Data Validation (DV) Report
for TESS ID 116264089
Sectors 25 - 26

**This Data Validation Report was produced in the
TESS Science Processing Operations Center (SPOC) Pipeline
at NASA Ames Research Center**

02-Aug-2020 22:02:04 Z

Contents

1 Summary

Target Properties	Value	Uncertainty	Units	Provenance
Catalog ID	116264089			
TOI ID	-			
TESS Name	-			
RA	268.02924377	0	degrees	TIC8
Dec	37.54617695	0	degrees	TIC8
Magnitude	11.7213	0.0062		TIC8
Radius	0.820	0.049	Solar radii	TIC8
Effective Temperature	5489	139	Kelvin	TIC8
log(g)	4.593	0.088523	cm/sec^2	TIC8
[M/H]	-0.240	0.1	Solar metallicity	TIC8
Stellar Density	1.744	0.370	Solar density	TIC8-Derived
Limb Darkening Coefficient 1	0.55544			
Limb Darkening Coefficient 2	-0.12465			
Limb Darkening Coefficient 3	0.532			
Limb Darkening Coefficient 4	-0.29106			
Number of Planet Candidates	1			
TOI Model	csv-file-toi-catalog-07-29-20-edited.csv			
TESS Names Model	-			
External TCE Model	-			
Software Revision	spoc-5.0.5-20200728			
Date Report Generated	02-Aug-2020 22:02:04 Z			

Sector	Target Table	Camera/ CCD	Crowding Metric	Flux Fraction
25	245	2:4	0.9585	0.8347
26	254	2:3	0.9527	0.8177

Planet Candidate	TOI ID	TESS Name	TOI Correlation	Period (days)	Period Ratio	Epoch (BTJD)	Semi-major Axis (AU)	Radius (Re)	Seff	Teq (K)	False Alarm	Suspected EB
1	-	-	-	1.306	1.00	1984.840	0.02	15.0	1025.5	1443	0.00e+00	false

2 Survey Image

Digitized Sky Survey (DSS) red image. The 5' x 5' image is centered on the J2000 coordinates of target (116264089).

3   Flux Time Series

Summary plot of sector-stitched flux time series and transits for target 116264089, marked with DV fitted epoch/period (or TPS epoch/period if fit was not successful). Transits of identified planets are labeled with epoch BTJD and orbital period. For the data of sector 25, target table 245, start BJD is 2458983 and the vertical offset is 0 ppm. For the data of sector 26, target table 254, start BJD is 2459010 and the vertical offset is 100000 ppm.
Open `./summary-plots/0000000116264089-00-flux-dv-fit-25-245.fig`

Summary plot of raw flux time series. For the data of sector 25, target table 245, start BJD is 2458983 and the vertical offset is 0 electrons/cadence. For the data of sector 26, target table 254, start BJD is 2459010 and the vertical offset is 17000 electrons/cadence.
Open ./summary-plots/0000000116264089-00-raw-flux-25-245.fig

4   Dashboards

Planet Candidate 1

Model Fitter	**Stellar Radius** 0.8 ± 0.0 Solar units	**Core Aperture Correlation Statistic** Value = 110.56 Significance = 100.00%	Ghost Diagnostic Test
	Period = 1.3 ± 0.0 days Depth = 25021 ± 249 ppm Planet Radius = 15.0 ± 0.9 Earth radii Semi-major Axis = 0.0 ± 0.0 AU Effective Stellar Flux = 1025.5 ± 178.7 Equilibrium Temperature = 1443 ± 63 Kelvin Chi-squared/DoF = 0.8 SNR = 190.1	**Halo Aperture Correlation Statistic** Value = 19.23 Significance = 100.00% **Core/Halo Ratio** Ratio = 5.75	
Eclipsing Binary Discrimination Test	**Odd-Even Depth Comparison Statistic** Value = 6.64e-01 Significance = 41.53%	**Offsets Relative to Out of Transit Centroid** Source RA Offset = 8.26e-01 ± 2.51e+00 arcsec (0.33 σ) Source Dec Offset = 9.74e-01 ± 2.52e+00 arcsec (0.39 σ) Source Offset Distance = 1.28e+00 ± 2.53e+00 arcsec (0.51 σ) **Offsets Relative to TIC Position** Source RA Offset = 2.69e-02 ± 2.51e+00 arcsec (0.01 σ) Source Dec Offset = -8.25e-02 ± 2.51e+00 arcsec (-0.03 σ) Source Offset Distance = 8.67e-02 ± 2.51e+00 arcsec (0.03 σ)	Difference Image Centroid Offsets
	Shorter Period Comparison Statistic Value = N/A Significance = N/A — **Longer Period Comparison Statistic** Value = N/A Significance = N/A	False Alarm = 0.00e+00 Transit Count = 39 Max Multiple Event Statistic = 188.8	Bootstrap Test

Summary of model fitter results and validation test results for target 116264089, planet candidate 1. In general, green denotes that the candidate is likely a planet, while red denotes that the candidate is unlikely to be a planet. Cyan denotes that no data is available. The color of the Model Fitter block is: green, when the SNR of the fit is greater than or equal to 10; yellow, if the SNR is greater than or equal to 7.1 but less than 10; red, if the SNR is less than 7.1 or if the fitter failed. The color of the Ghost Diagnostic Test and Eclipsing Binary Discrimination Test blocks are: green, when the significance is within 2-sigma; yellow, when the significance is between 2- and 3-sigma; red when the significance is greater than 3-sigma. The color of the Difference Image Centroid Offsets block is: green, when the max offset distance sigma is less than or equal to 2; yellow, when the max sigma is between 2 and 3; red when the max sigma is greater than 3. The color of the Bootstrap Test block is green whenever the false alarm probability is less than 10^{-12}, low enough to limit the total number of false alarms from a four year mission to less than one. If the false alarm probability is greater than 10^{-12}, the color of the Bootstrap Test block is: green, when the false alarm probability is less than or equal to the CCDF of a Gaussian distribution at the observed maximum multiple event statistic; yellow when the false alarm probability is between 1 and 2 times that of a Gaussian distribution at the max multiple event statistic; and red when the false alarm probability is more than 2 times that of a Gaussian distribution at the max multiple event statistic.

5   Pixel Level Diagnostics

To reduce clutter, the catalog IDs in the difference images have been replaced by indices representing distance from the target star. The mapping between the indices and the catalog IDs is found in a table at the end of this section.

5.1   Planet Candidate 1
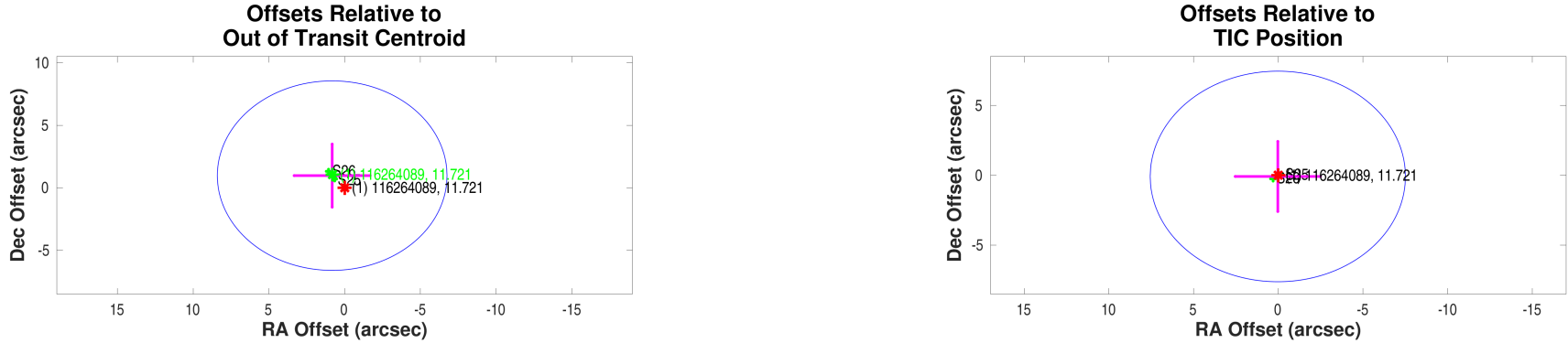
Multi-Sector Average PRF Fit of the Difference Images

Mean offset from the PRF fit to the out of transit image

	RA	Dec	Units
Offset	$0.8263 \pm 2.51e + 00$	$0.9744 \pm 2.52e + 00$	arcseconds
Offset/σ	0.33	0.39	
Offset Distance	$1.2776 \pm 2.53e + 00$		arcseconds
Offset Distance/σ	0.51		
3σ Radius	7.5807		arcseconds

Mean offset from the TIC RA and Dec

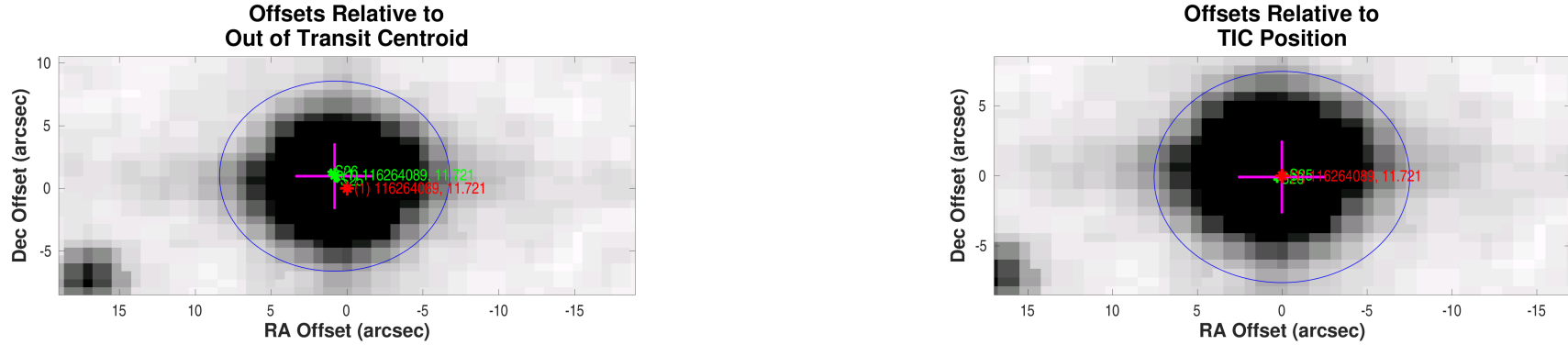|	RA	Dec	Units
Offset	$0.0269 \pm 2.51e + 00$	$-0.0825 \pm 2.51e + 00$	arcseconds
Offset/σ	0.01	-0.03	
Offset Distance	$0.0867 \pm 2.51e + 00$		arcseconds
Offset Distance/σ	0.03		
3σ Radius	7.5372		arcseconds

Planet Candidate 1

Difference image centroid offsets for target 116264089, planet candidate 1. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TC coordinates of the given target. Symbol key: green cross: per sector centroid offsets with 1-sigma error bars in RA and Dec; magenta cross: robust weighted mean offset over all sectors with 1-sigma error bars in RA and Dec; blue circle: 3-sigma radius of confusion for weighted mean offset; red asterisk: location of target star (out-of-transit centroid in left panel and TIC position in right panel); green asterisk: TIC location of target star with respect to out-of-transit centroid; blue asterisk: location of other TIC objects in the neighborhood. TIC ID and magnitude are noted in the text associated with each marked object. A constant error term of 2.5000 arcseconds has been added in quadrature to the computed uncertainty in the RA and Dec components of the robust mean offset.
Open `./planet-01/difference-image/0000000116264089-01-difference-image-centroid-offsets.fig`
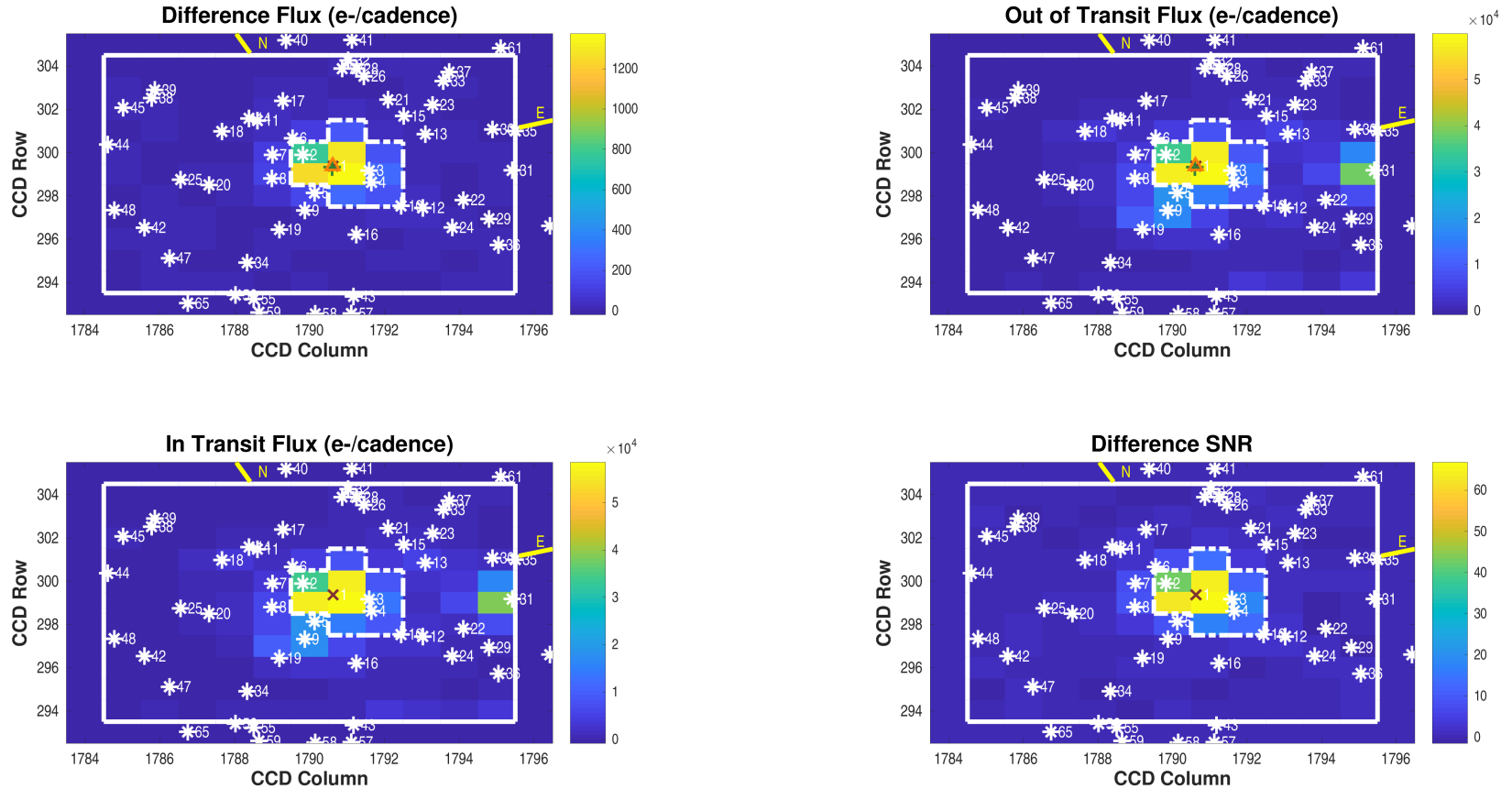
Planet Candidate 1

