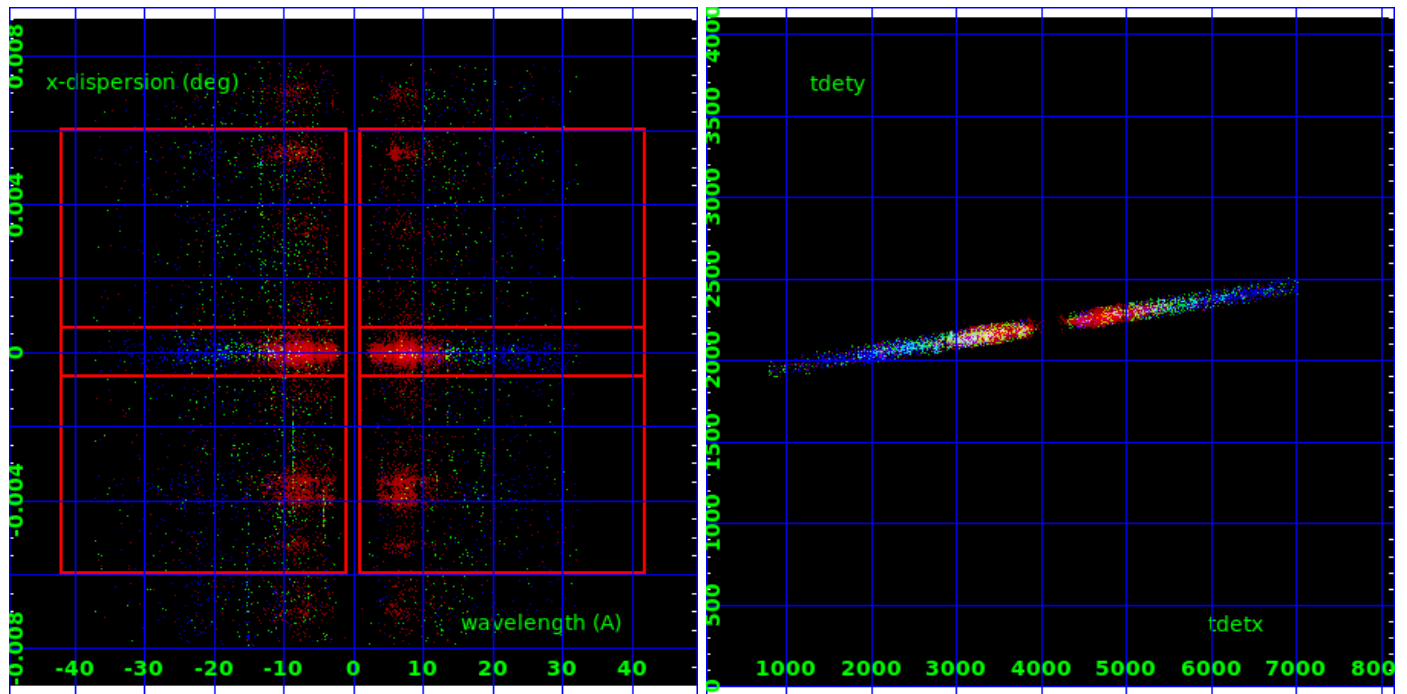
### 3.2 MEG Arm



MEG Order Sort 123

MEG Zero Order

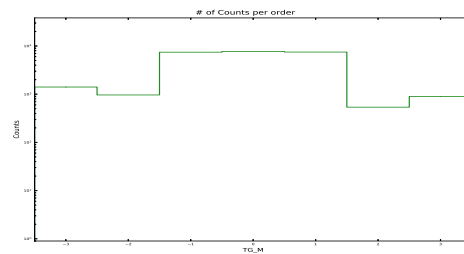
