LIGHTCURVE ANALYSIS FOR EIGHT MINOR PLANETS AT BASSANO BRESCIANO OBSERVATORY

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Lightcurves for eight minor planets were obtained at Bassano Bresciano Observatory from 2011 September to 2012 March: 1028 Lydina, 1430 Somalia, 3397 Leyla, 4350 Shibecha, 8345 Ulmerspatz, (16959) 1998 QE17, (27111) 1998 VV34, and (28913) 2000 OT.

Photometric measurements of eight minor planets were obtained at Bassano Bresciano Observatory (565) using the 0.32-m *f*/3.1 Schmidt and Starlight HX-516 CCD camera at prime focus. The camera was binned 2x2, giving a scale of 3.05 arcsec/pixel. Exposure times for the unfiltered, unguided images were 120 s. All exposures were taken when the target's altitude was more than 30°. *Polypus* software (Bassano Bresciano Observatory, 2010) was used to control the robotic observations. All raw images were processed with flat field and dark frames. *MPO Canopus* (Bdw Publishing, 2010) was used to perform differential photometry on the reduced images. Only solar-coloured comparison stars were used in order to minimize colour difference errors by using the Comp Star Selector in *MPO Canopus*. Data were light-time corrected but not reduced to standard magnitudes. The periods reported here were based on those having the lowest RMS error. Night-to-night calibration was done by adjusting the DeltaComp value in MPO *Canopus*. All data have been sent to the ALCDEF database (*http://minorplanetcenter.net/light_curve*)

Asteroid	Date	Phase Angle	Time h.	Num. Obs
1028 Lydina	2011-12-19	6.6	5.9	127
1028 Lydina	2011-12-20	7.1	5.5	115
1028 Lydina	2011-12-22	7.8	6.4	160
1028 Lydina	2011-12-27	9.5	6.2	153
1028 Lydina	2011-12-30	10.4	6.3	130
1430 Somalia	2011-09-19	6.1	1.7	30
1430 Somalia	2011-09-20	6.6	3.8	80
1430 Somalia	2011-09-21	7.1	2.8	69
1430 Somalia	2011-09-26	9.7	5.5	135
1430 Somalia	2011-09-27	10.2	3.5	58
1430 Somalia	2011-09-29	11.2	5.5	128
3398 Leyla	2012-02-14	23.1	1.0	27
3398 Leyla	2012-02-15	22.9	9.0	177
3398 Leyla	2012-02-16	22.8	3.3	51
4350 Shibecha	2012-03-20	17.5	2.5	61
4350 Shibecha	2012-03-21	17.8	2.8	61
4350 Shibecha	2012-03-22	18.1	4.8	121
4350 Shibecha	2012-03-25	19.1	4.5	98
8345 Ulmerspatz	2011-12-21	5.3	1.5	39
8345 Ulmerspatz	2011-12-23	4.5	1.5	59
8345 Ulmerspatz	2011-12-24	3.8	0.2	6
8345 Ulmerspatz	2011-12-26	2.3	2.3	60
8345 Ulmerspatz	2011-12-27	1.6	4.1	75
8345 Ulmerspatz	2011-12-29	0.3	1.7	45
8345 Ulmerspatz	2012-01-12	10.4	6.5	122
8345 Ulmerspatz	2012-01-13	11.1	7.0	94
16959 1998 QE17	2011-10-17	11.3	6.5	159
16959 1998 QE17	2011-10-22	13.8	2.2	50
27111 1998 VV34	2011-09-22	5.6	1.5	36
27111 1998 VV34	2011-09-30	10.5	5.0	107
27111 1998 VV34	2011-10-01	11.0	5.5	118
27111 1998 VV34	2011-10-03	12.2	5.5	126
28913 2000 OT	2012-02-17	9.2	5.4	63
28913 2000 OT	2012-02-21	11.5	5.8	39
28913 2000 OT	2012-02-22	12.1	6.5	161
28913 2000 OT	2012-02-24	13.2	4.0	83
28913 2000 OT	2012-02-25	13.8	6.7	164
28913 2000 OT	2012-02-26	14.3	4.8	122
28913 2000 OT	2012-02-29	15.8	3.2	69
28913 2000 OT	2012-03-11	20.8	4.8	121

Table I. Observation circumstances.

