

LIGHTCURVES ANALYSIS OF 12 ASTEROIDS FROM LEURA OBSERVATORY

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The following 12 light curves were obtained in the first 6 months of 2006. Analysis of the light curves were done and both synodic period and amplitude were derived. 762 Pulcova, $5.8400\text{h} \pm 0.0001\text{h}$, $0.20 \pm 0.02\text{mag}$; 7360 Moberg, $4.6996 \pm 0.0006\text{h}$, $0.38 \pm 0.01\text{mag}$; 171 Ophelia, $6.6666 \pm 0.0002\text{h}$, $0.50 \pm 0.02\text{mag}$; 710 Gertrud $8.291 \pm 0.002\text{h}$, $0.30 \pm 0.02\text{mag}$; 2104 Toronto $8.9669 \pm 0.0002\text{h}$, $0.35 \pm 0.02\text{mag}$; 1495 Helsinki, 5.3315 ± 0.0005 , $1.4 \pm 0.2\text{mag}$; 1241 Dysona, $8.6085 \pm 0.0005\text{h}$, $0.26 \pm 0.02\text{mag}$; (85804) 1998 WQ5, $3.0089 \pm 0.0001\text{h}$, $0.15 \pm 0.05\text{mag}$; (35369) 1997 UJ11, $2.40 \pm 0.04\text{h}$, $0.15 \pm 0.05\text{mag}$; 293 Brasilia, $8.173\text{h} \pm 0.0002\text{h}$, $0.30 \pm 0.05\text{mag}$; 291 Alice, $4.313\text{h} \pm 0.002\text{h}$, $0.20 \pm 0.03\text{mag}$; 683 Lanzia, $8.631\text{h} \pm 0.001\text{h}$, $0.20 \pm 0.02\text{mag}$.

Equipment and Procedures

Leura Observatory is located at an altitude of 950m in a quaint little town of Leura in the Blue Mountain, Australia. The observatory is equipped with a 0.35m f/11 Schmidt-Cassegrain telescope on a CGE mount and attached to it is an SBIG ST9XE ccd camera with Kodak KAF-0261 CCD giving 1.07 arc second/pixel at binning 1x1. This telescope is controlled remotely from Sydney by means of broadband internet connection 100 km away. The data was then downloaded to be processed by the observer using MPO Canopus differential aperture photometry reduction software immediately after completion of the nightly run. MPO Canopus software has been previously well documented where it implements the Fourier Analysis algorithm developed by Harris (1989).

All images were unfiltered. Dark frames and Flat Field frames were used for image calibration. Any poor quality images were discarded.

Targets were chosen from the list provided from Minor Planet Observatory CALL website by Brian Warner where light curve photometry opportunities were selected. The main criteria being little or no lightcurve work done previously.

Results

762 Pulcova

The light curve of this minor planet is well known. R.G. Davies (2001) and Stephens (2000) measured a high precision lightcurve of $5.83923\text{h} \pm 0.00004\text{h}$ and this asteroid is also a known binary system (Merline et al, 2000). The companion has an orbital period of 4.0 days.

A total of 383 images taken over 5 nights shows a synodic period of $5.8403\text{h} \pm 0.0005\text{h}$ and amplitude of $0.20 \pm 0.02\text{mag}$, that correlate well with the accepted value. A small dip during the maxima on the 9th March and 27th March may be due to effect of the satellite.

7360 Moberg

No previous light curve work has been published for this asteroid. 176 images were taken over a period of 3 nights. The curve shows a typical bimodal curve with a synodic period of $4.699\text{h} \pm 0.001\text{h}$ and amplitude of $0.38 \pm 0.01\text{mag}$.

171 Ophelia

This asteroid has been previously studied by Tedesco (1979) who derived a period of $6.672\text{h} \pm 0.072\text{h}$. Works compiled

in Raoul Behrend et al. of Geneva Observatory website for shape determination indicate a period of $6.66624h \pm 0.00012h$.

6 nights of observation with a U=3 data derived a period of $6.6666h \pm 0.0002h$ and it correlate well with previous work above.

710 Gertrud

No previous light curve work has been published for this asteroid. Due to unseasonable weather condition, short sessions were possible over a period of 6 consecutive nights. On the 5th night (11/04), a slight brightening is observed at phase 0.22. Further observations will be needed to determine the true nature of this phenomenon.

2104 Toronto

Again no previous light curve work has been published for this asteroid. A typical bimodal curve is obtained from 6 nights spanning from 06/03 to 17/04. Although a gap in the curve is present at phase 0.65, the derived period is $8.9669h \pm 0.0002h$.

1495 Helsinki

No previous light curve work has been published for this asteroid. The light curve resembles a bimodal curve but current observation only allows limited solution. Data was sent to Petr Pravec of Ondrajev Observatory for determination of binarity of the asteroid. It was suggested that the asteroid is more likely be a tumbler. Future observations and collaborations with observers from different longitude is required for a clearer solution for this complex light curve.