MEG Order Sort ALL

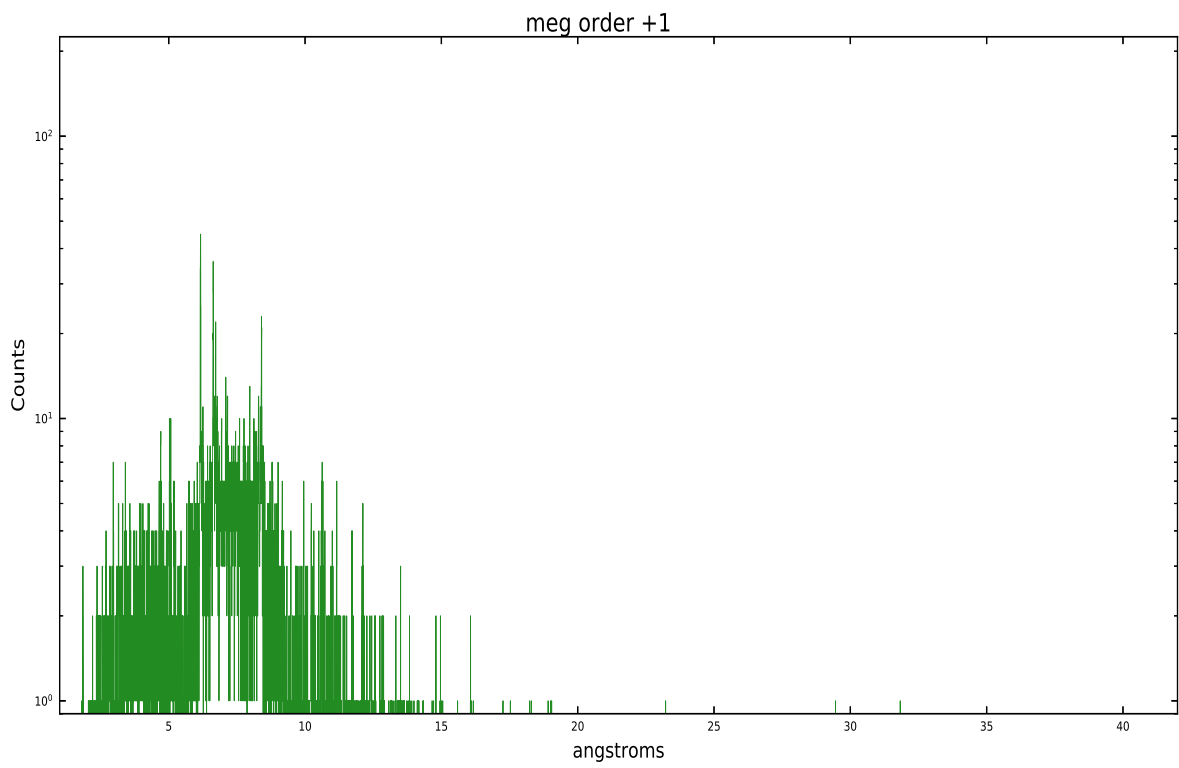
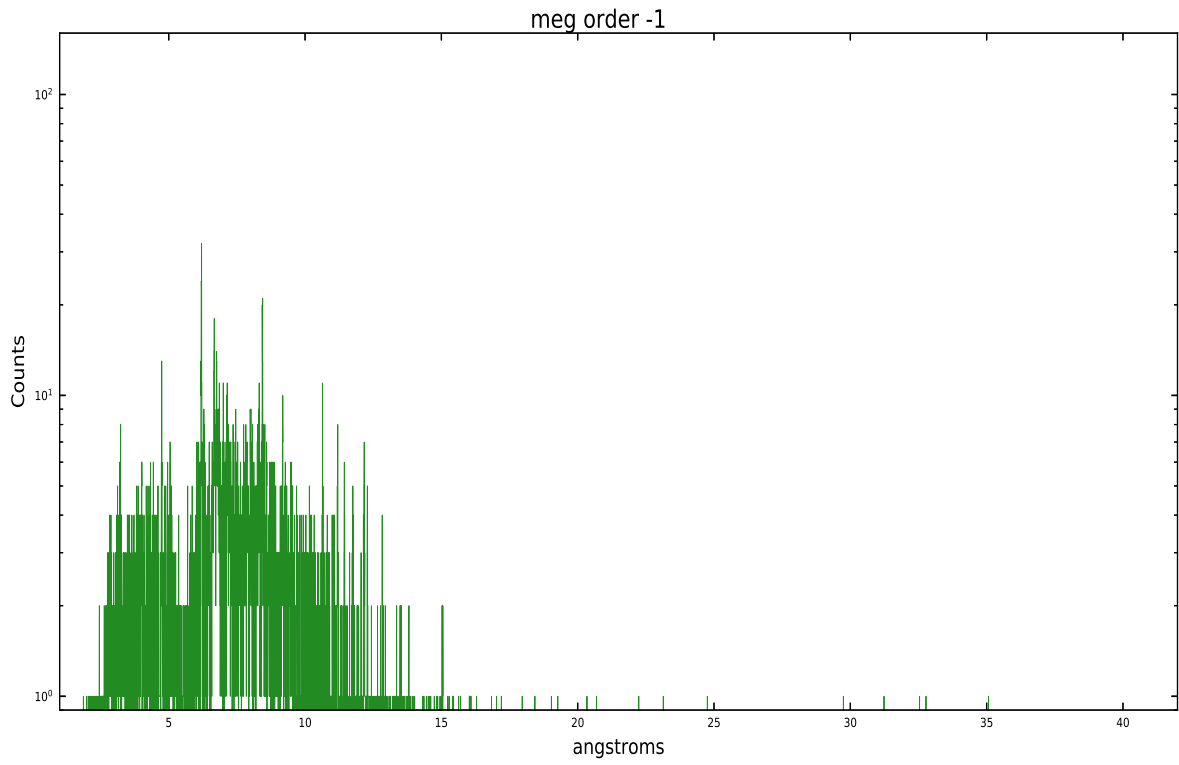


