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69.

PHOTOMETRY OF 628 CHRISTINE, 754 MALABAR, 815 COPPELIA, AND 1025 RIEMA

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Results for the following asteroids (lightcurve period and amplitude) observed from Santana Observatory during the period April to June 2003 are reported:
628 Christine (16.135 ± 0.01 hours and 0.22 mag.),
754 Malabar (11.740 ± 0.005 hours and 0.45 mag.),
815 Coppelgia (4.421 ± 0.005 hours and 0.24 mag.),
1025 Riema (3.580 ± 0.005 hours and 0.14 mag.).

Santana Observatory (MPC Code 646) is located in Rancho Cucamonga, California at an elevation of 400 meters and is operated by Robert D. Stephens. Details of the equipment used can be found in Stephens (2003) and at the author's web site (<http://home.earthlink.net/~rdstephens/default.htm>).

All of the asteroids were selected from the "CALL" web site "List of Potential Lightcurve Targets" (Warner 2003) or from the "Complete" list.

Aperture photometry was done using the software program "Canopus" developed by Brian Warner and including the Fourier analysis routine developed by Alan Harris (Harris et al., 1989). This program allows combining data from different observers and adjusting the zero points to compensate for different equipment and comparison stars. All observations were unfiltered. Dark frames and flat fields were used to calibrate the images.

628 Christine

Christine is a member of the Marias family and was discovered March 7, 1907 by A. Kopff at Heidelberg. Christine is 25 km in diameter. There is no known reference to the name Christine.

Christine was selected from the "Complete List of Potential Lightcurve Targets" (Warner 2003), as no suitable targets were found on the abridged list. H. J. Schober had previously reported in 1981 that the period was greater than 14 hours and the amplitude greater than 0.4 magnitudes. Indeed, the period is

greater than 14 hours, but at this opposition the amplitude was much less than when Schober observed it.

Between April 20 and May 2, 2003, 450 observations over 6 sessions were used to derive the synodic rotational period of $16.135 \pm .01$ hours with an amplitude of 0.22 ± 0.03 magnitude. During this period the phase angle changed from 7 to 9 degrees.

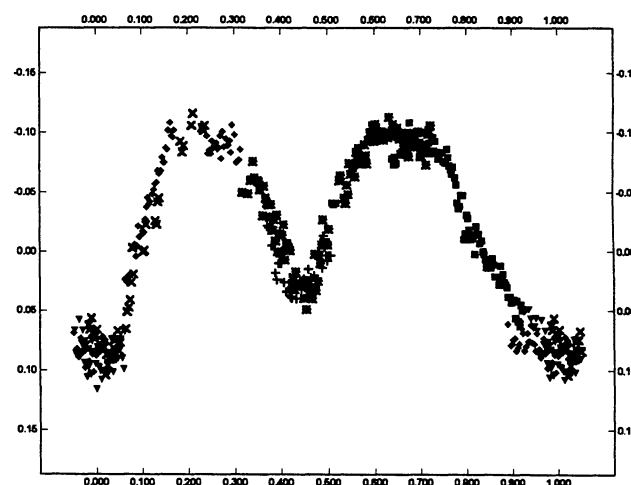


Figure 1. Lightcurve of 628 Christine based upon a derived period of 16.135 ± 0.01 hours.

754 Malabar

Malabar is a main-belt asteroid discovered August 22, 1906 by A. Kopff at Heidelberg. It is 44 km in diameter. Malabar is named in remembrance of the Dutch-German solar eclipse expedition to Christmas Island in 1922. Malabar is a city and mountain on Java. On 6 nights between May 31 and June 16, 2003, 674 observations were obtained to derive the synodic rotational period of $11.740 \pm .005$ hours with an amplitude of 0.45 ± 0.03 magnitude. During this period the phase angle stayed around 11 degrees. This was initially a difficult period to determine because of the flattened shape of the lightcurve at both maximums. It was hard to differentiate between the two maximums and eliminate aliases. However, eventually the different depths of the minimums was the factor that eliminated all other possibilities.

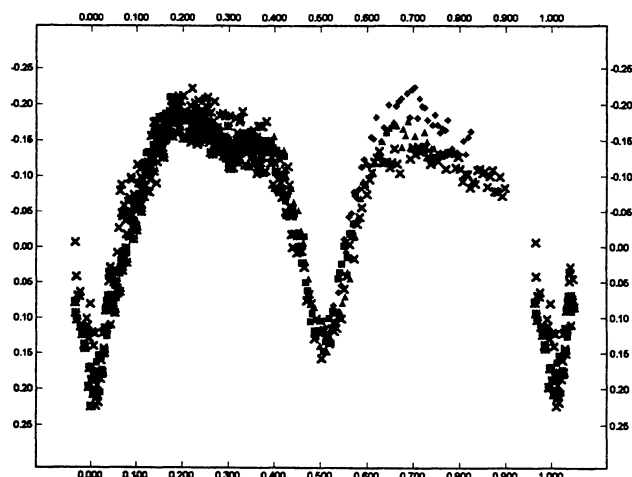


Figure 2. Lightcurve of 754 Malabar based upon a derived period of 11.740 ± 0.005 hours.