Difference image centroid offsets for target 116264089, planet candidate 1, diplayed on survey image for given target. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TIC coordinates of the given target. Symbol key: green cross: per sector centroid offsets with 1-sigma error bars in RA and Dec; magenta cross: robust weighted mean offset over all sectors with 1-sigma error bars in RA and Dec; blue circle: 3-sigma radius of confusion for weighted mean offset; red asterisk: location of target star (out-of-transit centroid in left panel and TIC position in right panel); green asterisk: TIC location of target star with respect to out-of-transit centroid; blue asterisk: location of other TIC objects in the neighborhood. TIC ID and magnitude are noted in the text associated with each marked object. A constant error term of 2.5000 arcseconds has been added in quadrature to the computed uncertainty in the RA and Dec components of the robust mean offset.

Open `./planet-01/difference-image/0000000116264089-01-difference-image-centroid-offsets-survey.fig`

Difference Image Summary Metrics

Number of Difference Images	Number of Metrics	Number of Good Metrics	Fraction of Good Metrics	Quality Threshold
2	2	2	1.0000	0.70

Difference Image
Planet Candidate 1 / Sector 25 / Target Pixel Table 245

Difference image for target 116264089, planet candidate 1, sector 25, target pixel table 245. Upper left: difference between mean flux out-of-transit and in-transit; upper right: mean out-of-transit flux; lower left: mean in-transit flux; lower right: difference between mean flux out-of-transit and in-transit after normalizing by the uncertainty in the difference for each pixel. The optimal aperture is outlined with a white dash-dotted line in each panel and the target mask is outlined with a solid white line. Symbol key: x: target position from TIC RA and Dec converted to CCD coordinates via motion polynomials; *: position of nearby TIC objects converted to CCD coordinates via motion polynomials; +: PRF-fit location of target from out-of-transit image; triangle: PRF-fit location of transit source from the difference image. Number of transits = 18; number of valid in-transit cadences = 322; number of in-transit cadence gaps = 9; number of valid out-of-transit cadences = 1606; number of out-of-transit cadence gaps = 37. Difference image quality metric = 1.00 (good).
Open ./planet-01/difference-image/0000000116264089-01-difference-image-25-245.fig
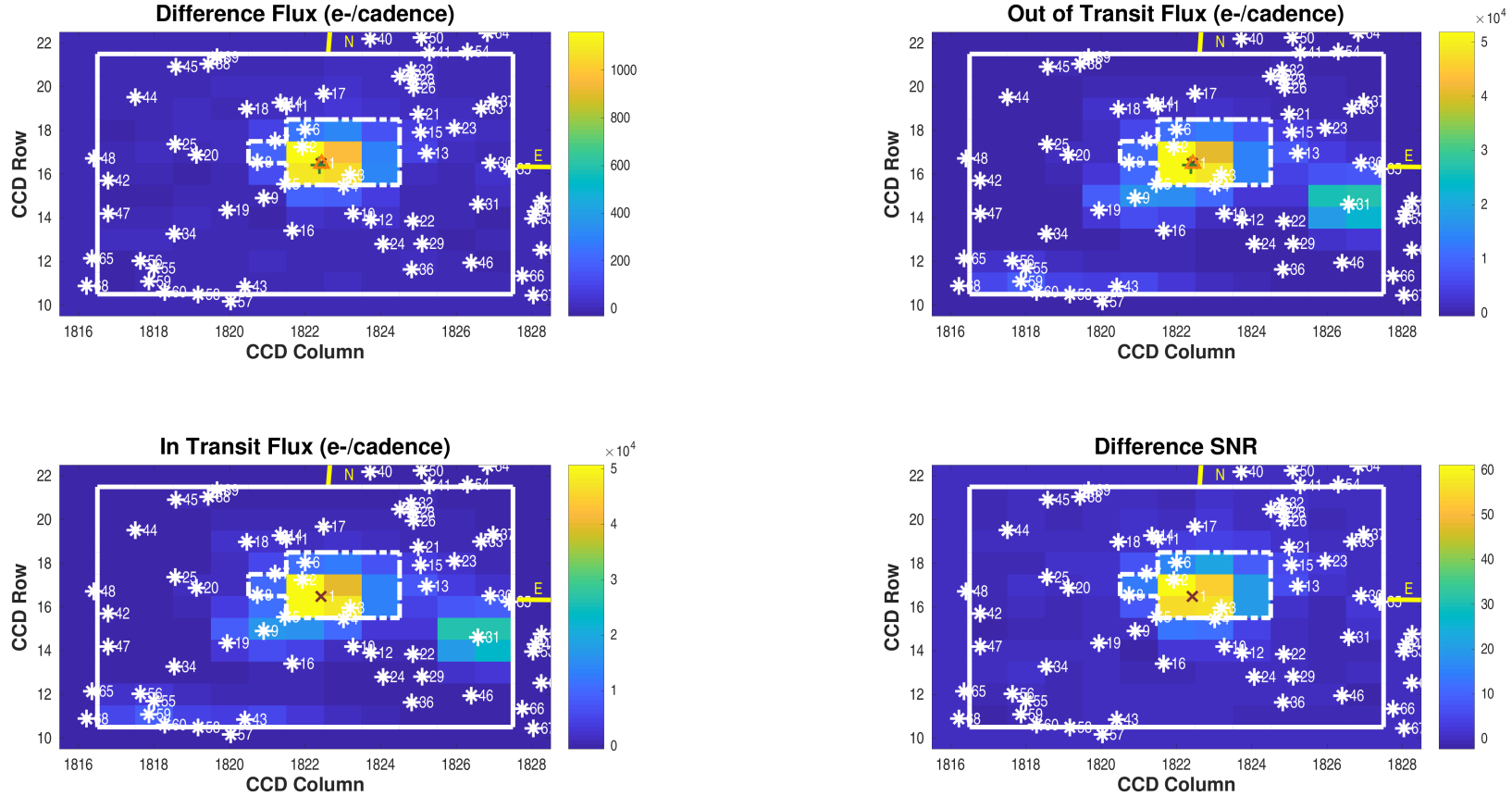
PRF Fit of the Difference Image

Offset from the PRF fit to the out of transit image

	Row	Column	Units	RA	Dec	Units
Out of Transit Image Centroid	$299.32 \pm 6.37e-05$	$1790.60 \pm 7.10e-05$	pixels	$268.02877877 \pm 9.40e-07$	$37.54619470 \pm 9.06e-07$	degrees
Difference Image Centroid	$299.37 \pm 7.01e-03$	$1790.62 \pm 7.76e-03$	pixels	$268.02901026 \pm 4.36e-05$	$37.54638850 \pm 4.08e-05$	degrees
Offset	$0.0452 \pm 7.01e-03$	$0.0169 \pm 7.76e-03$	pixels	$0.6608 \pm 1.25e-01$	$0.6977 \pm 1.47e-01$	arcseconds
Offset/σ	6.45	2.17		5.30	4.75	
Offset Distance	$0.0482 \pm 6.99e-03$		pixels	$0.9609 \pm 1.31e-01$		arcseconds
Offset Distance/σ	6.90			7.31		

Offset from the TIC RA and Dec converted to pixels via motion polynomials

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$299.37 \pm 1.45e-04$	$1790.63 \pm 1.48e-04$	pixels	$268.02906844 \pm 0.00e+00$	$37.54637420 \pm 0.00e+00$	degrees
Difference Image Centroid	$299.37 \pm 7.01e-03$	$1790.62 \pm 7.76e-03$	pixels	$268.02901026 \pm 4.36e-05$	$37.54638850 \pm 4.08e-05$	degrees
Offset	$-0.0003 \pm 7.01e-03$	$-0.0089 \pm 7.76e-03$	pixels	$-0.1661 \pm 1.25e-01$	$0.0515 \pm 1.47e-01$	arcseconds
Offset/σ	-0.05	-1.15		-1.33	0.35	
Offset Distance	$0.0089 \pm 7.75e-03$		pixels	$0.1739 \pm 1.30e-01$		arcseconds
Offset Distance/σ	1.15			1.34		

Difference Image
Planet Candidate 1 / Sector 26 / Target Pixel Table 254

Difference image for target 116264089, planet candidate 1, sector 26, target pixel table 254. Upper left: difference between mean flux out-of-transit and in-transit; upper right: mean out-of-transit flux; lower left: mean in-transit flux; lower right: difference between mean flux out-of-transit and in-transit after normalizing by the uncertainty in the difference for each pixel. The optimal aperture is outlined with a white dash-dotted line in each panel and the target mask is outlined with a solid white line. Symbol key: x: target position from TIC RA and Dec converted to CCD coordinates via motion polynomials; *: position of nearby TIC objects converted to CCD coordinates via motion polynomials; +: PRF-fit location of target from out-of-transit image; triangle: PRF-fit location of transit source from the difference image. Number of transits = 18; number of valid in-transit cadences = 325; number of in-transit cadence gaps = 6; number of valid out-of-transit cadences = 1605; number of out-of-transit cadence gaps = 39. Difference image quality metric = 1.00 (good).
Open ./planet-01/difference-image/0000000116264089-01-difference-image-26-254.fig

PRF Fit of the Difference Image

Offset from the PRF fit to the out of transit image

	Row	Column	Units	RA	Dec	Units
Out of Transit Image Centroid	$16.41 \pm 7.02e - 05$	$1822.38 \pm 8.57e - 05$	pixels	$268.02880135 \pm 1.98e - 06$	$37.54593930 \pm 1.99e - 06$	degrees
Difference Image Centroid	$16.47 \pm 7.87e - 03$	$1822.43 \pm 9.26e - 03$	pixels	$268.02917459 \pm 5.24e - 05$	$37.54630572 \pm 4.55e - 05$	degrees
Offset	$0.0660 \pm 7.87e - 03$	$0.0547 \pm 9.26e - 03$	pixels	$1.0653 \pm 1.50e - 01$	$1.3191 \pm 1.64e - 01$	arcseconds
Offset/σ	8.39	5.90		7.12	8.05	
Offset Distance	$0.0857 \pm 8.89e - 03$		pixels	$1.6956 \pm 1.67e - 01$		arcseconds
Offset Distance/σ	9.64			10.17		

Offset from the TIC RA and Dec converted to pixels via motion polynomials

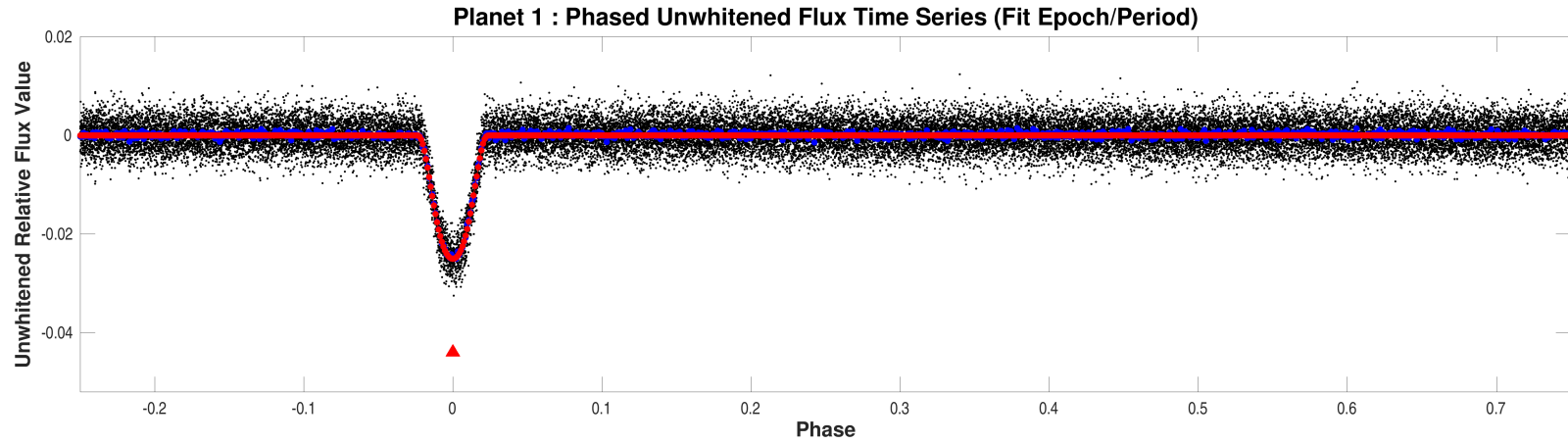|	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$16.48 \pm 3.43e - 04$	$1822.42 \pm 3.35e - 04$	pixels	$268.02906783 \pm 0.00e + 00$	$37.54637490 \pm 0.00e + 00$	degrees
Difference Image Centroid	$16.47 \pm 7.87e - 03$	$1822.43 \pm 9.26e - 03$	pixels	$268.02917459 \pm 5.24e - 05$	$37.54630572 \pm 4.55e - 05$	degrees
Offset	$-0.0131 \pm 7.88e - 03$	$0.0144 \pm 9.27e - 03$	pixels	$0.3047 \pm 1.49e - 01$	$-0.2490 \pm 1.64e - 01$	arcseconds
Offset/σ	-1.67	1.55		2.04	-1.52	
Offset Distance	$0.0195 \pm 8.22e - 03$		pixels	$0.3936 \pm 1.46e - 01$		arcseconds
Offset Distance/σ	2.37			2.69		

