Progress Report

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1 Column Profiles

Much of the week was spent trying to find stars to perform an analysis on. To do this I continue to view nights in at most three hour chunks. However, one of the big problems for locating stars is they tend to radiate at about 300-500 counts per bin. Unfortunately on most nights clouds will radiate at about the same rate, which means stars are essentially indistinguishable from background noise. Again, I can't see any shortcuts to expedite the process besides physically examining data a night at a time. I have started to produce tables of Gaussian values. Although the plots produce last week were decent, they contained a lot of noise. Playing around to get the best results I found averaging the column counts over the star flattened the noise and tended to produce a smoother Gaussian shape. I think this will provide the most accurate method for pinpointed exact transit times and locations of stars.

Date	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011	11-30-2011		11-28-2011	11-28-2011	11-28-2011	11-28-2011	11-28-2011	11-28-2011	11-28-2011	11-28-2011
Hour (i)/Filter	9/0	9/0	9/0	9.1	9.2	9.3	9.4	9.5	9.6	9.7		9/0	9.1	9.2	9.3	9.4	9.5	9.6	9.7
Row range (k)	32-55	32-55	32-55	32-55	32-55	32-55	32-55	32-55	32-55			48-68	48-68	48-68	48-68	48-68	48-68	48-68	48-68
Col range (j)	310-336	315-330	314-334	314-334	314-334	314-334	314-334	314-334	314-334	314-334		298-318	298-318	298-318	298-318	298-318	298-318	298-318	298-318
Gaussian Parameters																			
A0	46.9614	47.0785	50.0343	43.9033	46.5495	52.8377	56.6345	42.8709	3.98432	37.0897		35.5183	37.3161	31.5774	41.5888	41.4903	43.7302	30.51	31.4729
A1	13.6536	8.77097	9.6689	9.32526	9.38845	9.37666	9.0769	8.18939	7.93344	8.42184		10.5523	10.7422	10.3358	10.5202	10.1695	10.2669	9.56202	9.90132
A2	2.39609	2.5301	2.52021	2.7992	2.58552	2.98548	2.5263	2.61528	2.1278	2.37228		2.39741	2.62109	2.87027	2.65224	2.65306	3.23211	7.37213	2.49481
A3	221.915	219.824	223.221	101.527	128.513	133.693	132.577	136.163	70.8551	83.349		196.5	113.635	126.965	129.883	151.42	149.305	41.1075	114.666
A4	-0.340514	0.71078	-0.974748	-1.67229	-1.96053	-4.27084	-1.45496	-2.64506	0.41628	-0.0392419		-0.333711	-2.36444	-2.02428	-2.80025	-0.613051	-4.41178	-2.33494	0.477665
A5	0.0486994	-0.00387993	0.0986428	0.0657746	0.0955445	0.216157	0.0578357	0.114923	-0.00912939	0.0168635		0.0434345	0.0921692	0.0982687	0.134171	0.0299937	0.204209	0.134119	0.00335584
FWHM	5.642360762	5.957930196	5.934641026	6.59161227	6.088434323	7.030268148	5.94898188	6.158513767	5.010586092	5.586292496		5.645469124	6.172195272	6.758969331	6.245547916	6.247478869	7.611037416	17.3600395	5.874828597
Max Count	271.957	271.957	271.957	133.174	163.087	166.261	178.174	168.913	77.7826	121		234.333	134.952	146.619	156.19	187.429	169.714	66.3333	150.857

