## LIGHTCURVE AND ROTATION PERIOD DETERMINATION FOR MINOR PLANET 3397 LEYLA

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Photometric observations of Mars-crossing minor planet 3397 Leyla (1964 XA) was undertaken in March 2012. The resulting synodic rotation period of 3.098 ± 0.002 h and amplitude, A = 0.29 ± 0.05 mag was measured and determined from five nights of observations.

Cherryvalley Observatory (MPC Code I83) is a small observatory operated by the author and located in rural County Meath, Ireland. Observations from Cherryvalley Observatory were conducted with a 0.2-m *f*/10 Schmidt-Cassegrain Telescope (SCT) on a GEM mount using an SBIG STL-1301E CCD camera with a 1280x1024 array of 16-micron pixels fitted with an R-band photometric filter. The resulting image scale was 1.50 arcsecond per pixel. Exposures were 120 seconds each. The CCD camera working temperature was –30˚ C on average. All light images were dark and flat-field corrected, guided, and unbinned. For analysis, the light-time corrected mid-exposure times were used in *MPO Canopus v10.4.0.20* (Bdw Publishing). 365 useful data points were used in calculations from a total data set of 643, which were obtained over five nights of observations spanning 23 days.

Imaging, focus, and plate solving were done with *CCDSoft v5* and *TheSky6 Professional*. Data were reduced in *MPO Canopus* (Bdw Publishing) using differential photometry to facilitate easy exportation. Night-to-night zero point calibration was accomplished by selecting up to five comp stars with near solar colours, chosen by using the *MPO Canopus* Comp Star Selector feature. The Cousins R Magnitudes for the comparisons were derived using the 2MASS to BVRI formulae developed by Warner (2007). Period analysis was completed using *MPO Canopus*, which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris *et al*., 1989).

3397 Leyla. This asteroid was discovered by R. Burnham and N. G. Thomas in 1964 from Flagstaff. It is a Mars-crosser, defined approximately by an orbit of 1.3 AU < $q$ < 1.666 AU and $a$ < 3.2 AU. Its diameter is estimated to be 5.3 ± 0.5 km. The absolute magnitude is $H$ = 13.60 and phase slope parameter is $G$ = 0.226 ± 0.047. The asteroid was reported as a lightcurve opportunity in the *Minor Planet Bulletin* (Warner *et al.*, 2012).

Observations of 3397 Leyla were made 2012 March 4-27 resulting in a data span of 552 hours (approximately 178 rotational cycles).

Table I gives the observation circumstances. PAB is the phase angle bisector (see Harris *et al.*, 1984, for the derivation of the PAB).

The lightcurve (Figure 1) demonstrates a classical bimodal shape of two distinct minimums and maximums. The period solution of 3.098 ± 0.002 h is in agreement with earlier work by Klinglesmith (2012) from 154 data points with a rating of U = 1+ (Warner *et al.*, 2009). Based upon additional observations by Cherryvalley Observatory, the Klinglesmith period appears correct and the lightcurve presented here rates U = 2+ and possibly U = 3-. Leyla was well-placed for observation from Cherryvalley Observatory and, with a reported synodic period of approximately 3 hours, it is usually easy to get good coverage in a single night and so have a relatively dense data sets for analysis.

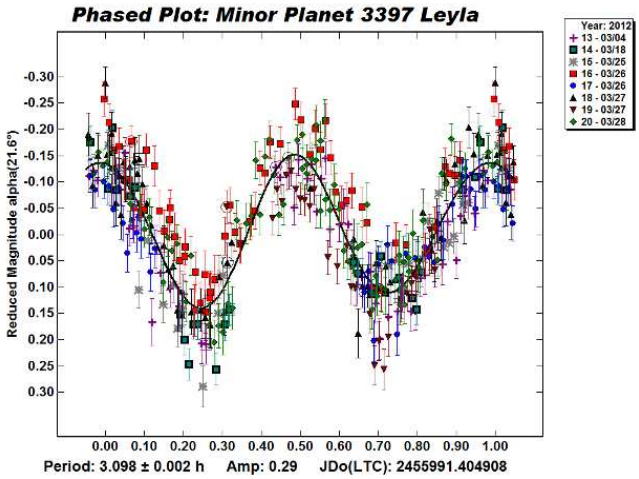


Figure 1. The lightcurve of 3397 Leyla shows a period of 3.098 ± 0.002 h with an amplitude of 0.29 ± 0.05 mag.

