

LIGHTCURVE ANALYSIS OF MINOR PLANETS OBSERVED AT THE OAKLEY SOUTHERN SKY OBSERVATORY: 2017 AUGUST–SEPTEMBER

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From 2017 July 26 to September 28, images of 19 minor planets were collected: 820 Adriana, 1326 Losaka, 1594 Danjon, 2021 Poincare, 2164 Lyalya, 2353 Alva, 2558 Viv, 2623 Zech, 3341 Hartmann, 4522 Britastra, (10113) 1992 PX2, 11434 Lohnert, (11889) 1991 AH2, (14892) 1991 VE5, (15549) 2000 FN, (21893) 1999 VL4, (23621) 1996 PA, (30769) 1984 ST2, and (42284) 2001 TV8.

The Oakley Southern Sky Observatory is equipped with an STX-16803 camera attached to a 0.5-m Planewave telescope operating at $f/6.7$. For minor planet photometry we use a luminance filter and bin the camera 3x3 to get a plate scale of 1.63 arcseconds.

From 2017 July 26 to August 5, we targeted six minor planets: 820 Adriana, 2558 Viv, 2623 Zech, 4522 Britastra, (10113) 1992 PX2, and (42284) 2001 TV8. Beginning on August 23, we targeted an additional six minor planets: 2164 Lyalya, 11434 Lohnert, (15549) 2000 FN, (21893) 1999 VL4, (23621) 1996 PA, and (30769) 1984 ST2. Finally, from September 19–30, we observed another seven minor planets: 1326 Losaka, 1594 Danjon, 2021 Poincare, 2353 Alva, 3341 Hartmann, (11889) 1991 AH2, and (14892) 1991 VE5. All images were processed using standard techniques with *MaxIm DL*. The processed images were then measured and lightcurves generated with *MPO Canopus*.

Table I lists the targets, range of dates, phase angle, phase angle bisector longitude and latitude as well as the period if we were able to determine one. We were unable to find periods for 1326 Losaka, 1594 Danjon, 2353 Alva, (23621) 1996 PA, and (30769) 1984 ST2.

2164 Lyalya. Our period of 7.705 ± 0.003 h does not agree with the period of 11.566 h (no uncertainty given) found by Chang *et al.* (2016). However, note that 7.705 h is approximately two thirds of 11.566 h.

2623 Zech. We found a period of 2.740 ± 0.002 h, which agrees within experimental uncertainty with the period of 2.7401 $\pm$ 0.0002 h found by Pray *et al.* (2014).

4522 Britastra. Chang *et al.* (2016) reported a period of 2.767 h (no uncertainty given). We could not fit our data to this period. Instead we found a period of 11.919 ± 0.011 h.

(10113) 1992 PX2. Our period of 6.775 ± 0.003 h falls just outside the uncertainty range with the period of 6.768 ± 0.002 h found by Waszczak *et al.* (2015).

