

ROTATION PERIODS AND LIGHT CURVES OF MINOR PLANETS (438) ZEUXO AND (4577) CHIKAKO

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Unfiltered differential photometry for minor planets (438) Zeuxo and (4577) Chikako is presented. Data obtained by the authors reveal lightcurves and synodic periods of 8.831 ± 0.002 hours for Zeuxo and 5.83 ± 0.01 hours for Chikako. The lightcurve amplitudes are 0.13 and 0.55 magnitudes respectively.

Observations reported here were obtained at the Blackberry Observatory, Port Allen, Louisiana (see Cooney and Robinson 2002 for a description) and at the Sonoran Skies Observatory, St. David, Arizona.

Sonoran Skies Observatory (MPC code G94) consists of a roll-off roof observatory which houses a C-14 on a Bisque Paramount GT1100S. The telescope operates at f/7.5 or f/6 depending on the need. Unfiltered images are taken with an SBIG ST9E CCD camera. Automated image acquisition is accomplished using Software Bisque Orchestrate in conjunction with CCDSoft V5. Usually two closely spaced asteroids are monitored alternately via the script. After acquisition the images were dark and bias subtracted and flat fielded.

The images of both authors were reduced by the first author (Cooney) using MIRA. Data were corrected for light travel time from the asteroid and are for mid-exposure. No other corrections have been applied. A spreadsheet was used to phase the data and apply the light-time correction. The uncertainty in period is based on an "eyeball" estimate of the range over which the period may be adjusted while still providing a solution that appears consistent given the scatter in the data. Dates referenced are UT.

(438) Zeuxo

There is no previously published lightcurve or rotation period for Zeuxo per Harris (2001). Authors Cooney and Gross obtained data over six nights in January and February of 2002. The data phase well with a period of 8.831 ± 0.002 hours and an amplitude of 0.13 magnitudes. There is a single prominent maximum and indications of several low amplitude maxima and minima as shown in Figure 1.

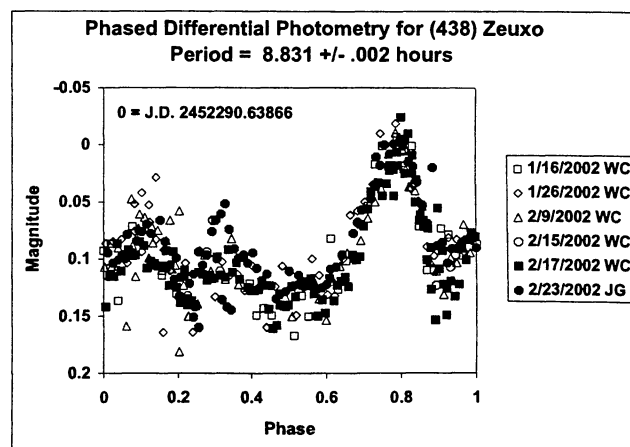


Figure 1. Phased light curve of (438) Zeuxo

(4577) Chikako

There is no previously published lightcurve or rotation period for Chikako per Harris (2001). Two nights of data were obtained at Blackberry Observatory. The data cover the entire proposed lightcurve for the proposed period of 5.83 ± 0.01 hours and amplitude of 0.55 magnitudes as shown in Figure 2.

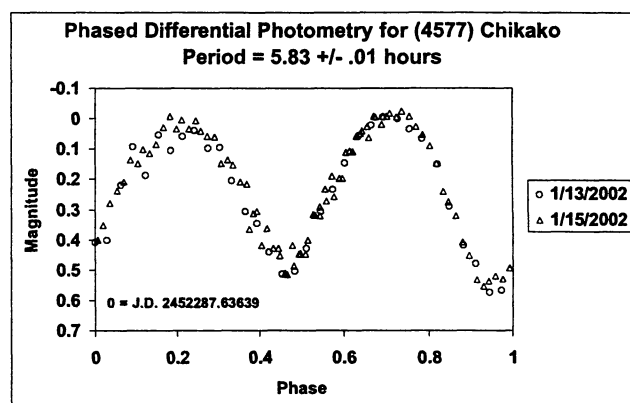


Figure 2. Phased light curve of (4577) Chikako

Acknowledgements

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References

Harris, Alan W. (2001). "Minor Planet Light Curve Parameters", on Minor Planet Center web site: <http://cfa-www.harvard.edu/iau/lists/LightcurveDat.html>.