1028 Lydina. This asteroid was selected from Warner *et al.* (2011b) where it was listed as having a period of 15.59 h, amplitude 0.70 mag, and quality code U = 2. We observed for 5 nights covering an 11-day span. All sessions showed one minimum and one maximum. Our analysis found a bimodal lightcurve with a period P = 11.674 ± 0.002 h and amplitude A = 0.30 ± 0.02 mag. Despite the small gap in the lightcurve at around 0.9 phase in the plot, we are confident in the reported period.

1430 Somalia. Somalia was selected from Warner *et al.* (2011a). No previous period was reported. We observed it for 6 nights covering a 10-day span. The longest session covered more than half of the derived period of P = 6.913 ± 0.001 h. The lightcurve has an amplitude A = 0.45 ± 0.02 mag.

3397 Leyla. We selected this asteroid from Warner *et al.* (2012). No previous period was reported. Observations were made on 2 nights over a 2-day span. The raw data from the longest session showed 6 minimums and 5 maximums, which made a 3- hour period very likely. Our analysis found P = 3.099 ± 0.002 h for a bimodal lightcurve with amplitude A = 0.38 ± 0.02 mag.

4350 Shibecha. This asteroid was selected from Warner *et al.* (2012). No previous period was reported. Observations on 4 nights covered a 5-day span. All sessions appeared to show fast changes with little overall amplitude. We found a period of P = 2.89 ± 0.01 h and amplitude A = 0.16 ± 0.03 mag.

8345 Ulmerspatz. We selected this target from Warner *et al.* (2011b). No previous period was reported. We observed it for 8 nights over a 22-day span. The period for the bimodal lightcurve is P = 17.416 ± 0.002 h with an amplitude A = 0.80 ± 0.03 mag.

(16959) 1998 QE17. This asteroid was selected from Warner *et al.* (2011b), which gave a period of 6.31 h and amplitude of 0.30 mag with quality code U = 1+. We obtained observations on 2 nights over a 5-day span. In the first session it was possible see a very regular sine wave with 4 minimum and 4 maximum, or a period of about 3 hours assuming a bimodal lightcurve. Another session fives days later was enough to find the period. Given the amplitude of 0.30 ± 0.03 mag, the lightcurve is almost certainly bimodal. This lead to a period solution P = 3.226 ± 0.001 h.

(27111) 1998 VV34. We selected 1998 VV34 from Warner *et al.* (2011a). No previous period was reported. Observations on 4 nights were obtained over an 11-day span. In the longest session it was possible to see 4 minimum and 3 maximum, which indicated a period of about 3 hours. The final analysis found a bimodal lightcurve with P = 3.323 ± 0.001 h and amplitude A = 0.15 ± 0.03 mag.

(28913) 2000 OT. 2000 OT was was selected from Warner *et al.* (2012) where the asteroid was reported to have a period of 15.30 hours and amplitude 0.35 mag with quality code U = 2. We observed it on 8 nights over a 23-day span. The best solution we

found was for a bimodal lightcurve with a period of P = 13.754 ± 0.002 h and amplitude A = 0.32 ± 0.02 mag.