Spot Image MEG

Full Detector MEG

	order	order	order	order	order	order	order
	-3	-2	-1	0	1	2	3
Events	1408	964	7439	7651	7482	538	895





# A Summary

## A.1 Status

V&V Scientist	Melania Nynka
V&V Date (YYYY-MM-DD)	2020.10.19
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	26.943837353945

## A.2 Comments

The focal plane temperature during the interval 719178083.62 - 719183885.22 (MET s) of this observation was warmer than the upper limit for optimum calibration of the ACIS gain and spectral resolution (i.e., -111.0 C for ACIS-S).

The Chandra calibration team calibrates the ACIS gain and spectral resolution using data from the external calibration source (ECS). ECS data show that the frontside-illuminated (FI) CCDs are more temperature sensitive than the backside-illuminated (BI) CCDs.

A summary of the current calibration status of the ACIS gain and spectral resolution can be found at:

[http://asc.harvard.edu/cal/Acis/Cal\\_prods/Gain\\_and\\_Spectral\\_Resolution/ACIS\\_response\\_summary.html](http://asc.harvard.edu/cal/Acis/Cal_prods/Gain_and_Spectral_Resolution/ACIS_response_summary.html)

The main points are:

- 1) The gain on BI chips remains within 0.3% (i.e., the systematic uncertainty in the ACIS gain quoted on the Chandra Calibration Status Summary web page) at all measured temperatures.
- 2) The gain on FI chips remains within 0.3% below row 600 at all measured temperatures.
- 3) The gain on FI chips above row 600 can be underestimated by as much as 1% for focal plane temperatures exceeding -116 C.
- 4) The spectral resolution (i.e., FWHM) on BI chips is insensitive to the focal plane temperature.
- 5) Warmer focal plane temperatures increase the FWHM on FI chips by up to 30 eV near row 512 and by up to 70 eV near the top of the chips.

In summary, the user should be cautious in the spectral analysis of high S/N emission lines detected on the top half of FI chips in this observation. Default processing with the current version of the CALDB will underestimate photon energies by up to 1% and broaden emission lines by up to 70 eV.