Cooney, W. R. Jr., and Robinson, L. (2002). "Rotation Periods and Light Curves of Minor Planets (412) Elisabetha, (547) Praxedis, and (7564) 1988 CA", Minor Planet Bulletin, 29 (4), pp. 78-79

ASTEROID LIGHTCURVE PHOTOMETRY FROM GOODSELL OBSERVATORY (741)

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Lightcurve results of several asteroids derived from observations obtained at the Goodsell Observatory during mid-2002 are reported.: 592 Bathseba: synodic period 6.571 ± 0.008 hr, amplitude 0.22 ± 0.02 mag.; 676 Melitta: synodic period 7.870 ± 0.003 hr, amplitude 0.09 ± 0.02 mag.; 759 Vinifera: synodic period 14.229 ± 0.003 hr, amplitude 0.36 ± 0.02 mag.; 5199 Dortmund: period indeterminate; 5391 Emmons: synodic period 3.028 ± 0.004 hr, amplitude 0.14 ± 0.02 mag.; 8417 Lancetaylor: synodic period 6.538 ± 0.020 hr, amplitude 1.71 ± 0.02 mag.; 9936 1986 PN4: synodic period 10.704 ± 0.010 hr, amplitude 0.23 ± 0.02 mag.; 18487 1996 AU3: synodic period 6.512 ± 0.024 hr, amplitude 0.72 ± 0.02 mag.

Equipment and Procedures

This is a report on asteroid lightcurve investigations undertaken at the Goodsell Observatory in the United States. Goodsell Observatory, (Minor Planet Observatory code 741) is located at Carleton College in Northfield, Minnesota at an elevation of 286m. The main instrument at Goodsell is a 0.41m Brashear refractor. However, although this is a fine instrument, it is currently not well suited to CCD photometry. Therefore 0.20m f/10 Schmidt-Cassegrain telescopes with SBIG ST-8 and SBIG ST-8E CCD cameras were employed for these observations. The cameras were operated in 2x2 binned mode. The images were calibrated using dark frames and sky flats. All images were obtained without the use of filters.

Procedure

The target asteroids were, in general, selected a list of potential lightcurve targets posted on the Collaborative Asteroid Lightcurve Link (CALL) home page, maintained by Brian Warner. No lightcurve data for any of these asteroids had been previously reported (Harris, 2001). The differential photometry was measured using the program "Canopus" by Brian Warner, which uses aperture photometry. "Canopus" was also used in preparing the lightcurves. This program uses a routine based on the method developed by Dr. Alan Harris (Harris et al., 1989). Differential magnitudes were calculated using reference stars from the USNO-A 2.0 catalog. Comparison stars differed from night-to-night due to movement of the asteroid. "Canopus" allows compensation for

night-to-night comparison star variation by offsetting individual night's magnitude scales to obtain a best fit. Asteroid sizes were estimated using the table "Conversion of Absolute Magnitude to Diameter" table on the MPC website. (<http://cfa-www.harvard.edu/iau/lists/Sizes.html>) Discovery details were obtained from the MPC "Discovery Circumstances" web page. (<http://cfa-www.harvard.edu/iau/lists/NumberedMPs.html>)

Observations and Results

592 Bathseba

Bathseba is a main-belt asteroid with an estimated diameter of 60 km. It was discovered on March 18 1906 by M. Wolf at Heidelberg. Observations were made on nine nights during the period from June 16 to August 8, 2002, using either 60 or 90 second exposures. A total of 333 observations were used in the solution. Figure 1 shows the resulting lightcurve. The synodic period was determined to be 6.571 hours ± 0.008 hours, with an amplitude of 0.22 magnitude ± 0.02 magnitude.

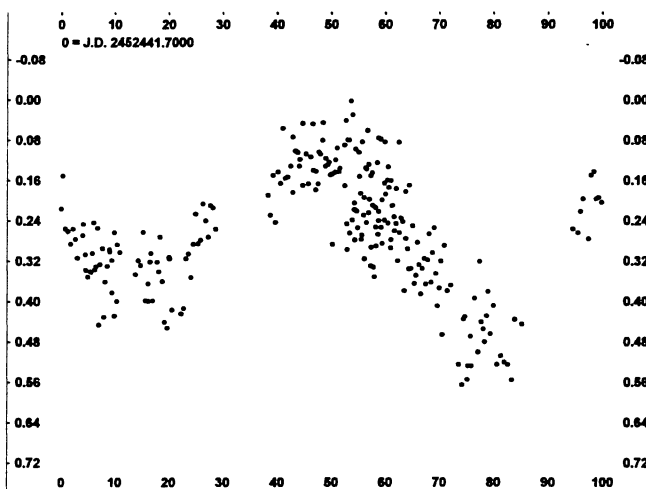


Figure 1. Lightcurve of 592 Bathseba, based on a period of 6.571 hours. Zero Point of the curve is J.D. 2452441.7000. Ordinate is relative magnitude.

676 Melitta

676 Melitta is a main-belt asteroid with an estimated diameter of 60 km. It was discovered on January 16, 1909 by P. Melotte at Greenwich. Observations were made on eight nights during the period from July 28 to August 16, 2002, using either 60 or 90 second exposures. A total of 686 observations were used in the solution. Figure 2 shows the resulting lightcurve. The synodic period was determined to be 7.863 hours ± 0.002 hours, with an amplitude of 0.09 magnitude ± 0.02 magnitude.