1241 Dysona

This asteroid has been documented before namely Behrend (2002) where a period was found to be 8.856h. Correspondence with Raoul Behrend of Geneva observatory indicated that the observations done were relatively short and there are a number alias exists. The period reported by this author's observations between 21/04/2006 and 06/05/2006 is another alias with smaller residual. It may require further observations with longer runs to precisely determine the light curve period. The Period derived is $8.6072 h \pm 0.0008h$.

85804 1998 WQ5

This asteroid is selected from the Collaborative Asteroid Lightcurve Link homepage (CALL) for its Southerly position and the challenge to obtain light curve for a relatively faint target. Later on I discovered that the Binary Asteroid Photometric Survey placed 85804 as a possible Binary Asteroid target. Some observations were done by them and correspondence with Petr Pravec of the Ondrajev observatory suggested yet again that further observations are needed and should be done in collaboration. The period recorded is $3.0089h \pm 0.0001h$.

35369 1997 UJ11

This asteroid is a target opportunity. Its in the same field as 710 Gertrud on 06/04. The period derived from only 1 session as $2.48h \pm 0.09h$.

293 Brasilia

No previous light curve work has been published for this asteroid. A regular bimodal curve obtained with a period of $8.1730h \pm 0.0002h$.

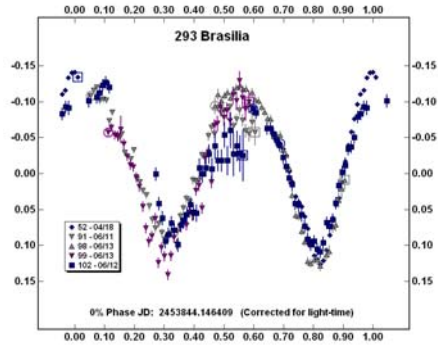
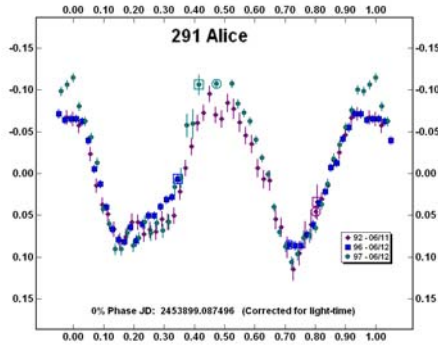
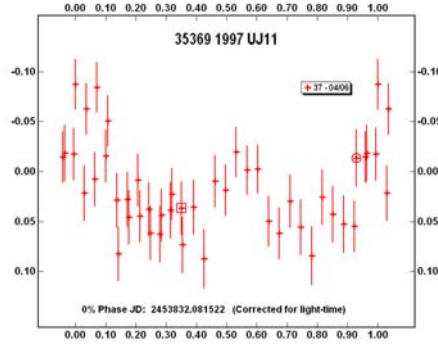
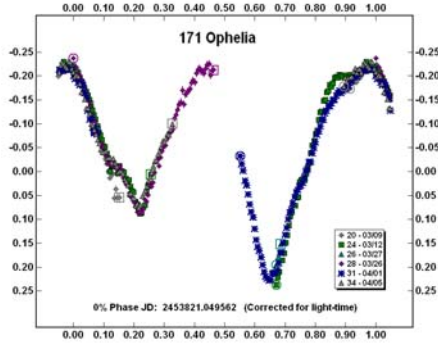
291 Alice