5.2 Difference Image TIC Key

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
1	116264089	11.721	268.02906814	37.54637455	0.00
2	116264084	16.770	268.02531011	37.55043094	18.12
3	116264090	16.626	268.03473926	37.54363532	18.95
4	1508535331	18.953	268.03362313	37.54080861	23.89
5	116264092	18.032	268.02250276	37.54113328	26.59
6	1508535343	20.581	268.02563711	37.55474938	31.70
7	1508535342	20.597	268.02007906	37.55188158	32.42
8	1508535336	19.987	268.01700244	37.54647364	34.44
9	116264095	13.342	268.01864797	37.53758788	43.42
10	116264099	17.586	268.03578344	37.53403122	48.39
11	1508535344	20.603	268.02179879	37.56044483	54.74
12	116264104	17.178	268.03926215	37.53253652	57.69
13	116264085	14.810	268.04897184	37.54930211	57.78
14	1508535341	20.001	268.02062146	37.56135581	59.08
15	1508535333	19.957	268.04755913	37.55449614	60.34
16	1508535327	19.024	268.02447569	37.52958870	61.83
17	1508535345	19.683	268.02866839	37.56372672	62.48
18	116264080	15.552	268.01430615	37.55965388	63.72
19	116264098	16.995	268.01187938	37.53441165	65.28
20	116264086	16.073	268.00537460	37.54799406	67.88
21	1508535334	18.319	268.04689654	37.55899666	68.22
22	1508535329	20.704	268.04721017	37.53239698	72.20
23	1508535332	18.128	268.05392264	37.55569334	78.47
24	116264107	17.909	268.04184739	37.52662255	79.92
25	1508535340	19.495	268.00117086	37.55057720	81.05
26	116264076	17.614	268.04568645	37.56549116	83.58
27	1508535346	20.181	268.04292280	37.56832765	88.37
28	116264075	17.402	268.04539351	37.56761998	89.56
29	1508535328	18.999	268.04926720	37.52684295	90.93
30	1508535330	19.965	268.06114924	37.54718217	91.62
31	116264096	12.456	268.05934944	37.53685049	92.98
32	116264073	17.572	268.04496107	37.56993391	96.18
33	116264079	17.653	268.05875594	37.56063752	99.08
34	1508535335	20.078	268.00216449	37.52834835	100.54
35	1508535401	19.444	268.06483099	37.54575657	102.10
36	1508535188	19.584	268.04761158	37.52039970	107.45
37	1508535408	20.665	268.06089961	37.56242127	107.67
38	116264071	17.956	268.00642516	37.57067906	108.78

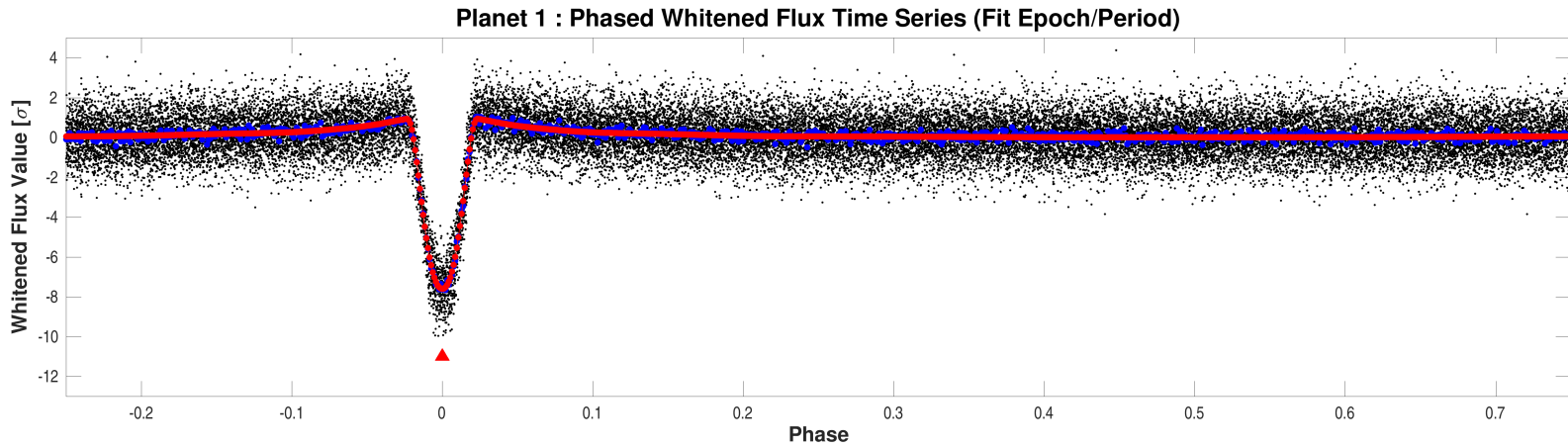| Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
39	1508535347	20.580	268.00798451	37.57239096	111.33
40	1508535419	18.168	268.03683933	37.57752606	114.32
41	1508535418	20.135	268.04820517	37.57439561	114.72
42	1508535339	20.679	267.98889647	37.54130438	116.11
43	1508535326	19.193	268.01621862	37.51551566	116.99
44	116264077	16.708	267.99301903	37.56209424	117.43
45	116264072	16.756	268.00032191	37.56983701	117.76
46	1508535187	19.369	268.05881538	37.52231925	121.28
47	1508535338	20.128	267.98936629	37.53309679	122.99
48	116264088	18.743	267.98590840	37.54676498	123.20
49	1508535189	18.509	268.07034163	37.53534204	124.32
50	1508535421	20.574	268.04655312	37.57803381	124.42
51	1508535190	20.191	268.07135749	37.53791240	124.49
52	1508535420	19.506	268.03809104	37.58027708	124.74
53	116264102	15.047	268.06998927	37.53349757	125.66
54	1508535409	20.580	268.05542610	37.57476022	126.90
55	116264110	18.338	267.99873447	37.51972877	129.22
56	1508535320	19.905	267.99606699	37.52148541	130.00
57	1508535325	18.417	268.01369774	37.51173114	132.21
58	1508535311	20.388	268.00743508	37.51338483	133.86
59	116264113	14.340	267.99796268	37.51638840	139.77
60	1508535310	19.104	268.00107796	37.51388628	141.64
61	1508535402	18.716	268.07275833	37.56543604	142.34
62	1508535410	20.283	268.05604883	37.57973663	142.67
63	1508535186	20.641	268.07193160	37.52574179	143.13
64	1508535411	20.583	268.05901085	37.57945315	146.58
65	1508535321	19.149	267.98683867	37.52189568	149.31
66	1508535184	18.751	268.06865177	37.51924705	149.34
67	1508535183	19.318	268.07097940	37.51444695	165.90
68	116264114	17.023	267.98620274	37.51507952	166.32

RA, Dec and Distances are corrected for proper motion. This table may not contain all of the objects shown.

6   Phased Light Curves

Phased unwhitened flux time series is plotted in black dots. When all transits fit completed with full or secondary convergence, the phase is determined with the fitted epoch and period; otherwise, the phase is determined with the TPS epoch and period. The values of the phased unwhitened flux time series averaged in one cadence wide bins are plotted in bigger blue dots. When all transits fit completes with full or secondary convergence, the averaged values of the phased unwhitened fitted model light curve are plotted in red dots. Transit event markers in different colors indicate the locations of the transits of all planet candidates. The transits of the same planet candidate are labeled with the markers of the same color, for example, blue markers for transits of plane candidate #1, red markers for transits of planet candidate #2, etc.

Open `./summary-plots/0000000116264089-01-phased-unwhitened-flux-time-series.fig`

Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)

Phased whitened flux time series is plotted in black dots. When all transits fit completed with full or secondary convergence, the phase is determined with the fitted epoch and period; otherwise, the phase is determined with the TPS epoch and period. The values of the phased whitened flux time series averaged in one cadence wide bins are plotted in bigger blue dots. When all transits fit completes with full or secondary convergence, the averaged values of the phased whitened fitted model light curve are plotted in red dots. Transit event markers in different colors indicate the locations of the transits of all planet candidates. The transits of the same planet candidate are labeled with the markers of the same color, for example, blue markers for transits of plane candidate #1, red markers for transits of planet candidate #2, etc.
Open `./summary-plots/0000000116264089-01-phased-whitened-flux-time-series.fig`

Planet: 1   Phased Unwhitened Flux Time Series by Sector

Phase (Hours)

Phased unwhitened flux time series by sector for target 116264089, planet candidate 1. Period = 1.3062 days; transit epoch = 1984.8396 BTJD.
Open `./summary-plots/0000000116264089-01-phased-unwhitened-flux-time-series-by-sector.fig`

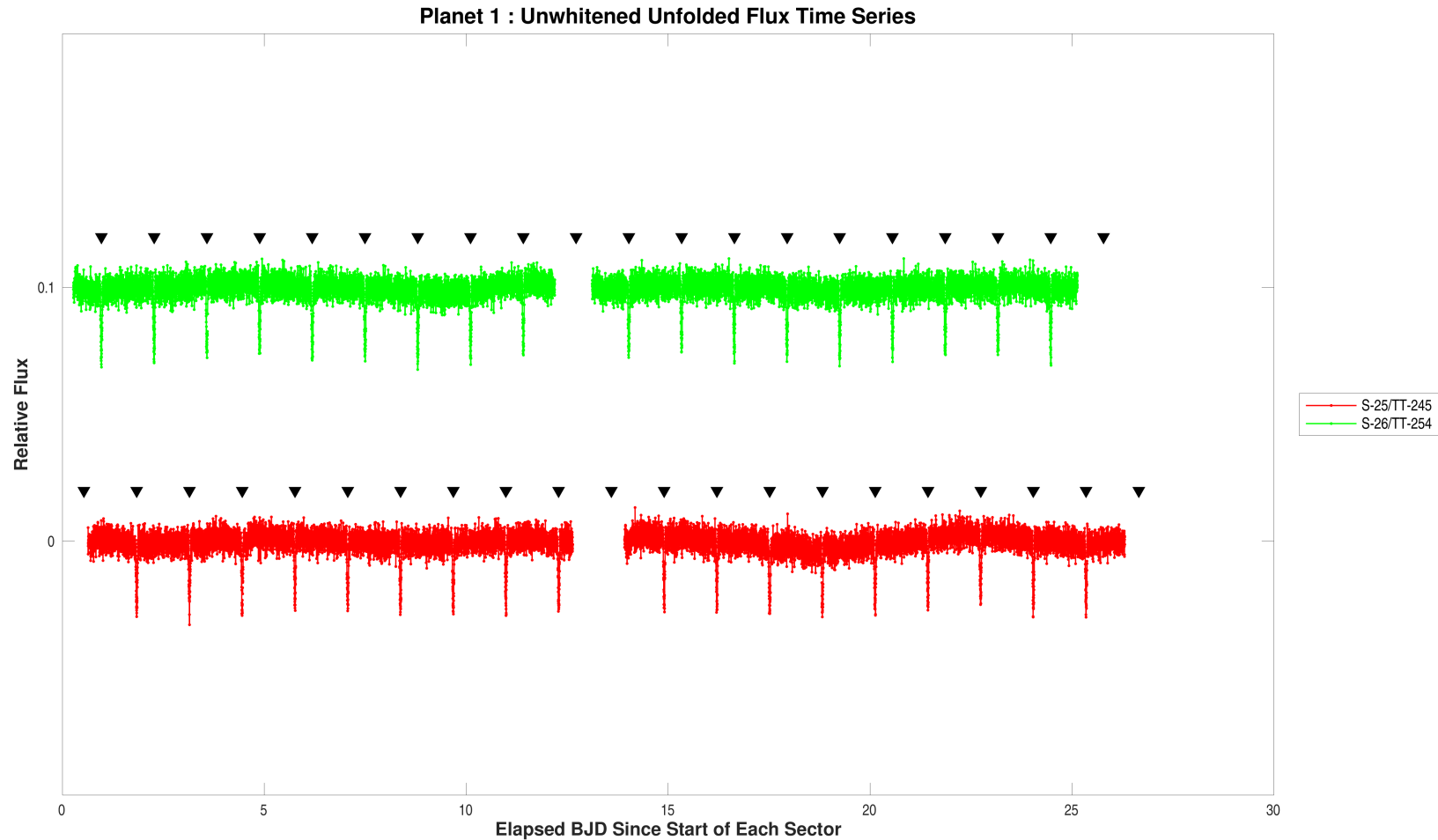# 7   Planet Candidate 1

7.1   Model Fitter: All Transits

Model Characteristic	Name
Transit Model	mandel-agol_geometric_transit_model
Limb Darkening Model	claret_tess_nonlinear_limb_darkening_model

