

Vanmunster, T. (2009). *Peranso* software.
<http://www.peranso.com/>

Warner, B.D. (2009). "CALL Site Sections / Lightcurve Targets."
<http://www.minorplanetobserver.com/astlc/default.htm>

THE ROTATIONAL PERIOD OF 2235 VITTORE

James W. Brinsfield
 Via Capote Observatory
 5180 Via Capote, Thousand Oaks CA 91320
 jbrinsfi@gmail.com

David Higgins
 Hunters Hill Observatory (E14)
 7 Mawalan Street, Ngunnawal ACT 2913
 AUSTRALIA

(Received: 2010 January 5)

Lightcurve data of 2235 Vittore were acquired at the Via Capote Observatory in California, USA, and Hunters Hill Observatory in Australia. A rotation period of 32.1 ± 0.01 hrs with an amplitude of 0.21 mag was obtained in this collaborative effort.

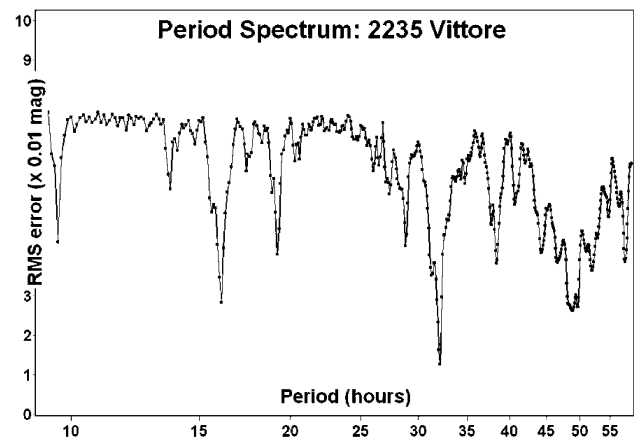
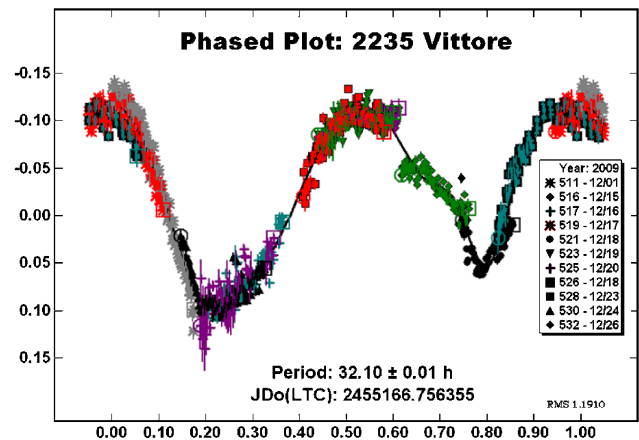
Observations at the Via Capote Observatory were made using a Meade LX-200 0.36-m f/10 Schmidt-Cassegrain (SCT). The CCD imager was an Alta U6 with a 1024x1024 array of 24-micron pixels. All observations were made at 1x binning yielding an image scale of 1.44 arcseconds per pixel. All images were dark and flat field corrected. All sessions except 526 were acquired at the Via Capote Observatory. Observations at Hunters Hill Observatory (session 526) were made using Meade LX-200 0.36-m SCT working at f/4. The CCD imager was an SBIG ST-8E with a 1530 x 1020 array of 9-micron pixels operating at -10° C. All observations were taken at a sub-frame of 1148 x 765 pixels at 1x binning yielding an image scale of 1.31 arcseconds per pixel. All images were dark and flat field corrected with no other image enhancements made. Images were measured using *MPO Canopus* (Bdw Publishing). All observations were made using unfiltered differential photometry and the data were light-time corrected. Period analysis was also done with *Canopus*, incorporating the Fourier analysis algorithm developed by Harris (1989).