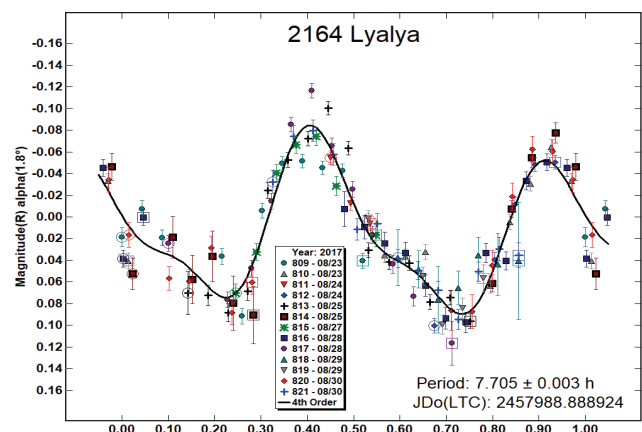
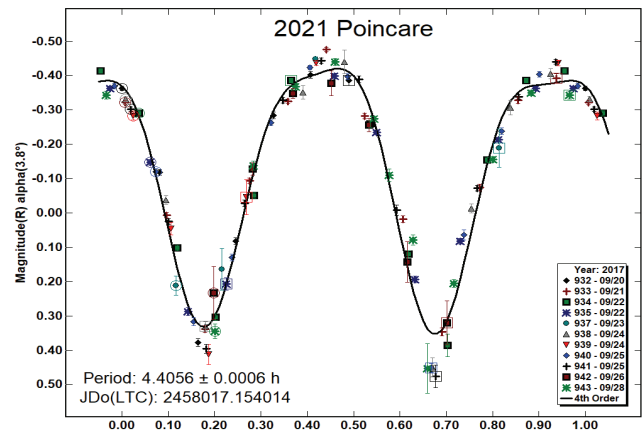
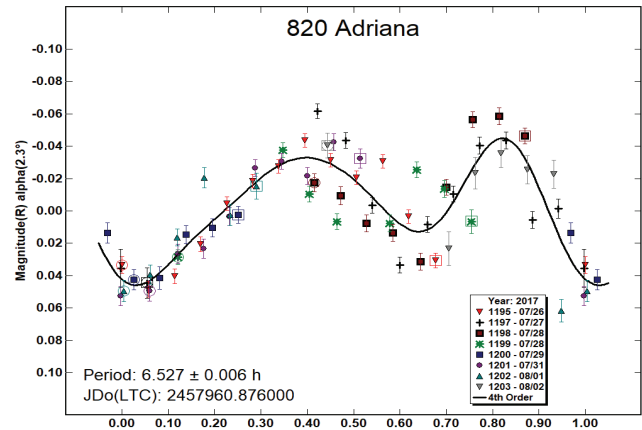
References