References

Bassano Bresciano Observatory (2010). Polypus software, v1.5. *http://www.osservatoriobassano.org /testi/automazione.htm*

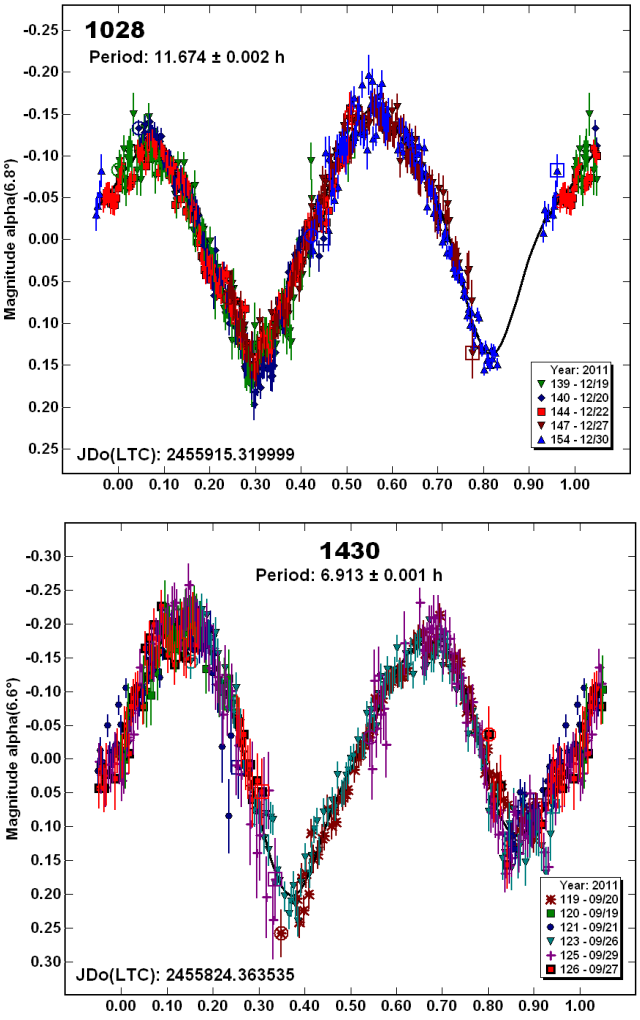
Bdw Publishing (2010). *MPO Canopus* software, v 10.4.0.20. *http://minorplanetobserver.com*

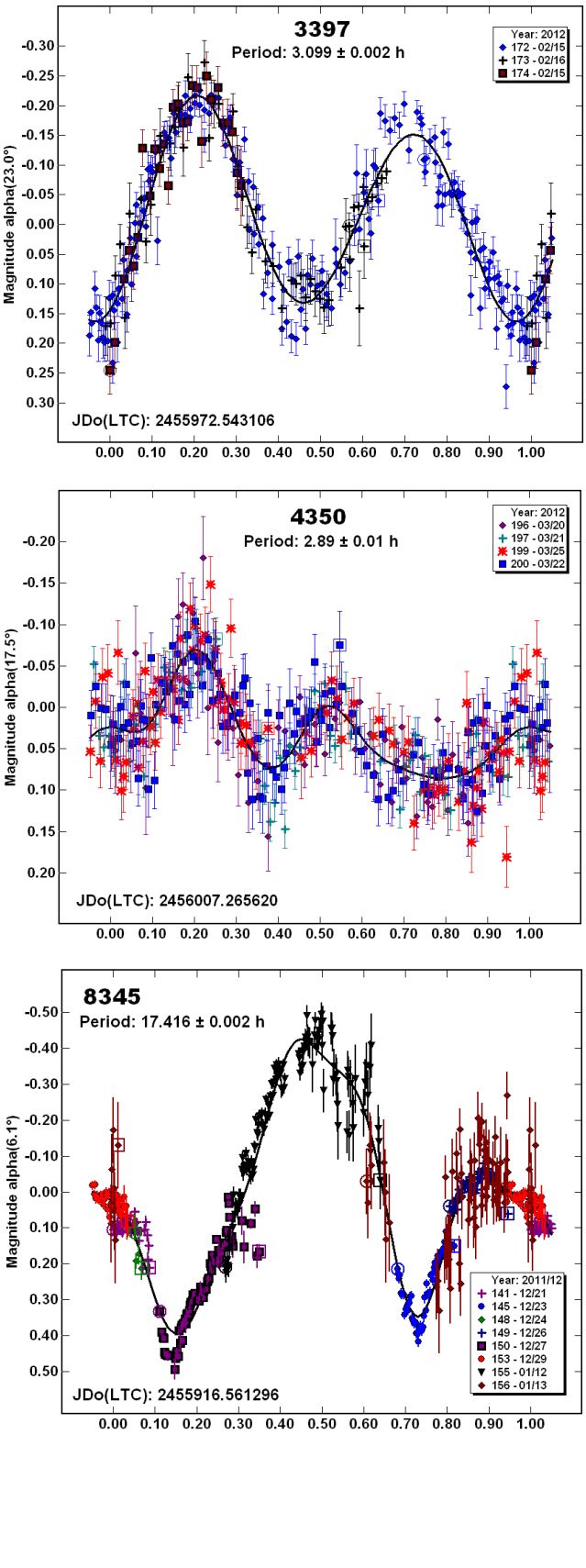
Warner, B.D., Harris, A.W., Pravec, P., Durech, J., and Benner, L.A.M., (2011a). "Lightcurve Photometry Opportunities: 2011 July-September." *Minor Planet Bulletin* **38**, 174-179.