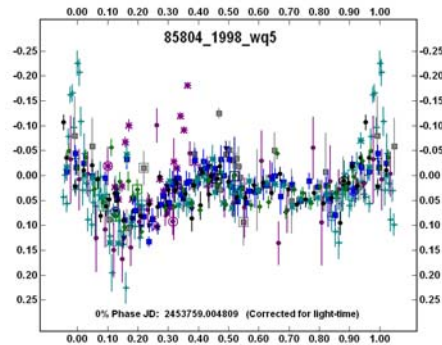
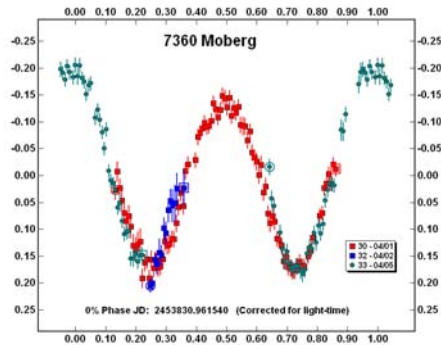
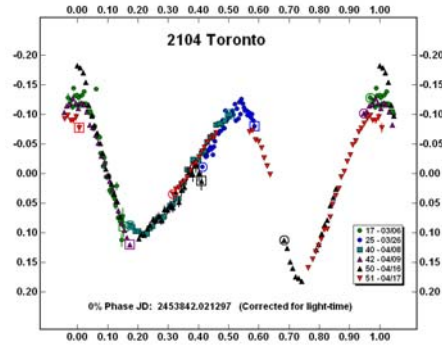
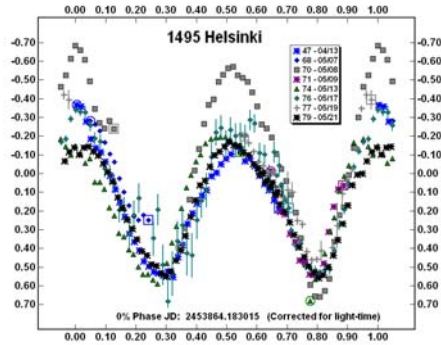
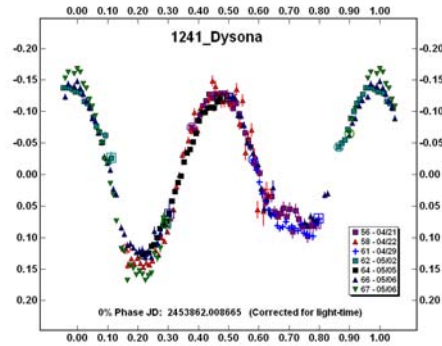
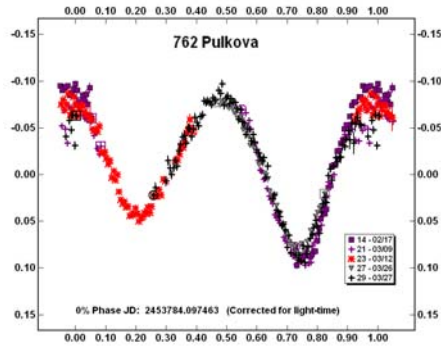
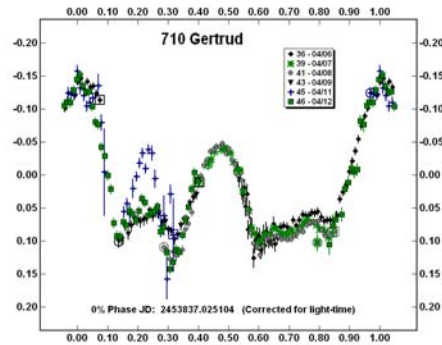
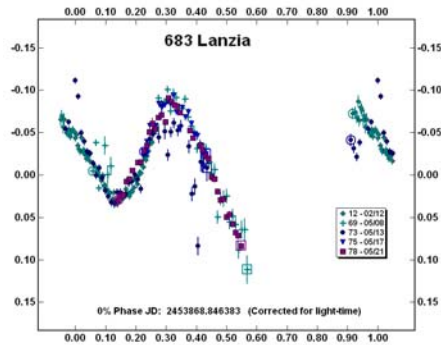
Alice has been a very well studied asteroid. Binzel (1983) has reported the pole position. Lager (1976), Kryszczynska (1996), Piironen (1998) reported a period of 4.32h . This asteroid was observed as an opportunistic target where it was in the same field as 293 Brasilia on the nights of 11/06 and 12/06. The derived period is $4.313h \pm 0.002h$ that is in close agreement with the previous results.

683 Lanzia

Lanzia was selected as one of my original trial asteroid (12/02). 3 months later I decide to try completing the whole curve. Unfortunately, the asteroid is no longer in a favourable position and it only allowed 4 short hour sessions which resulting in reasonably overlapped incomplete curve. The period is derived as $8.631h \pm 0.001h$. This is in agreement with previously derived value of 8.630h by Stephens (2004).

#	Name	Date Range	Sessions	Data Points	Period (h)	PError (h)	Amplitude(m)	AError(m)
171	Ophelia	09/03-05/04	6	435	6.6666	0.0002	0.50	0.02
291	Alice	11/06-12/06	2	130	4.313	0.002	0.20	0.03
293	Brasilia	18/04-13/06	4	243	8.173	0.0002	0.20	0.03
683	Lanzia	12/02-25/05	5	226	8.631	0.001	0.20	0.02
710	Gertrud	06/04-12/04	6	277	8.291	0.002	0.35	0.02
762	Pulkova	17/03-27/03	5	383	5.84	0.0001	0.20	0.02
1241	Dysona	21/04-06/05	7	285	8.6072	0.0008	0.26	0.02
1495	Helsinki	13/04-21/05	8	329	5.3315	0.0005	1.40	0.40
2104	Toronto	06/03-17/04	6	256	8.9669	0.0002	0.35	0.02
7360	Moberg	01/04-05/04	3	176	4.6996	0.0006	0.38	0.01
35369	1997 UJ11	6/04	1	41	2.4	0.04	0.15	0.05
85804	1998 WQ5	23/01-26/04	10	332	3.0089	0.0001	0.35	0.10





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