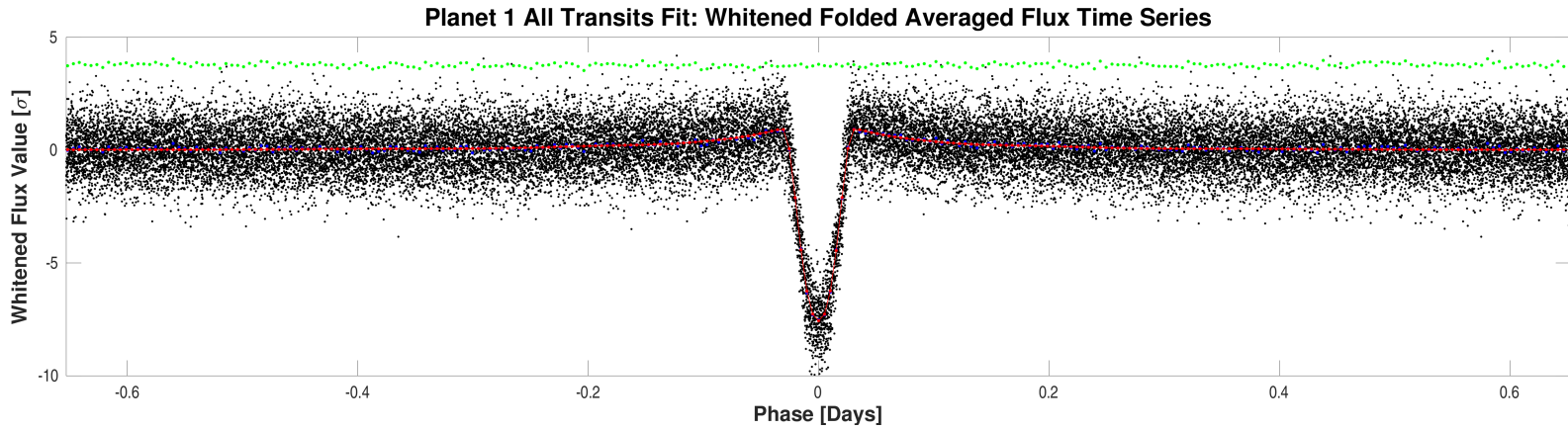| TCE Parameter	Value	Units
Trial Transit Pulse Duration	1.0	hours
Transit Epoch	1984.8364331	TJD
Orbital Period	1.3062358	days
Maximum SES	37.7	
Maximum MES	188.8	
Robust Statistic	181.4	
Chi Square Goodness of Fit Statistic (DoF)	2263.3 (1059)	
Chi Square2 Statistic (DoF)	369.9 (2982.5)	
Threshold for Desired PFA		

DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	190.1		
Orbital Period	1.3061831	7.0369e-06	days
Transit Epoch	1984.8396292	1.5412e-04	BTJD
Impact Parameter	0.8471	9.3405e-03	
Planet Radius to Star Radius Ratio	0.1677908	3.0156e-03	
Semi-major Axis to Star Radius Ratio	5.8599	7.5070e-02	
Planet Radius	15.0238	9.3193e-01	Earth radii
Semi-major Axis	0.0231	1.8162e-03	AU
Effective Stellar Flux	1025.5073	1.7866e+02	Goldilocks
Equilibrium Temperature	1443	6.2861e+01	Kelvin
Stellar Density	1.5845	6.0895e-02	Solar density
Transit Depth	25021	2.4942e+02	ppm
Transit Duration	1.3879	1.0104e-02	hours
Transit Ingress Duration	0.6939	5.0519e-03	hours
Eccentricity	0.0000	0.0000e+00	
Peri Longitude	0.0000	0.0000e+00	degrees
Model Chi Square Statistic (DoF)	6327.6 (7642.8)		
Model Chi Square Goodness of Fit Statistic (DoF)	949.0 (1618)		
Model Chi Square2 Statistic (DoF)	21.9 (35)		

DoF: Degrees of Freedom
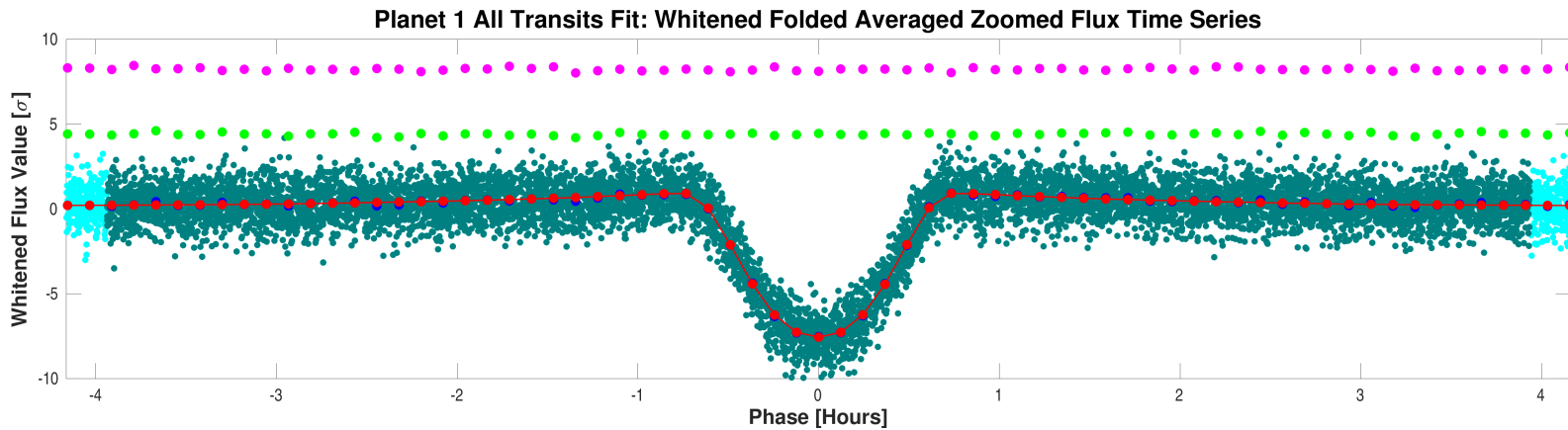
Planet 1 : Unwhitened Unfolded Flux Time Series

Flux time series for CatId 116264089, Planet candidate 1 in the unwhitened domain. For the data of Sector-25/TargetTableId-245, start BJD is 2458983 and the vertical offset is 0. For the data of Sector-26/TargetTableId-254, start BJD is 2459010 and the vertical offset is 0.1. Transit event markers indicate the location of transits of the given planet candidate. All transits fit completed with full convergence.

Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-unwhitened-25-245.fig`

Planet 1 All Transits Fit: Whitened Folded Averaged Flux Time Series

Folded flux time series for CatId 116264089, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light curve of the all transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. All transits fit completed with full convergence.
Open ./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-whitened.fig

Planet 1 All Transits Fit: Whitened Folded Averaged Zoomed Flux Time Series

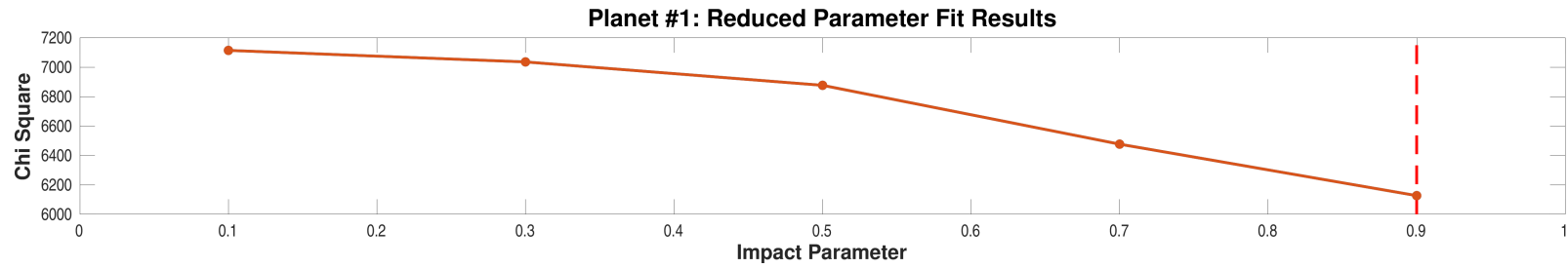Folded flux time series for CatId 116264089, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the fitted model light curve of the all transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Magenta dots are the averaged values of the folded flux time series, with a phase shift of 0.5 relative to the blue dots, vertically offset for clarity. All transits fit completed with full convergence.
Open ./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-whitened-zoomed.fig

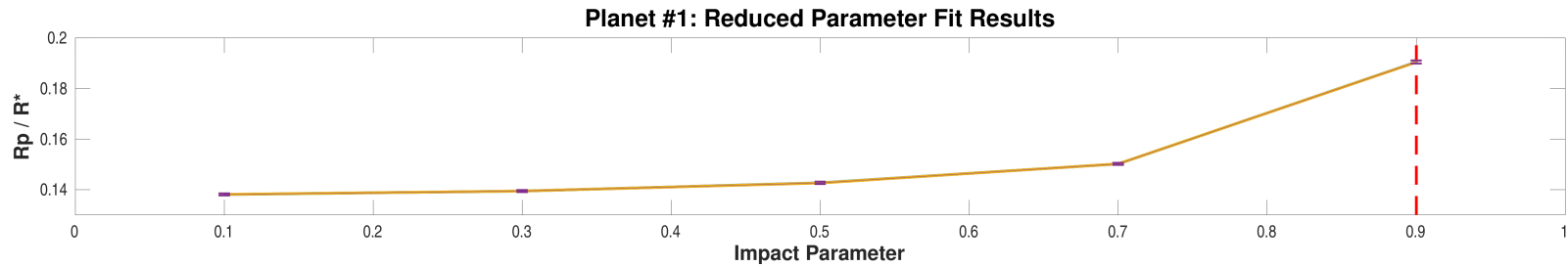## 7.2   Model Fitter: Reduced Parameter Fit Results

Impact Parameter	SNR	Model Chi Square	Planet Radius to Star Radius	Uncert	Semi-major Axis to Star Radius	Uncert	Transit Depth (ppm)	Uncert	Transit Duration (hours)	Uncert
0.10	188.5	7113.8	0.1381208	4.1129e-04	10.0797	3.5862e-02	22393	1.3242e+02	1.1249	3.9463e-03
0.30	189.8	7035.5	0.1394754	4.1136e-04	9.6716	3.4782e-02	22472	1.3157e+02	1.1372	4.0314e-03
0.50	191.8	6876.4	0.1427169	4.1524e-04	8.8105	3.2830e-02	22664	1.3074e+02	1.1683	4.2874e-03
0.70	197.2	6476.6	0.1502006	4.2417e-04	7.3564	2.9940e-02	23245	1.2955e+02	1.2469	4.9827e-03
0.90	199.0	6126.8	0.1904413	6.1597e-04	5.5787	2.9878e-02	25481	1.3827e+02	1.4170	7.1271e-03

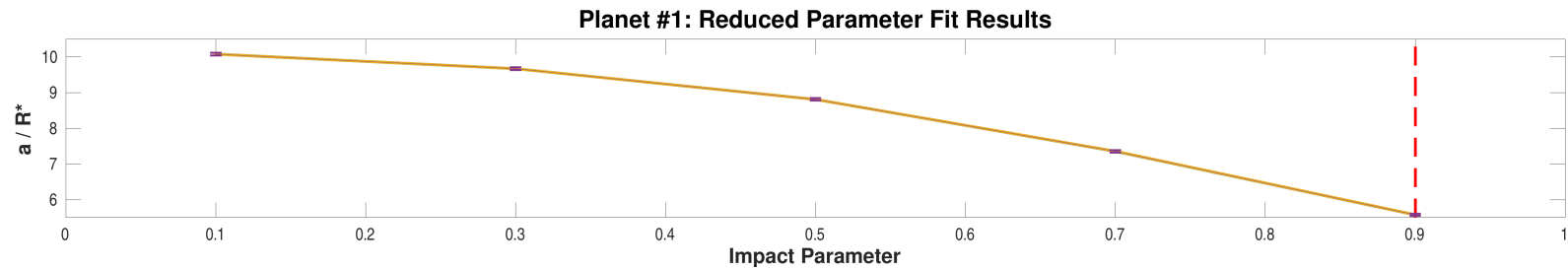Highlighted row is the best reduced-parameter model fit.