Date	11-26-2011		11-26-2011		11-26-2011		11-26-2011		11-26-2011		11-26-2011		11-26-2011		11-26-2011	
Hour (i)/Filter	9/0		9.1		9.2		9.3		9.4		9.5		9.6		9.7	
Row range (k)	65-85		65-85		65-85		65-85		65-85		65-85		65-85		65-85	
Col range (j)	317-340		317-340		317-340		317-340		317-340		317-340		317-340		317-340	
Gaussian Parameters		Sigma		Sigma		Sigma		Sigma		Sigma		Sigma		Sigma		Sigma
A0	50.1707	2.7175	47.6703	4.42323	58.507	3.85272	56.4609	4.10361	61.3673	5.97989	42.1541	3.14037	7.18895	1.40493	42.6188	4.47476
A1	11.4277	0.100363	11.5682	0.164487	11.3767	0.110007	11.6076	0.1331	11.2445	0.16248	10.9158	0.141692	10.1723	0.320863	10.7526	0.183507
A2	2.37667	0.154053	2.59709	0.273432	2.84963	0.197419	2.39529	0.207357	2.94585	0.294808	2.49137	0.218511	1.59991	0.388566	3.00384	0.321696
A3	181.948	2.25953	98.37	3.43812	119.942	2.62796	126.642	3.41875	126.949	3.90583	132.718	2.48184	78.4012	1.17259	81.6862	2.85841
A4	-0.403617	0.670779	-1.72579	1.10988	-3.66349	0.939918	-3.03994	1.02461	-2.13191	1.43092	-1.22191	0.75342	0.250458	0.264825	-1.06942	1.01567
A5	0.0217032	0.0273871	0.0512464	0.0453627	0.153963	0.0388516	0.117185	0.041666	0.0732607	0.0595264	0.0376969	0.0312766	-0.00428132	0.0107789	0.0570921	0.0430437
FWHM	5.596630156		6.115679591		6.710365845		5.640476906		6.93694663		5.866728016		3.767500138		7.073502644	
Max Count	229.429	15.15	132.81	11.52	156	12.49	163.095	12.77	170.238	13.05	164.333	12.82	88.0476	9.38	124.381	11-28-2011

Figure 1: The location and Gaussian parameters of a sample star over several nights. This also compares the different filters for the same star. The most pronounced of all filters was the red (0) filter, demonstrated by consistently having the highest peak counts.

2 Row Profiles

After talking to you we discussed trying to take some profiles of Jupiter, as it radiates at a much higher rate than a star from our perspective. The downside is planets move much, much quicker than a star in our sky. However, I wrote a code that allows a user to fairly easily produce an averaged row
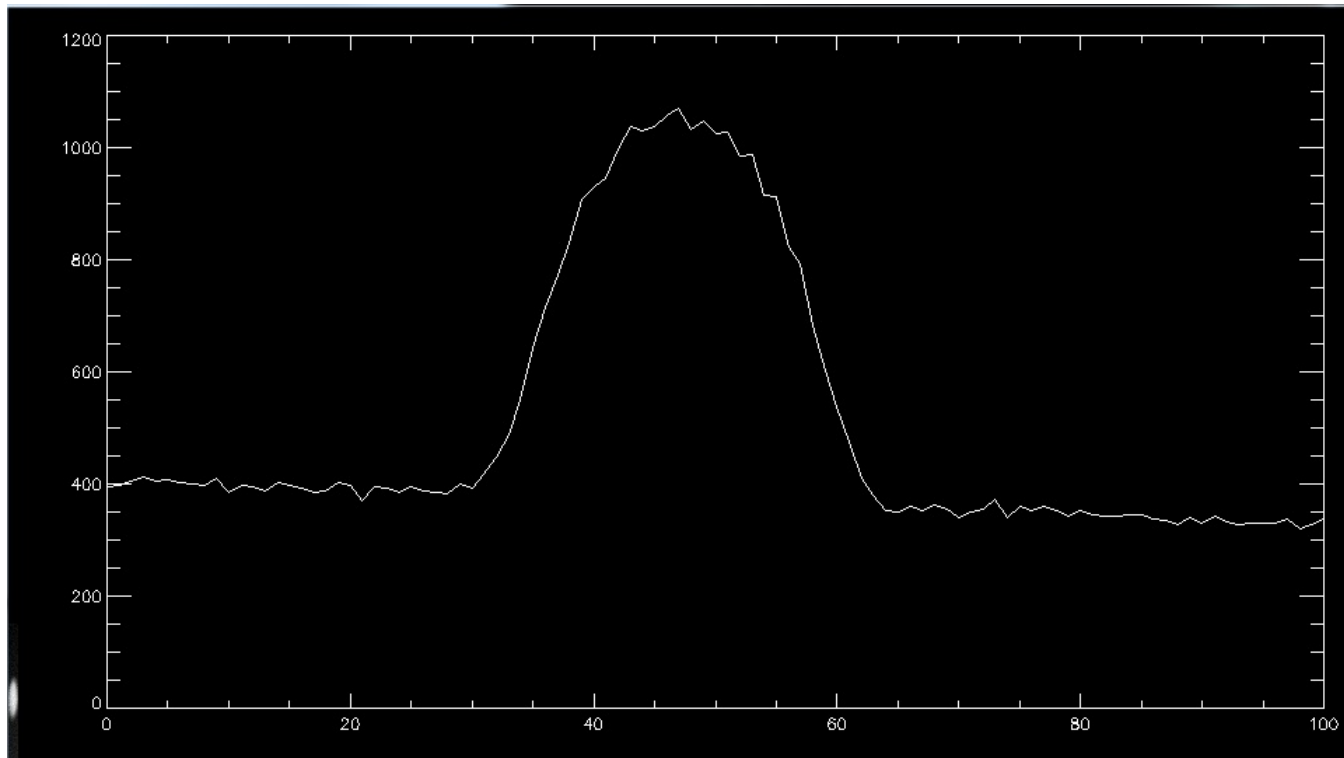
Figure 2: This is an averaged row profile of Jupiter from November 6, 2011. The same data was used to produce the image in the bottom left corner of the figure. It is very much a Gaussian shape, and as discussed above the averaging process tends to smooth the background noise considerably. Note that even in this plot the background is radiating around 400 counts/bin