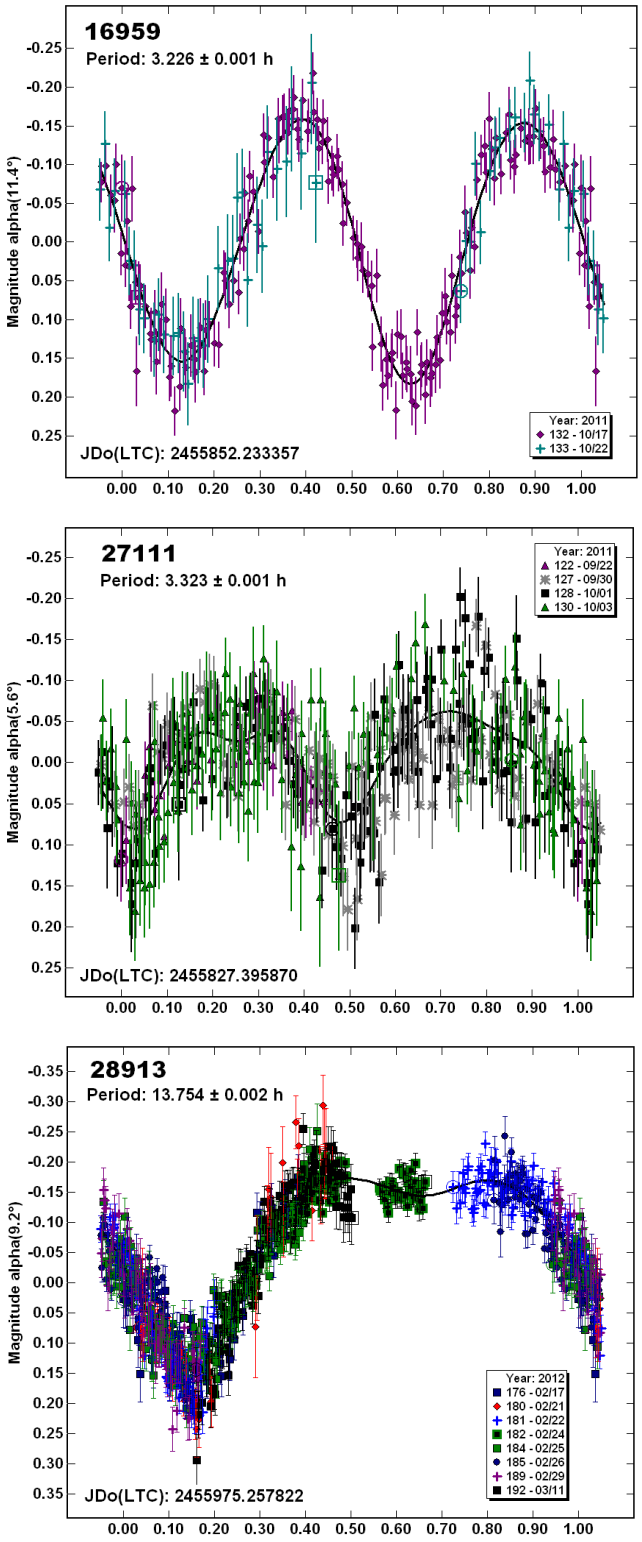
Warner, B.D., Harris, A.W., Pravec, P., Durech, J., and Benner, L.A.M., (2011b). "Lightcurve Photometry Opportunities: 2011 October-December." *Minor Planet Bulletin* **38**, 224-229.