Model chi squares of reduced parameter fits vs. impact parameter for CatId 116264089, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open ./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000116264089-01-reduced-fits-chi-square.fig

Ratios of planet radius to star radius of reduced parameter fits vs. impact parameter for CatId 116264089, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open ./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000116264089-01-reduced-fits-rp-over-rstar.fig

Ratios of semimajor axis to star radius of reduced parameter fits vs. impact parameter for CatId 116264089, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open ./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000116264089-01-reduced-fits-a-over-rstar.fig
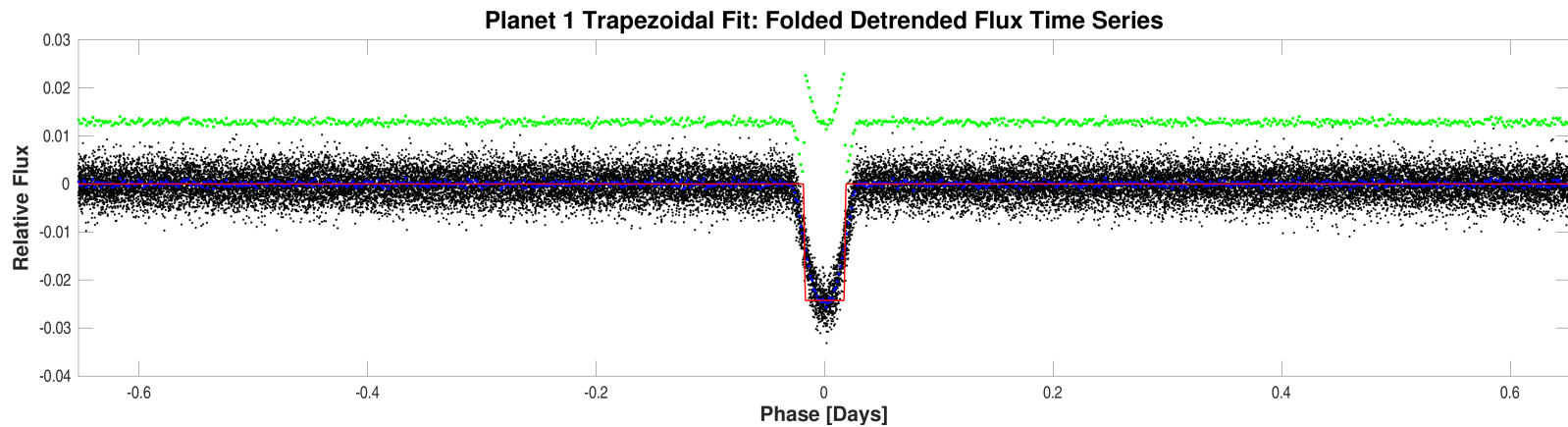
7.3   Model Fitter: Trapezoidal Fit Results

Model Characteristic	Name
Transit Model	trapezoidal_model
Limb Darkening Model	

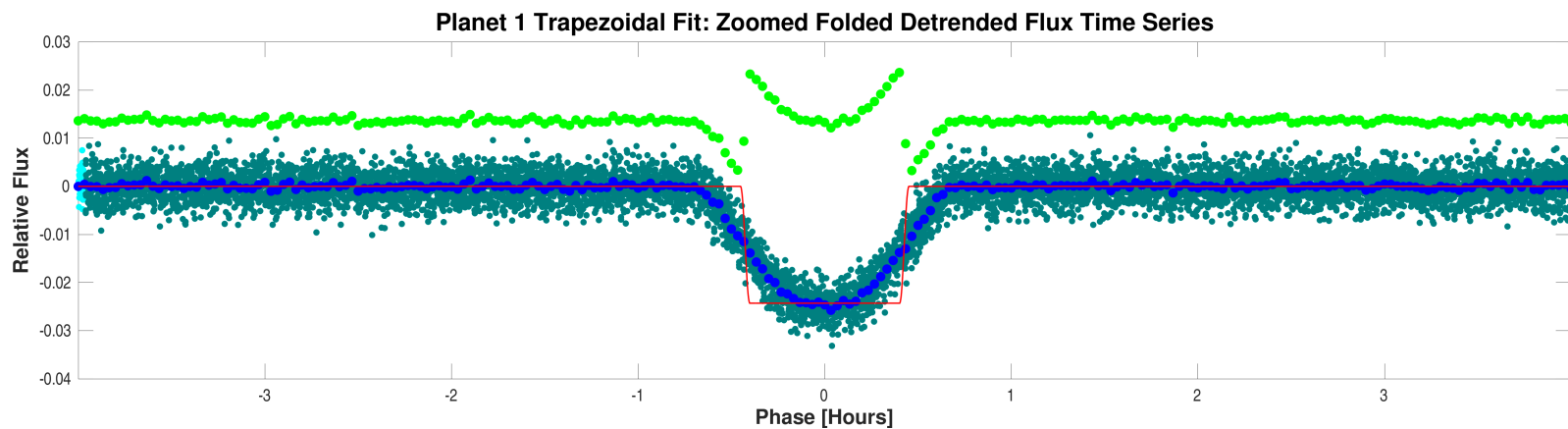| TCE Parameter	Value	Units
Trial Transit Pulse Duration	1.0	hours
Transit Epoch	1984.8364331	TJD
Orbital Period	1.3062358	days
Maximum SES	37.7	
Maximum MES	188.8	
Robust Statistic	181.4	
Chi Square Goodness of Fit Statistic (DoF)	2263.3 (1059)	
Chi Square2 Statistic (DoF)	369.9 (2982.5)	
Threshold for Desired PFA		

DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	210.1		
Orbital Period	1.3062358		days
Transit Epoch	1984.8386385		BTJD
Transit Depth	24283		ppm
Transit Duration	1.3331		hours
Transit Ingress Duration	0.4805		hours
Model Chi Square Statistic (DoF)	35125.2 (8503)		

DoF: Degrees of Freedom

Planet 1 Trapezoidal Fit: Folded Detrended Flux Time Series

Folded detrended flux time series for CatId 116264089, Planet candidate 1 and folded trapezoidal model light curve.
Open ./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000116264089-01-all-trapezoidal.fig

Planet 1 Trapezoidal Fit: Zoomed Folded Detrended Flux Time Series

Zoomed folded detrended flux time series for CatId 116264089, Planet candidate 1 and folded trapezoidal model light curve.
Open ./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000116264089-01-all-trapezoidal-zoomed.fig

7.4   Validation Tests

The Centroid Test and Eclipsing Binary Discrimination Test are chi-squared hypothesis tests. For these tests, a significance of 100% favors a planet, while 0% indicates an unlikely planet.

7.4.1   Weak Secondary Test

Result	Value	Uncertainty	Units	Statistic in Sigmas	Significance (%)
Orbital Period	1.3062		days		
Transit Duration	1		hours		
Maximum MES	188.8				
Secondary Phase	0.90346		days		
Secondary MES	1.9				
Minimum Phase	0.48818		days		
Minimum MES	-2.8				
Median MES	0.1				
MAD MES	0.58426				
Robust Statistic	1.7				
Secondary Depth	210.1	1.1583e+02	ppm		
Geometric Albedo	0.3	1.5581e-01		-4.6644	100.00
Planet Effective Temperature	1613	2.2656e+02	Kelvin	0.7232	23.48

7.4.2   Eclipsing Binary Discrimination Test

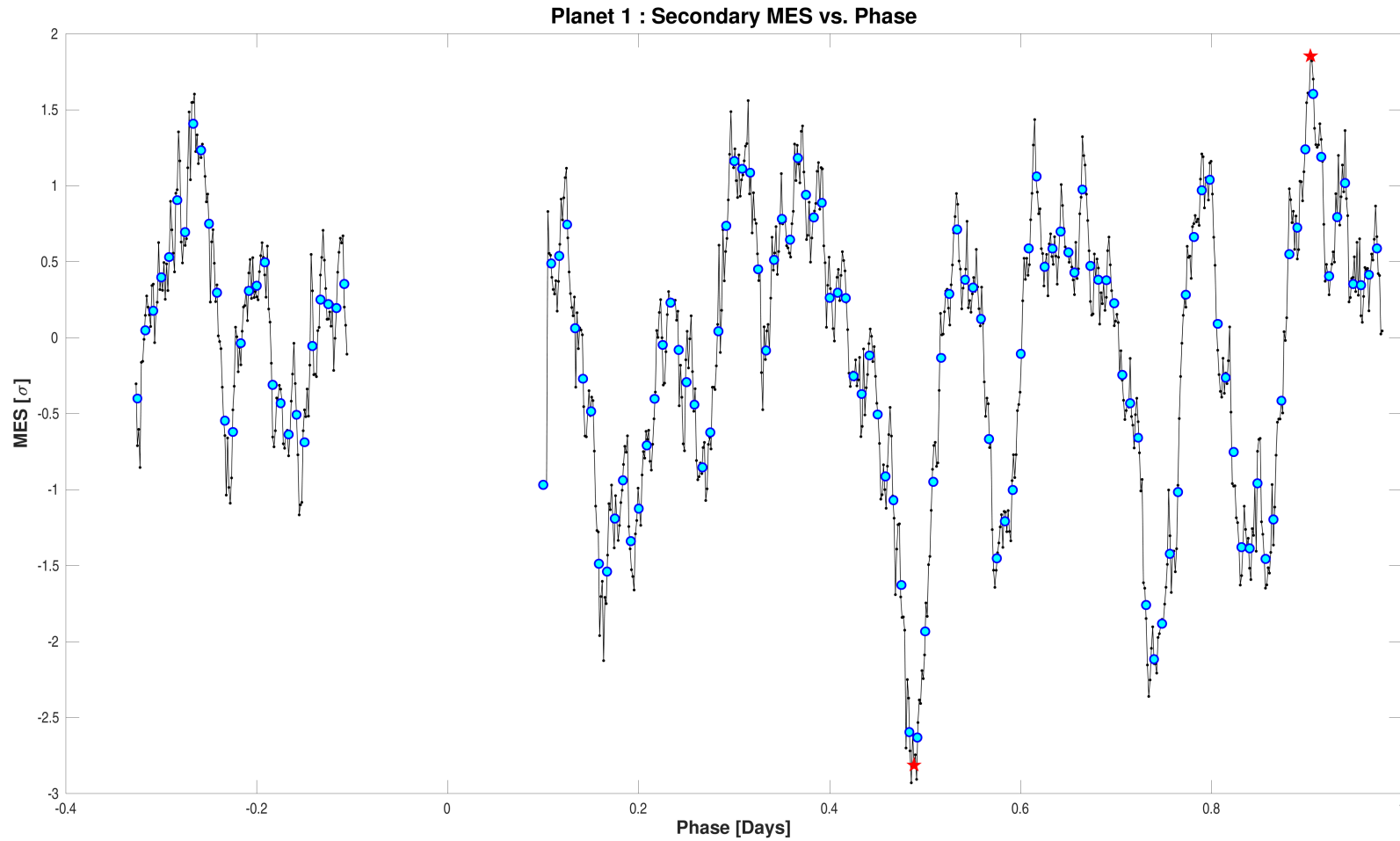| Result	Value	Value in Sigmas	Significance (%)
Odd Even Transit Depth Comparison Statistic	6.6358e-01	0.8146	41.53

7.4.3   Bootstrap Test

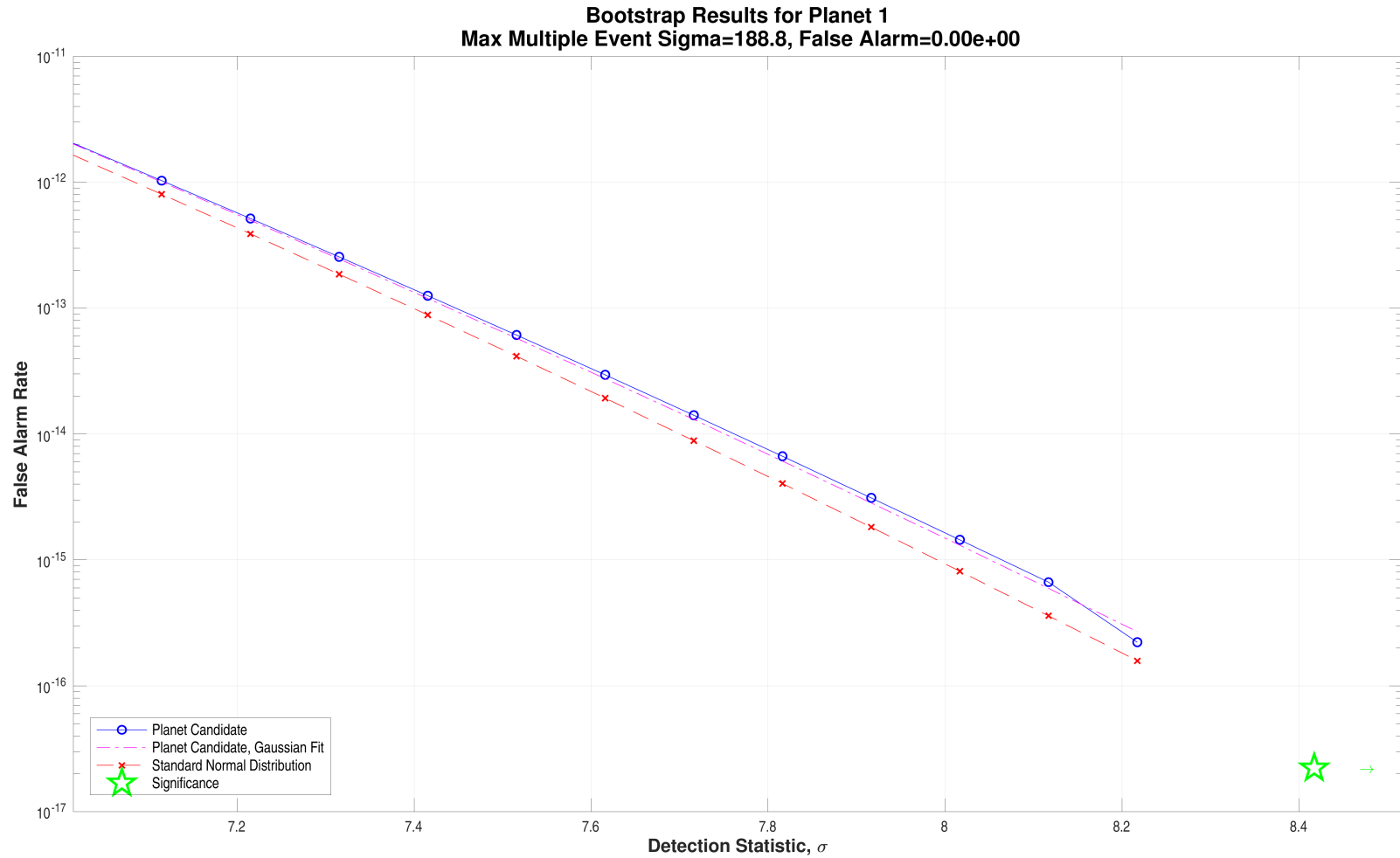| Result	Value
False Alarm Probability	0.0000e+00
Bootstrap Threshold for Desired PFA	7.2
MES Mean	-0.14
MES Standard Deviation	1.03
Transit Count	39

7.4.4   Ghost Diagnostic Test

Result	Value	Significance (%)
Maximum MES	188.8	
SNR	190.1	
Core Aperture Statistic	1.1056e+02	100.00
Halo Aperture Statistic	1.9229e+01	100.00
Ratio of Core/Halo Aperture Statistics	5.7497e+00	