815 Coppelia

Discovered February 2, 1916 by M. Wolf at Heidelberg, Coppelia belongs to the Marias family of asteroids. It is named for the short ballet in two acts by Leo Delibes, which is based on a tale by T. A. Hoffman. 348 observations over 5 sessions between March 12 and 19, 2003 were used to derive the synodic rotational period of 4.421 ± 0.005 hours with an amplitude of 0.24 ± 0.04 magnitude. During this period the phase angle changed from 9 to 10 degrees. This was the best opposition of Coppelia until 2012.

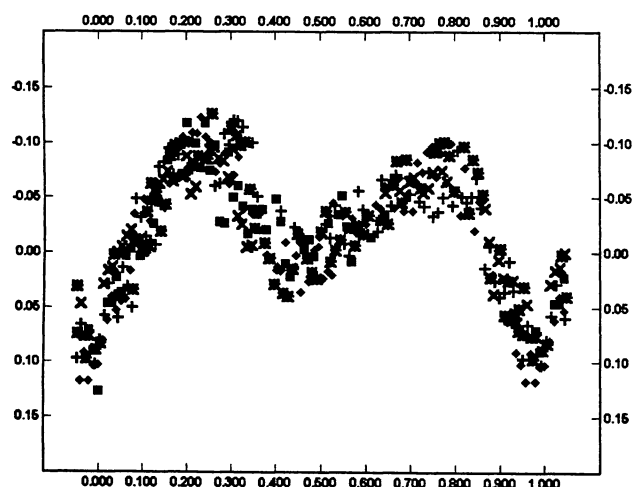


Figure 3. Lightcurve of Coppelia based upon a derived period of 4.421 ± 0.005 hours.

1025 Riema

Discovered by K. Reinmuth at Heidelberg on August 13, 1923, Riema is a member of the Hungarias family. Riema is estimated to be between 8 and 19 km in diameter. It is named in honor of Johannes Riem (1868-1945) a German astronomer. Between

April 1 and 9, 2003, 5 sessions and 368 observations were used to derive the synodic rotational period of 3.580 ± 0.005 hours with an amplitude of 0.14 ± 0.04 magnitude. During this period the phase angle changed from 13 to 15 degrees. The low amplitude and asymmetric lightcurve contributed to difficulties in determining the period. The next good opposition of Riema will occur in 2014.

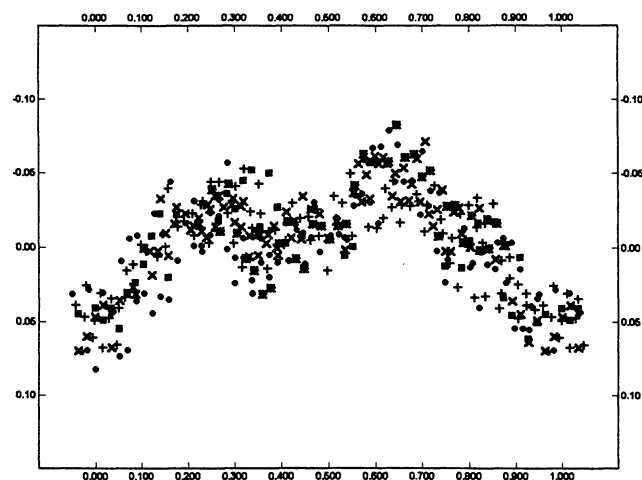


Figure 4. Lightcurve of Riema based upon a derived period of 3.580 ± 0.005 hours.

Acknowledgements

Many thanks to Brian Warner for his continuing work and enhancements to the software program "Canopus" which makes it possible for amateur astronomers to analyze and collaborate on asteroid rotational period projects and for maintaining the CALL Web site which helps coordinate collaborative projects between amateur astronomers. Also, I am indebted to Brian Warner for writing a scripting program capable of controlling the Paramount German equatorial mount temporarily in use at Santana Observatory.

References

- Harris, A. W., Young, J. W., Bowell, E., Martin, L. J. Millis, R. L., Poutanen, M., Scaltriti, F., Zappala, V., Schober, H. J., Debehogne, H., and Zeigler, K. W., 1989. "Photoelectric Observations of Asteroids 3, 40, 60, 261, and 863." *Icarus* **77** 171-186.
- Schober, H. J., 1981. *Astronomical Astrophysics* **100** 311-313.
- Stephens, R. D. (2003). "Photometry of 2134 Dennisalpm, 2258 Viipuri, 3678 Mongmanwai, 4024 Ronan, and 6354 Vangelis". *The Minor Planet Bulletin*, **30**(3).
- Stephens, R. D. (2003). <http://home.earthlink.net/~rdstephens/default.htm>.
- Warner, B. (2003). "Potential Lightcurve Targets". <http://www.minorplanetobserver.com/astlc.targets>.