Warner, B.D., Harris, A.W., Pravec, P., Durech, J., and Benner, L.A.M., (2012). "Lightcurve Photometry Opportunities: 2012 January-March." *Minor Planet Bulletin* **39**, 31-34.

Warner, B.D. (2006). *A Practical Guide to Lightcurve Photometry and Analysis*. Springer: New York.







CCD PHOTOMETRY AND LIGHTCURVE ANALYSIS OF MAIN-BELT ASTEROIDS 14 IRENE, 4874 BURKE, 1985 HOPMANN, 3017 PETROVIC, AND 3070 AITKEN FROM OBSERVATORI CARMELITA IN TIANA

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Observations carried out from 2011 December to late 2012 March allowed us to determine the synodic periods of 14 Irene, 1985 Hopmann, 3017 Petrovic, 3040 Aitken, and 4874 Burke. For 14 Irene, a period of 15.038 ± 0.002 h was found with an amplitude A = 0.10 mag, well in accordance with other published estimates. 1985 Hopmann exhibited a rotational period of 17.476 ± 0.003 h, A = 0.44 mag. 3017 Petrovic exhibited a rotational period of 4.080 ± 0.001 h, A = 0.62 mag. 3070 Aitken showed a period of 6.390 ± 0.005 h, A = 0.59 mag. For 4874 Burke we found a short rotational period of 3.657 ± 0.001 h with A = 0.31 mag.

The Carmelita Observatory (MPC B20) is situated in Tiana, in the southernmost part of the Serra de Marina, a moderately light-polluted suburban park 15 km north of Barcelona, Spain. The observatory is equipped with an Astro-Physics AP900 German equatorial mount on top of a fixed pier, a 25-cm Schmidt-Cassegrain telescope with a focal reducer, and a dual-chip SBIG ST8-XME CCD camera with filter wheel. However, for this particular imaging run, a 13-cm triplet refractor with a field flattener yielding an effective resolution of 2.08 arcsec/pix was used.

14 Irene (1952 TM) is a main-belt asteroid (e = 0.16569, a = 2.5874) of very respectable size (about 150 km) that was discovered by J. R. Hind in 1851. It is known that the asteroid lightcurve is very shallow, and several rotational periods have been estimated over the years. The most recent data sets published are those from Hanus *et al.* (2011) and Pilcher (2009). They determined synodic periods of 15.02991 h and 15.028 h, respectively. The 2011-2012 apparition presented an excellent opportunity for the small refractor, with the asteroid at V ~ 10.8. We collected more than 3,000 60-s images from 2011 December 18 to 2012 January 10 through a C filter with Maxim DL acquisition software. The CCD camera operated at –15º C and all images were calibrated with master bias, dark, and flat frames. We performed real-time differential photometry of the asteroid with *Fotodif* as the images were being downloaded. With *MPO Canopus* we derived a lightcurve showing a period of 15.038 ± 0.002 h and amplitude A = 0.10 mag. This agrees well with the most recent results.