7.4.5   Validation Test Figures
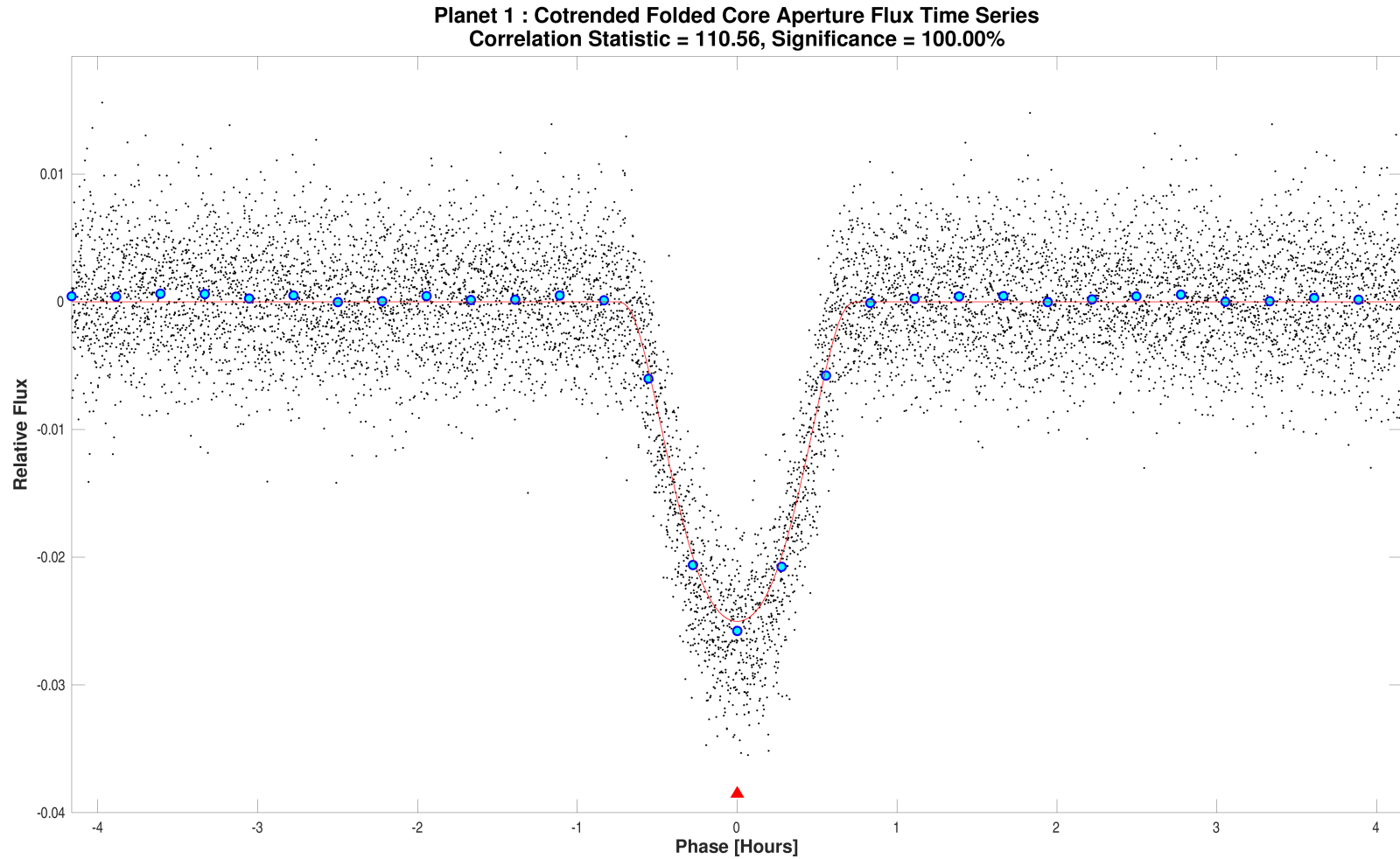

Planet 1 : Secondary MES vs. Phase

The primary event has been set to zero and both the max and min of the resulting MES vs. Phase are marked with a red star. The best matched pulse duration in hours is 1. The maximum secondary MES and corresponding phase are 1.8541 and 0.90346 days respectively. The minimum secondary MES and corresponding phase are -2.8135 and 0.48818 days respectively.

Open `./planet-01/report-summary/0000000116264089-01-weak-secondary-diagnostic.fig`

Bootstrap Results for Planet 1
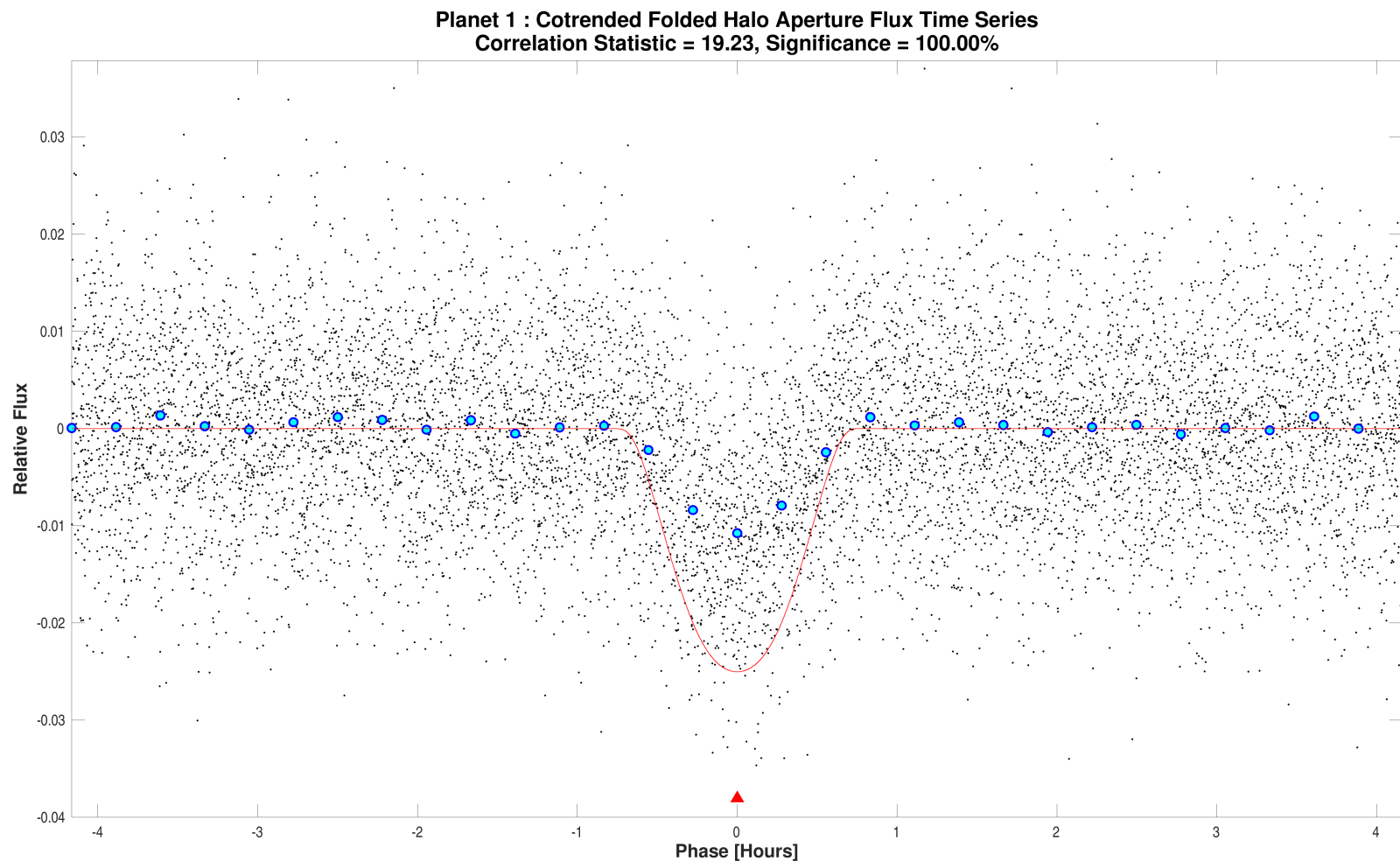**Max Multiple Event Sigma=188.8, False Alarm=0.00e+00**

Bootstrap results for target 116264089, planet 1. Cumulative sum of the probabilities (derived from the histogram of counts) from upper tail to the search transit threshold; false alarm probability is indicated by the star. The Gaussian equivalent threshold for this false alarm probability is Inf. The threshold on this distribution that achieves the same false alarm rate as a 7.1 sigma threshold on a Gaussian distribution is 7.1939.
Open `./planet-01/bootstrap-results/0000000116264089-01-bootstrap-false-alarm.fig`

Planet 1 : Cotrended Folded Core Aperture Flux Time Series
Correlation Statistic = 110.56, Significance = 100.00%

Optical ghost diagnostic core aperture flux time series for target 116264089, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft engineering data, motion proxies, and/or cotrending basis vectors (CBVs) to remove systematic effects. Flux time series data represent the mean per pixel flux in the core or haloaperture; phase folded data points are shown in the figure with black dots. Binned and averaged phase folded flux values are marked with filled blue circles. The unwhitened transit model light curve is displayed in the figure with a red line. The value and significance of the core aperture correlation statistic are displayed in the figure title if the statistic was successfully computed.

Open ./planet-01/ghost-diagnostic-results/0000000116264089-01-core-unwhitened-cotrended-zoomed-model.fig

Planet 1 : Cotrended Folded Halo Aperture Flux Time Series
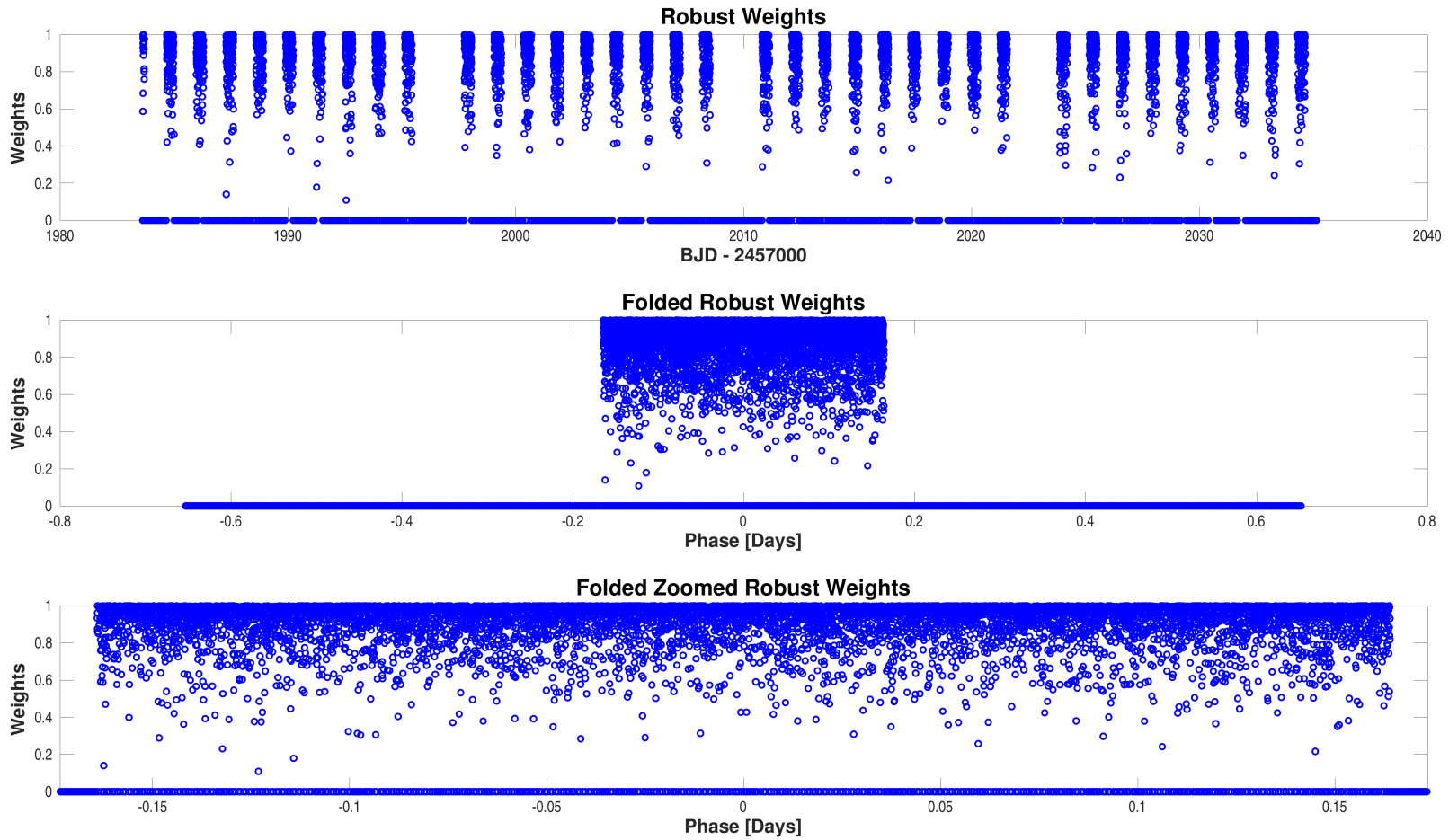**Correlation Statistic = 19.23, Significance = 100.00%**

Optical ghost diagnostic halo aperture flux time series for target 116264089, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft engineering data, motion proxies, and/or cotrending basis vectors (CBVs) to remove systematic effects. Flux time series data represent the mean per pixel flux in the core or haloaperture; phase folded data points are shown in the figure with black dots. Binned and averaged phase folded flux values are marked with filled blue circles. The unwhitened transit model light curve is displayed in the figure with a red line. The value and significance of the halo aperture correlation statistic are displayed in the figure title if the statistic was successfully computed.