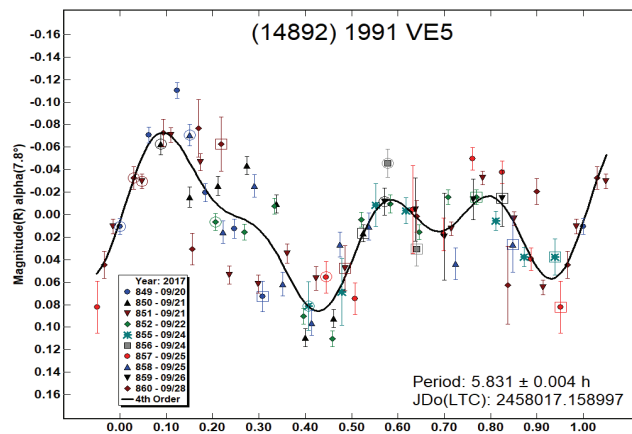
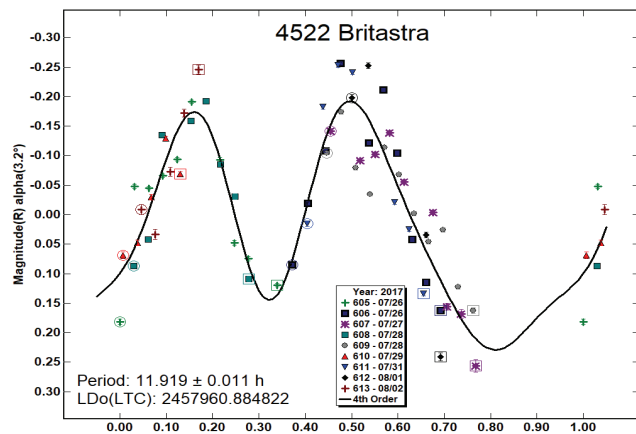
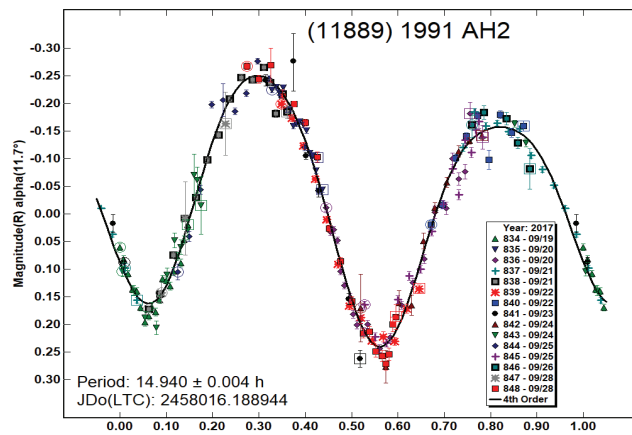
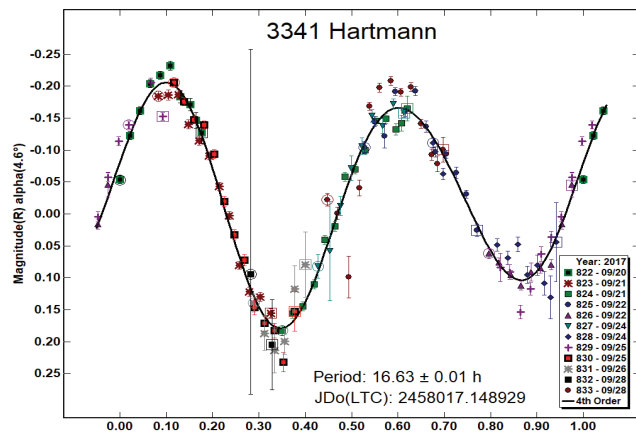
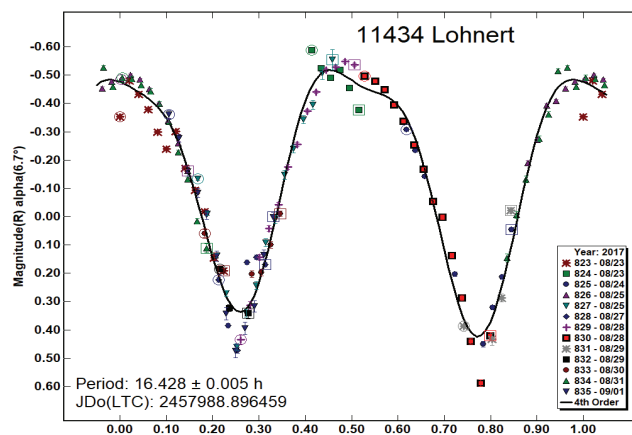
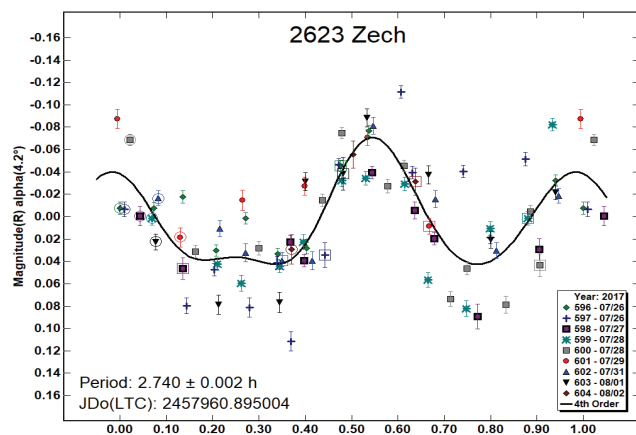
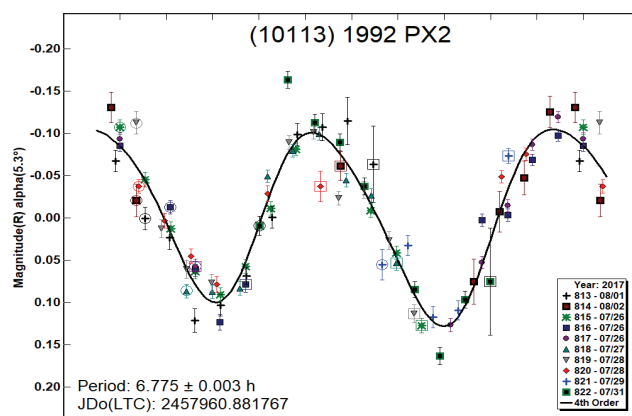
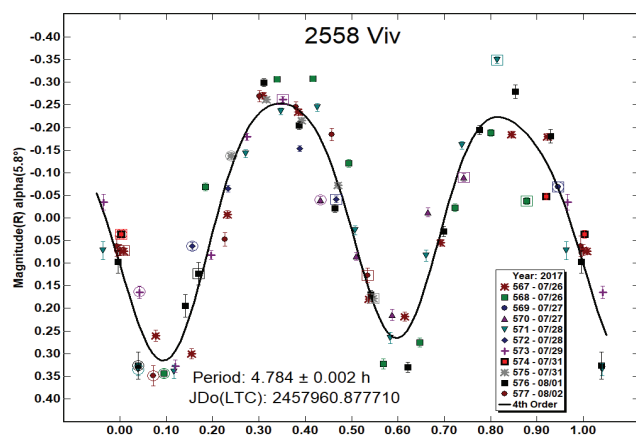
Chang, C.-K., Lin, H.-W., Ip, W.-H., Prince, T.A., Shrinivas, R.K., Levitan, D., Laher, R., Surace, J. (2016). “Large Super-Fast