profile of any section in the sky. It is quite robust in handling different sizes (heights,widths) of an image you wish to produce an averaged row profile, so much so that once an object is found it is a few clicks to get all of the information displayed in the spreadsheets. It helped to have a very similar script for the column profiles, and allowed me to touch up a few things that were inefficient or just annoying about the code I used for the column profiles. I am eager to start producing similar row profiles of the stars. Of course, the main bottleneck right now is finding them.

3 Future Considerations

I want to get several more row profiles of Jupiter, and at the same time produce an averaged column profile of several nights to compare. However, the end goal is to find stars from several nights and apply the same process. As discussed, Jupiter is a good place to start to make sure the methodology is sound and we're getting the information we want out of the data. So again, I plan on spending most of my week tracking down the same star on different nights and continue to add to my data spreadsheets. As well, I would like to touch up my code for my column profile script with some tricks I learned for the row profile code.

Date	11-16-2011		11-13-2011		11-06-2011	
Hour(i).Filter	5/0		0.6		(6-7)/0	
Rows Averaged	0-100		20-118		90-190	
Column Range (j)	317-323		318-324		276-282	
Gaussian Paramaters		Sigma				
A0	125.434	11.5426	619.661	13.2779	771.384	13.8112
A1	45.6783	0.549504	56.2223	0.165915	48.062	0.136319
A2	14.1237	1.15402	8.39889	0.226964	8.3671	0.189019
A3	601.134	5.23765	1016.26	11.8698	418.498	11.2819
A4	-0.0308354	0.587109	-4.04428	0.758579	-2.60806	0.744019
A5	-0.00797796	0.00605132	0.012146	0.00723694	0.0185772	0.00732163
FWHM	33.25877187		19.77787453		19.7030148	
Max Count	720		1414		1068.86	
Min Count	510.714		729.714		319.571	

Figure 3: The parameters needed to produce an averaged row profile of Jupiter on different nights. As seen above, the different nights appear to have some very different parameters, particularly the night of the 16th.