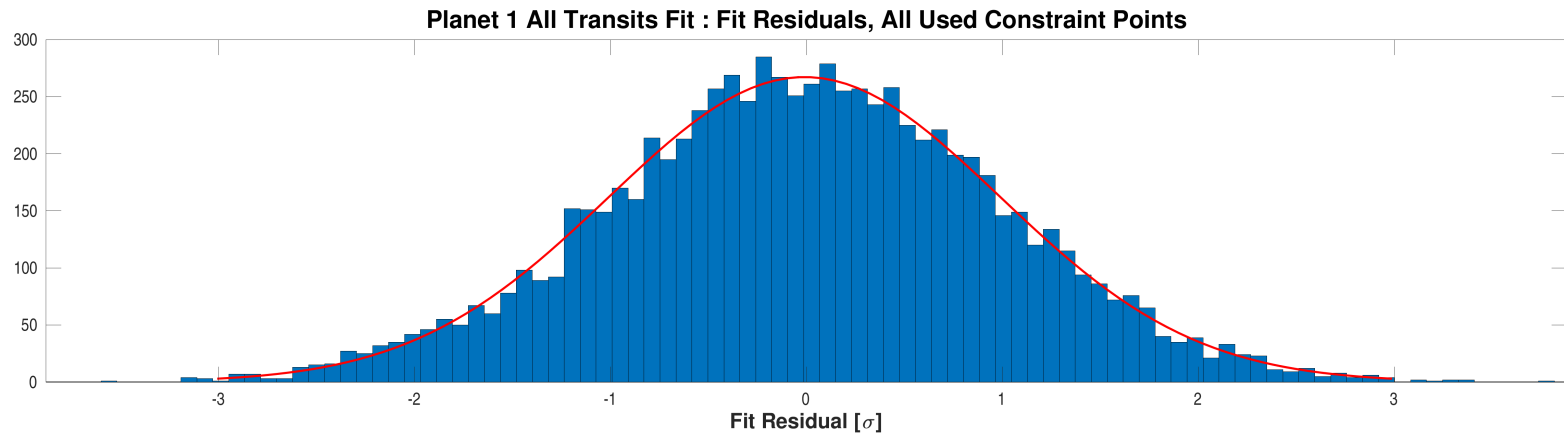Open ./planet-01/ghost-diagnostic-results/0000000116264089-01-halo-unwhitened-cotrended-zoomed-model.fig

Appendix A   Planet Candidate 1
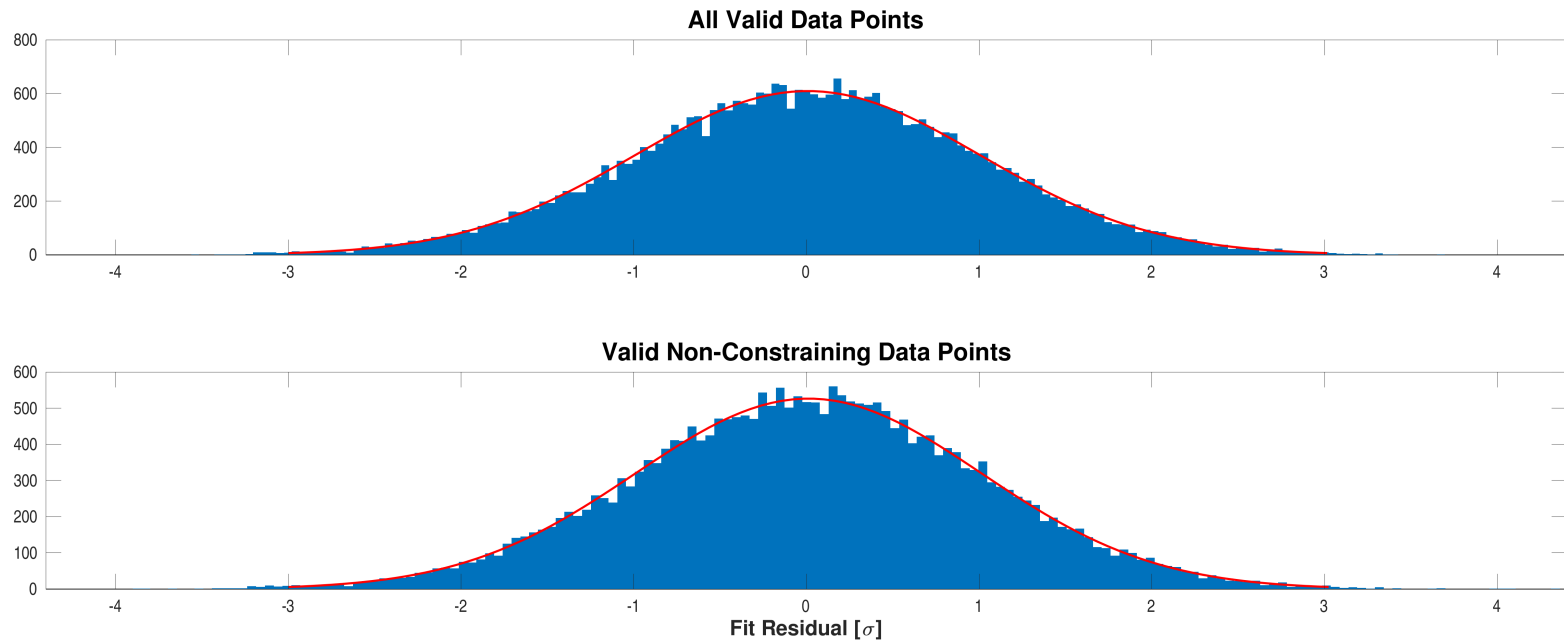
A.1   Model Fitter: All Transits

Robust weights distribution for CatId 116264089, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-robust-weights.fig`

Planet 1 All Transits Fit : Fit Residuals, All Used Constraint Points

Fit residuals distribution for CatId 116264089, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
Open ./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-histo-used.fig

All Valid Data Points

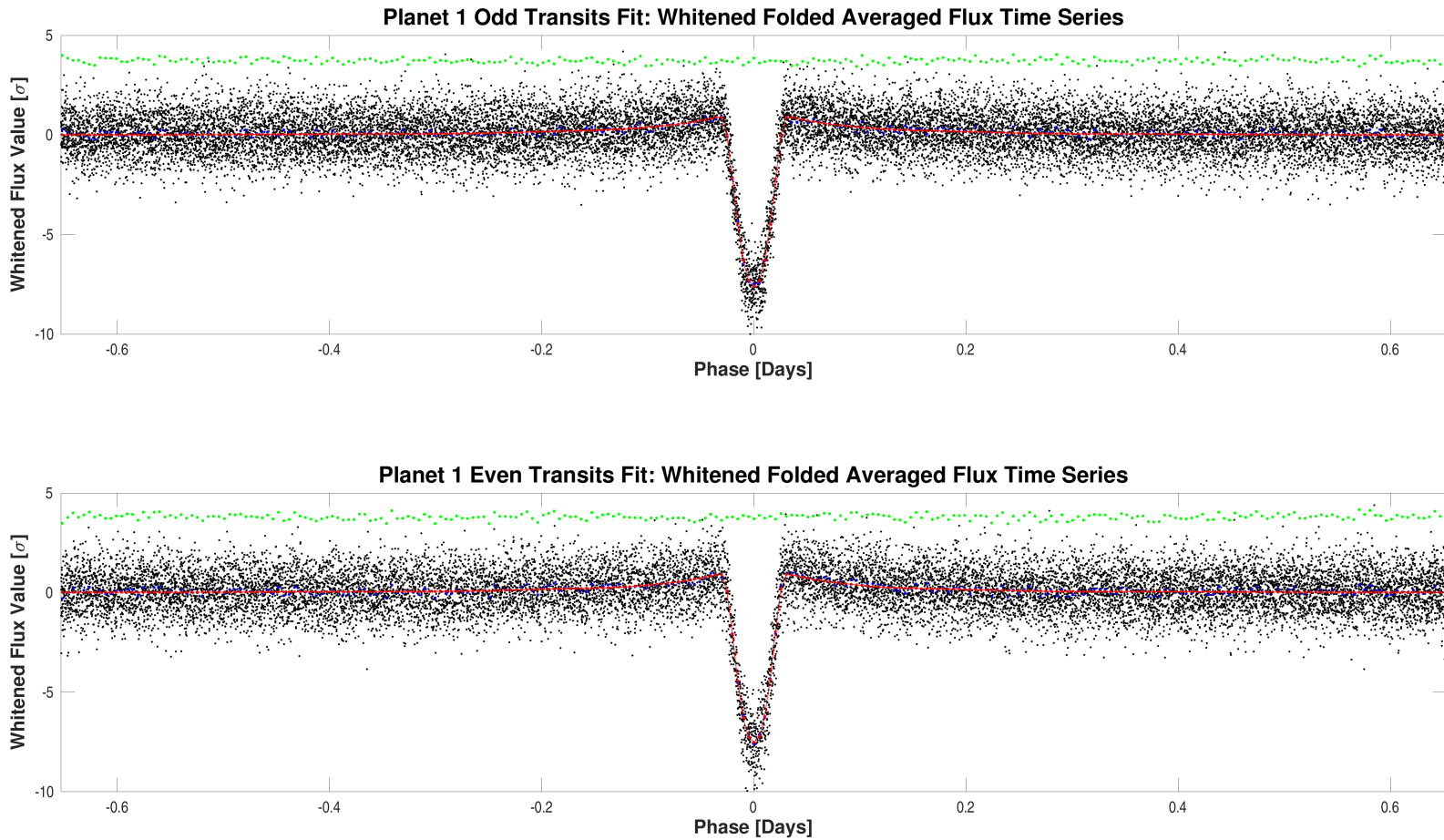**Valid Non-Constraining Data Points**

Fit residuals distribution for CatId 116264089, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open ./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000116264089-01-all-histo-all-and-unused.fig

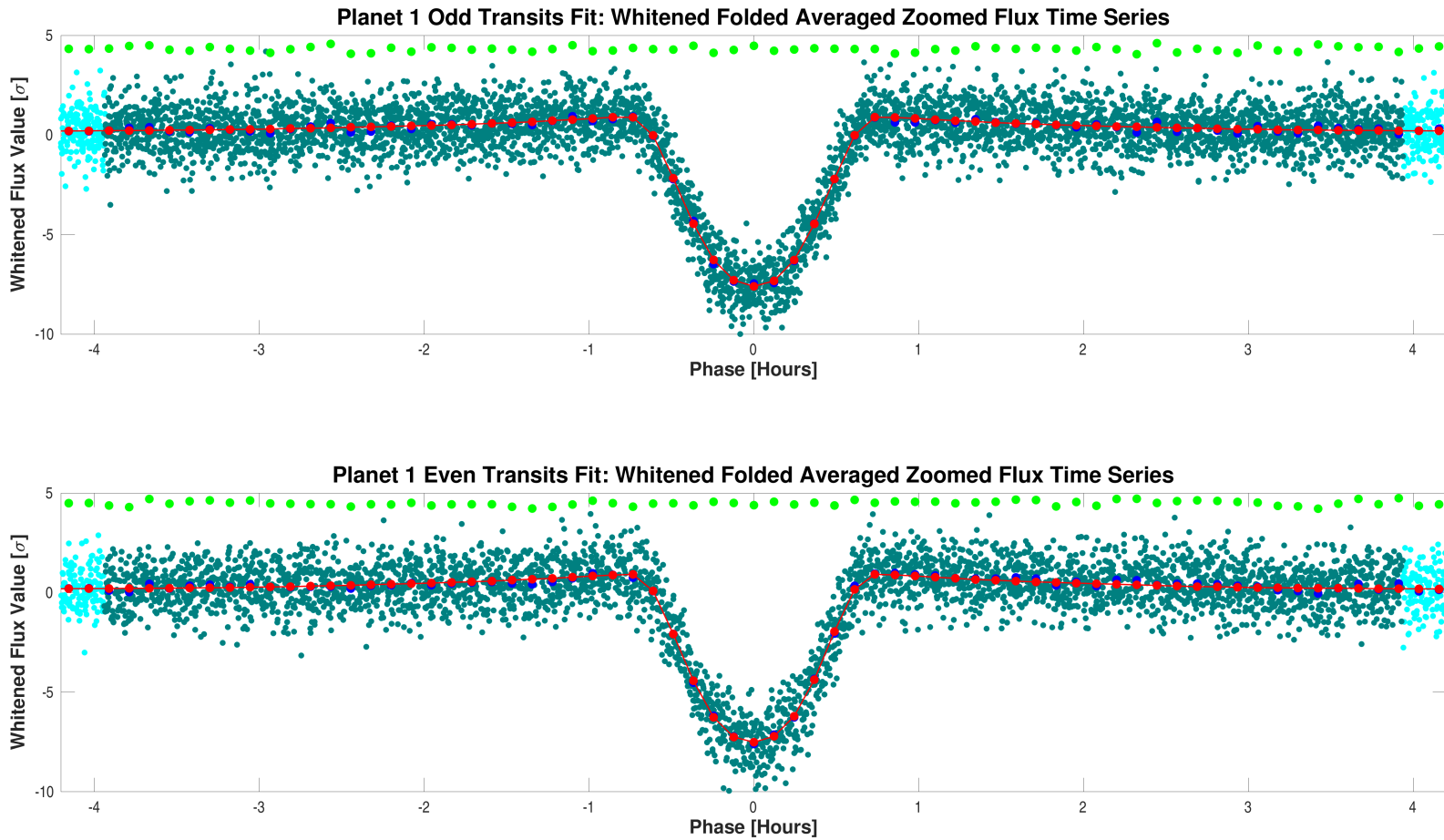## A.2   Model Fitter: Odd & Even Transits