Rotator Hunting Using the Intermediate Palomar Transient Factory.” *Astrophys. J. Sup. Ser.* **227**, A20.

Pray, D., Pravec, P., Chiozny, V., Krugly, Yu.N., Benishek, V., Pollock, J., Caton, D.B., Smith, A.B., Hawkins, R.L., Inasaridze, R., Montaigne, R., Leroy, A., Reichart, D.E., Haislip, J.B., LaCluyze, A.P. (2014). “(2623) Zech.” *CBET* **4012**.

Waszczak, A., Chang, C.-K., Ofek, E.O., Laher, R., Masci, F., Levitan, D., Surace, J., Cheng, Y.-C., Ip, W.-H., Kinoshita, D., Helou, G., Prince, T.A., Kulkarni, S. (2015). “Asteroid Light Curves from the Palomar Transient Factory Survey: Rotation Periods and Phase Functions from Sparse Photometry.” *Astron. J.* **150**, A75.





Number	Name	2017 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period (h)	P.E.	Amp	A.E.
820	Adriana	07/26-08/02	71	2.0, 4.7	298	0	6.527	0.006	0.10	0.03
1326	Losaka	09/19-09/30	197	13.2, 14.9	354	-22			0.05	0.03
1594	Danjon	09/20-09/30	129	9.1, 11.9	352	-13			0.15	0.05
2021	Poincare	09/20-09/28	101	3.4, 8.0	354	-3	4.4056	0.0006	0.80	0.05
2164	Lyalya	08/23-08/30	125	1.6, 4.3	327	-2	7.705	0.003	0.20	0.03
2353	Alva	09/20-09/30	92	2.7, 6.9	353	-3			0.08	0.03
2558	Viv	07/26-08/02	76	5.7, 7.1	303	-8	4.784	0.002	0.58	0.03
2623	Zech	07/26-08/02	84	4.0, 7.4	300	-4	2.740	0.002	0.15	0.05
3341	Hartmann	09/20-09/28	122	4.4, 6.6	356	-8	16.63	0.01	0.40	0.05
4522	Britastra	07/26-08/02	69	3.0, 6.1	299	3	11.919	0.011	0.40	0.06
10113	1992 PX2	07/26-08/02	86	2.5, 5.4	300	4	6.775	0.003	0.22	0.03
11434	Lohnert	08/23-09/01	131	6.5, 9.8	322	-5	16.428	0.005	0.90	0.05
11889	1991 AH2	09/20-09/28	192	11.7, 13.1	352	-21	14.940	0.004	0.45	0.03
14892	1991 VE5	09/20-09/28	77	7.4, 11.8	350	-5	5.831	0.004	0.15	0.05
15549	2000 FN	08/23-09/01	168	4.8, 10.0	326	-4	55.09	0.04	1.00	0.05
21893	1999 VL4	08/23-09/01	172	6.6, 11.5	327	-5	3.0100	0.0005	0.14	0.04
23621	1996 PA	08/23-09/01	113	7.5, 15.6	325	-5			0.12	0.05
30769	1984 ST2	08/23-09/01	130	4.6, 10.1	325	-2			0.07	0.05
42284	2001 TV8	07/26-08/05	198	12.9, 14.2	302	-21	5.1053	0.0003	0.70	0.05

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range.