Acknowledgements

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References

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| Date 2012 | Time (UT) | Ph (deg) | Earth Dist (AU) | V-mag Predicted | Sun Dist (AU) | CCD Exposure (s) Each | LPAB (deg) | BPAB (deg) | CCD Total Frames | CCD Frames | Filter Band |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mar-04 | 00:00:00 | 21.7 | 0.834 | 15.1 | 1.718 | 120 | 153 | +27 | 74 | 57 | R |
| Mar-18 | 00:00:00 | 23.0 | 0.885 | 15.3 | 1.747 | 120 | 155 | +23 | 64 | 29 | R |
| Mar-25 | 00:00:00 | 24.3 | 0.923 | 15.5 | 1.764 | 120 | 157 | +21 | 137 | 93 | R |
| Mar-26 | 00:00:00 | 24.5 | 0.929 | 15.5 | 1.766 | 120 | 157 | +21 | 201 | 90 | R |
| Mar-27 | 00:00:00 | 24.7 | 0.936 | 15.5 | 1.769 | 120 | 157 | +21 | 167 | 96 | R |
| | | | | Ā = 15.4 | | | | | T = 643 | T = 365 | |

Table I. Observing Circumstances of 3397 Leyla between 2012 March 04th to March 27th

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JPL Small-Body Database Browser
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## A REQUEST TO POST YOUR LIGHTCURVE INVERSION MODELS

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We request that all authors of published lightcurve inversion papers, past and current, submit their results to the DAMIT lightcurve inversion website for permanent retention and ready availability to interested people.

An increasing number of people are using the lightcurve inversion software to produce good quality lightcurve inversion models and publishing them in the *Minor Planet Bulletin.* We are requesting that after publication, you submit your data to second author Durech at *durech@sirrah.troja.mff.cuni.cz*. Please use the format of shape and data files as they are produced by *LCInvert*, as published by Brian Warner. We wish to post these on the DAMIT website for asteroid lightcurve inversion models, *http://astro.troja.mff.cuni.cz/projects/asteroids3D*. This database archive is described by Durech et al. (2010). Here they are available to all interested people, and full reference to the authors of the model is also provided. This is analogous to the ALCDEF site for lightcurves. Submission to ALCDEF has become a standard procedure which is being followed nowadays by most of the authors who publish lightcurves in the *Minor Planet Bulletin.* We hope that submission of published lightcurve inversion models to DAMIT will also become a standard procedure. And we encourage the authors of all past as well as current published lightcurve inversion models to make them available to DAMIT.

Reference

Durech, J., Sidorin, V., and Kaasalainen, M. (2010) "DAMIT: a database of asteroid models." *Astron. Astrophys.* **513**, A46.

## ASTEROID LIGHTCURVE ANALYSIS AT THE OAKLEY SOUTHERN SKY OBSERVATORY: 2012 JANUARY-APRIL

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Photometric data for 29 asteroids were collected over 35 nights of observing during 2012 January-April at the Oakley Southern Sky Observatory. The asteroids were: 225 Henrietta, 648 Pippa, 862 Franzia, 1311 Knopfia, 1714 Sy, 1985 Hopmann, 2145 Blaauw, 2234 Schmadel, 2464 Nordenskiold, 2550 Houssay, 2698 Azerbajdzhan, 2903 Zhuhai, 3810 Aoraki, 3968 Koptelov, 4790 Petrpravec, 4892 Chrispollas, 4950 House, 5374 Hokutosei, 6321 Namuratakao, 6574 Gvishiani, 6972 Helvetius, (7036) 1995 BH3, (15269) 1990 XF, (19774) 2000 OS51, (21976) 1999 XV2, (30185) 2000 GT95, (30432) 2000 LM20, (44443) 1998 UY19, and (90076) 2002 VS95.

Twenty-nine asteroids were observed from the Oakley Southern Sky Observatory in New South Wales, Australia, on the nights of 2012 January 16-19, 21-23, February 11, 13-14, 16-17, 21-23, March 23-26, 29-31, April 2, 10-13, 16, 19-21, 24-26, 29. Through analyzing the data, we were able to find light curves for 12 asteroids. During this period, New South Wales experienced much rain and cloud coverage. Of the 12 lightcurves found, seven were for asteroids that had no previously published period. Out of the remaining five asteroids with lightcurves, only two agreed with previously published results.

The asteroids were selected based upon their position in the sky an hour after sunset. Then, asteroids with no previously published period were given higher priority than those asteroids that already have a published period. Finally, asteroids with uncertain periods were given priority in hopes that their previously published period could be improved. The telescope used was an *f*/8.1 0.5-meter Ritchey-Chretien optical tube assembly mounted on a Paramount ME mount. The camera was a Santa Barbara Instrument Group STL-1001E CCD camera with a clear filter. The image scale was 1.2 arcseconds per pixel with varied exposure times between 20 and 210 seconds. Calibration of the images was done using master twilight flats, darks, and bias frames. All calibration frames were created using *CCDSoft*. *CCDSoft* was also used to process the images and *MPO Canopus* was used to measure the images.

We have the first reported observations of the period of the following asteroids: 2145 Blaauw, 2234 Schmadel, 2464 Nordenskiold, 2698 Azerbajdzhan, 5374 Hokutosei, 6972 Helvetius, (15269) 1990 XF.

225 Henrietta. Our result is close to the period of 7.360 ± 0.001 h found by Chiorny (2007) but not within experimental uncertainty. Our result is closer to the period of 7.356 ± 0.001 h found by Michalowski *et al.* (2000). However, since these are all synodic periods, which can change from one apparition to the next depending on the behavior of the phase angle bisector (i.e., the sidereal-synodic period difference), and the periods are within 2-sigmas, all the results can be considered mutually consistent.