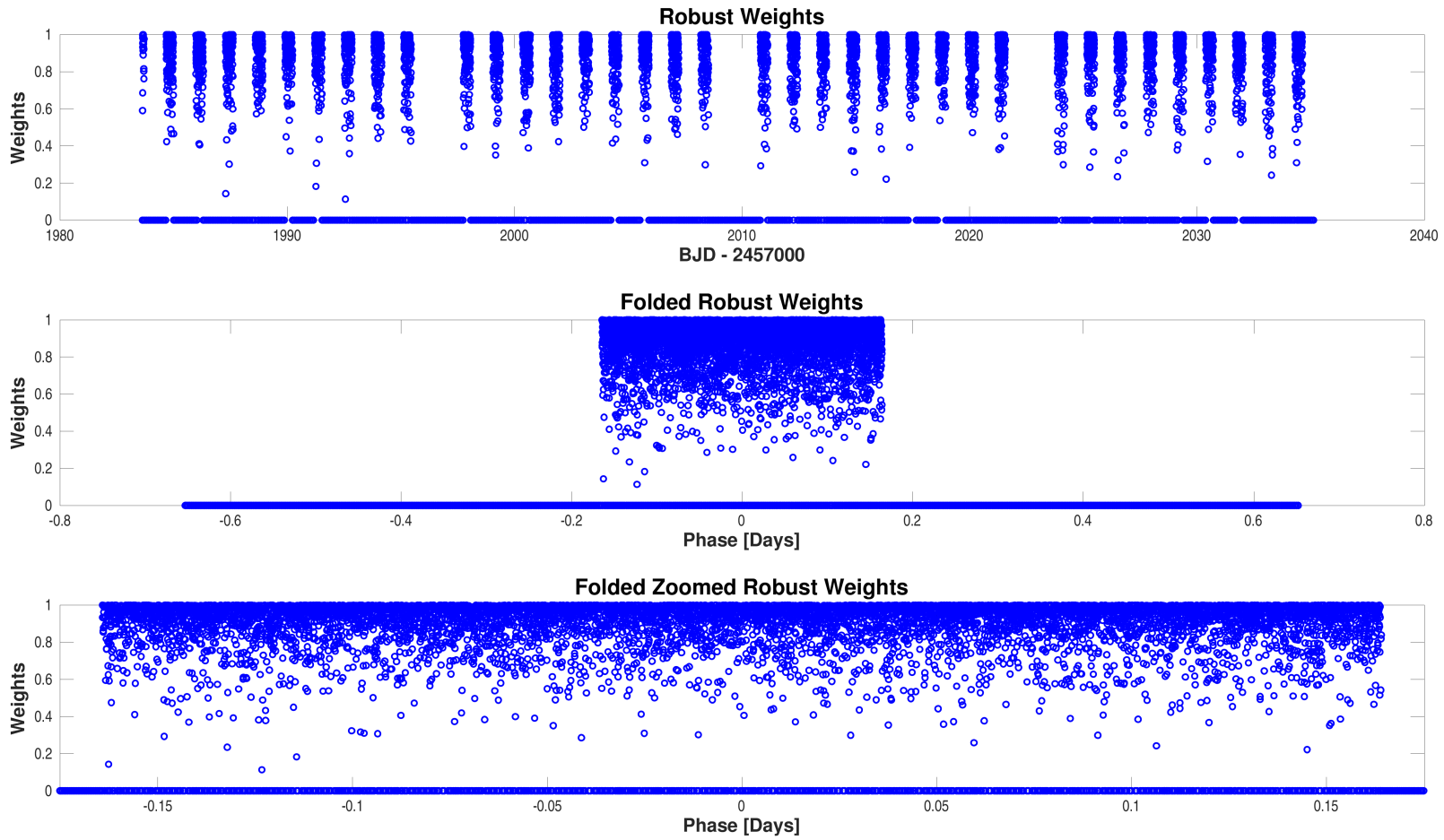| Parameter	Odd Transits Value	Odd Transits Uncertainty	Even Transits Value	Even Transits Uncertainty	Units	Difference ‖Uncertainty‖
SNR	2.4		126.0			
Orbital Period	1.3061724	9.4621e-06	1.3061970	1.0610e-05	days	1.7253e+00
Transit Epoch	1984.8398576	2.0851e-04	1986.1455354	2.2112e-04	BTJD	1.6627e+00
Impact Parameter	0.8522	1.4304e-02	0.8419	1.1978e-02		5.5470e-01
Planet Radius to Star Radius Ratio	0.1699756	4.9758e-03	0.1656371	3.5270e-03		7.1134e-01
Semi-major Axis to Star Radius Ratio	5.7912	1.0464e-01	5.9431	1.0750e-01		1.0127e+00
Planet Radius	15.2194	1.0074e+00	14.8310	9.3542e-01	Earth radii	2.8257e-01
Semi-major Axis	0.0231	1.8162e-03	0.0231	1.8162e-03	AU	1.1258e-04
Effective Stellar Flux	1025.5185	1.7866e+02	1025.4928	1.7866e+02	Goldilocks	1.0162e-04
Equilibrium Temperature	1443	6.2861e+01	1443	6.2861e+01	Kelvin	1.0162e-04
Stellar Density	1.5294	8.2902e-02	1.6529	8.9691e-02	Solar density	1.0111e+00
Transit Depth	25216	3.2229e+02	24785	4.1927e+02	ppm	8.1460e-01
Transit Duration	1.4010	1.3964e-02	1.3718	1.4619e-02	hours	1.4470e+00
Transit Ingress Duration	0.7005	6.9822e-03	0.6859	7.3093e-03	hours	1.4470e+00
Eccentricity	0.0000	0.0000e+00	0.0000	0.0000e+00		
Peri Longitude	0.0000	0.0000e+00	0.0000	0.0000e+00	degrees	
Model Chi Square Statistic (DoF)	6335.7 (7643.1)		6335.7 (7643.1)			

DoF: Degrees of Freedom

Folded flux time series for CatId 116264089, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light curve of the odd/even transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Odd-even transits fit completed with full convergence.

Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000116264089-01-odd-even-whitened.fig`

Planet 1 Odd Transits Fit: Whitened Folded Averaged Zoomed Flux Time Series

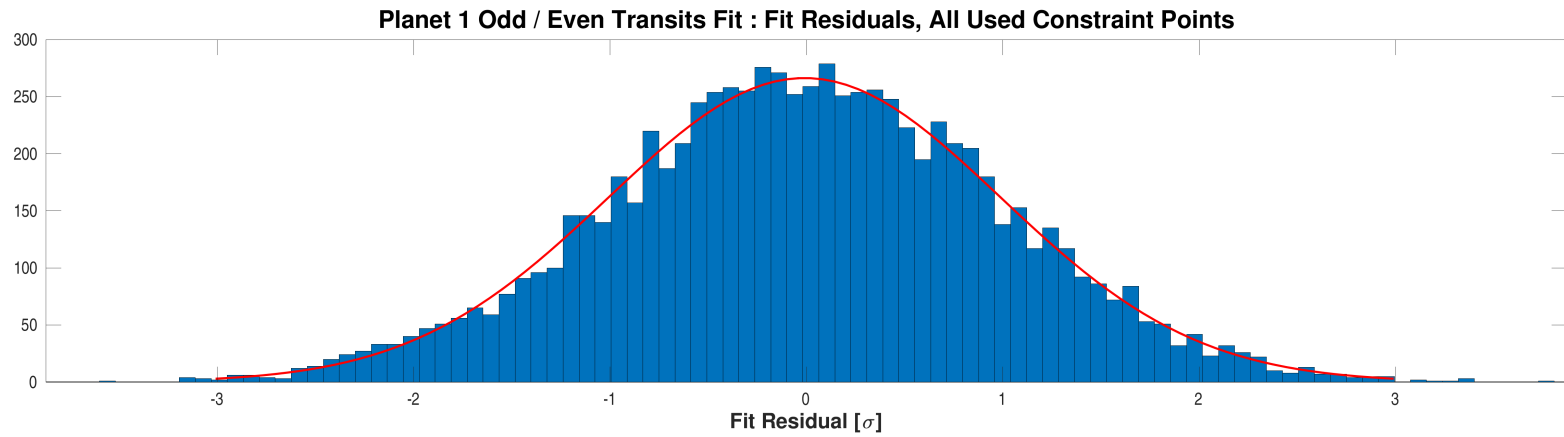**Planet 1 Even Transits Fit: Whitened Folded Averaged Zoomed Flux Time Series**

Folded flux time series for CatId 116264089, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the fitted model light curve of the odd/even transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Magenta dots are the averaged values of the folded flux time series, with a phase shift of 0.5 relative to the blue dots, vertically offset for clarity. Odd-even transits fit completed with full convergence.

Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000116264089-01-odd-even-whitened-zoomed.fig`
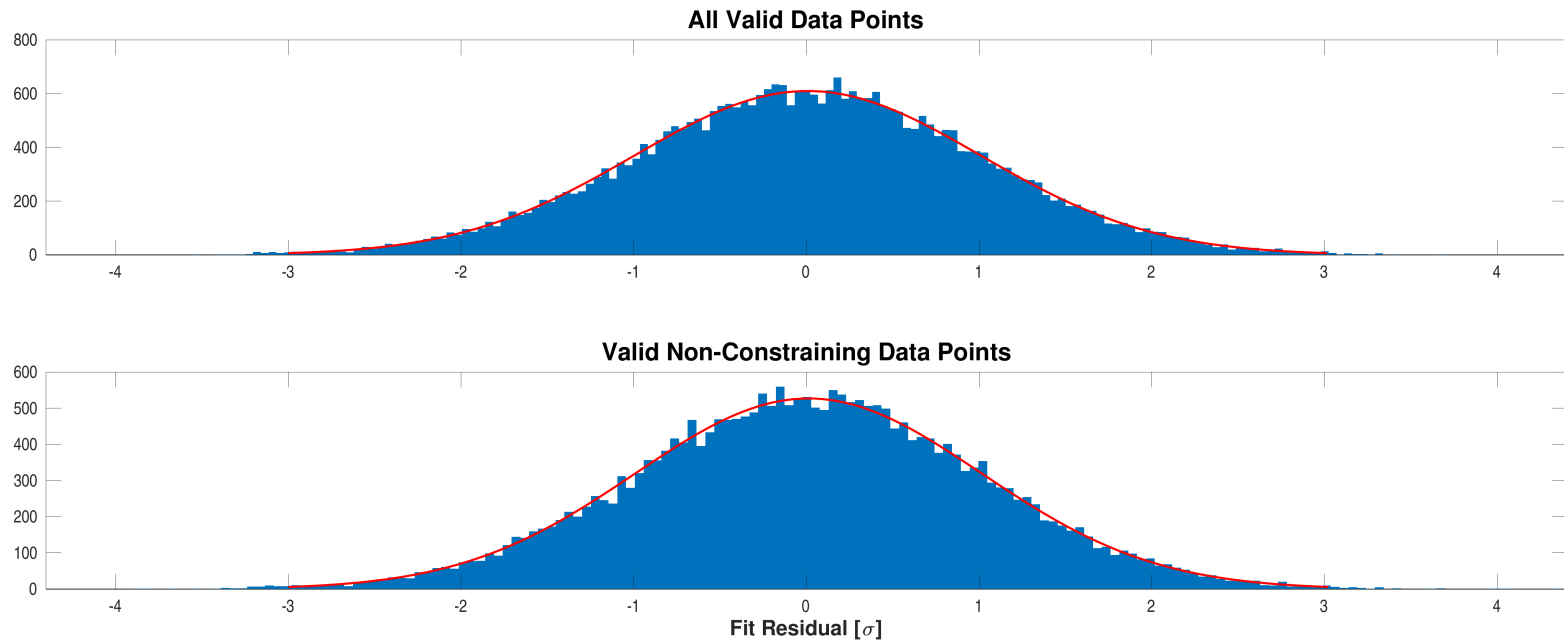
Robust weights distribution for CatId 116264089, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.

Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000116264089-01-odd-even-robust-weights.fig`

Fit residuals distribution for CatId 116264089, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
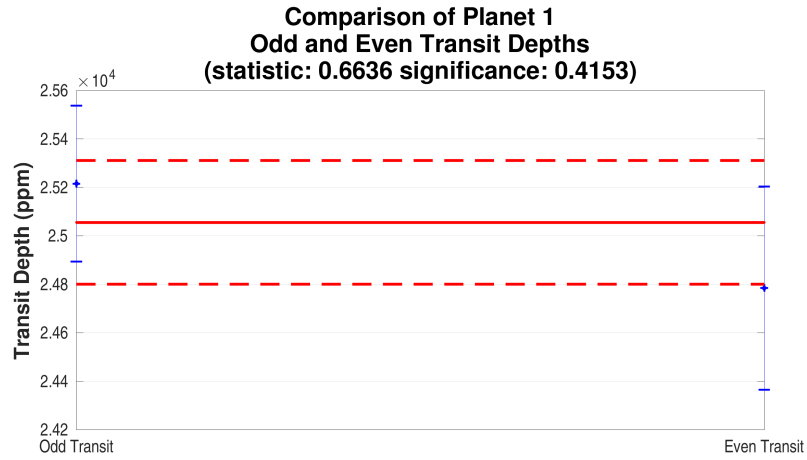Open ./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000116264089-01-odd-even-histo-used.fig

Fit residuals distribution for CatId 116264089, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open ./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000116264089-01-odd-even-histo-all-and-unused.fig

A.3   Eclipsing Binary Discrimination Test

Top-left: Diagnostic plot of Odd/Even Transit Depth Test for catId 116264089, planet 1. A significance level close to 1/0 favors a transiting planet/an eclipsing binary. Open `./planet-01/binary-discrimination-test-results/0000000116264089-01-eclipsing-binary-discrimination-tests.fig`

Appendix B   Alerts

This target did not trigger any alerts.