The project was initially started at Via Capote. After seven observing sessions, a significant uncertainty in the lightcurve period remained. There were several possible candidates in the period spectrum but no dominate candidate was emerging. Because there was evidence the rotation period was rather long, a collaboration request was sent to Hunters Hill for help with this project. The location of the Hunters Hill observatory is very complimentary to that of Via Capote's location in that collaborative image runs on the same target can be effectively extended 10 hours or longer. Nearly one hour of simultaneous

observations were made on December 18. This permitted a direct linkage of sorts for the two data sets and improved the period solution significantly. Although there is rather dense coverage of the target for most of phase angles of rotation, some gaps remain and so the period remains less than secure. A plot of the period spectrum for candidate rotation periods is shown below. In this case, collaboration even though consisting of only one session, significantly improved the confidence of the entire project. We could find no previously reported lightcurves for this object.

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, 24, 60, 261, and 863." *Icarus* 77, 171-186.



#	Name	Date Range (mm/dd/2009)	Data Points	Phase	L _{PAB}	B _{PAB}	Period (h)	PE (h)	Amp (mag)	AE (mag)
2235	Vittore	12/01 - 12/26	992	10.5 9.2 10.5	83	-20	32.1	0.01	0.21	0.03

Table I. Observing circumstances and results for 2235 Vittore.

ASTEROID LIGHTCURVES FROM THE CHIRO OBSERVATORY

Dr. Maurice Clark
Department of Physics, Texas Tech University
Lubbock, TX 79407
maurice.clark@ttu.edu

(Received: 16 March)

Asteroid lightcurve period and amplitude results obtained at the Chiro Observatory in Western Australia during 2009 June are presented for: 180 Garumna, 1311 Knopfia, 1599 Giomus, 1840 Hus, (6495) 1992 UB1, (16924) 1998 FL61, (43064) 1999 VK114, (43595) 2001 QT101, (51276) 2000 JZ71, (52722) 1998 GK, (54896) 2001 OP70, (74350) 1998 VO54, (77733) 2000 OS73, 79087 Scheidt, and (87228) 2000 OD42

Chiro Observatory is a private observatory owned by Akira Fujii near Yerecion in Western Australia (MPC 320). The main instrument is a 0.30-m f/6 Newtonian. An SBIG STL-1001E CCD was used with this telescope. All images were unfiltered and were reduced with dark frames and sky flats. A 125-mm f/5 refractor with an SBIG ST-8XE CCD and red filter was also used. Images were again reduced with dark frames and sky flats. All images with both CCD's were of 180-seconds duration.

The asteroids were chosen from the Collaborative Asteroid Lightcurve Link home page that is maintained by Brian Warner (CALL, Warner 2010). Where possible, asteroids were chosen that would have other asteroids in the field on at least some nights in an effort to maximize the data. Since, in most cases, these other asteroids were $V > 17$, the data tended to be noisy. However, the exercise was felt to be worthwhile (doing photometry on an 18th magnitude asteroid with a 0.30-m telescope can be “interesting”!) Another factor that needed to be considered was that during June, the opposition point, where most asteroids are at their brightest, coincides with the region of the Milky Way with the highest density of stars, making photometry of a moving object difficult in the extreme! For this reason, asteroids either with high southern declinations or well away from opposition point were chosen. Despite this, some problems with field stars were experienced.

Image analysis was accomplished using differential aperture photometry with *MPO Canopus*. Period analysis was also done in *Canopus*, which implements the FALC algorithm developed by Alan Harris (Harris et al., 1989). Differential magnitudes were calculated using reference stars from the USNO-A 2.0 catalog and the UCAC2 catalog. Results are summarized in the table below, and the lightcurve plots are presented at the end of the paper. The data and curves are presented without additional comment except where circumstances warrant.

180 Garumna. Observations of this asteroid were made on four nights, while it was in the field of the asteroid I was principally studying. Observations in 2004 by the author, R. Roy, D. Starkey, and S. Sposetti enabled R. Behrend (2010) to derive a provisional rotation period of 23.85 h. The latest observations support a period somewhat over 23 hours. Since the observations cover only a small portion of the lightcurve, the period should still be considered only approximate. This asteroid next reaches

opposition in 2010 July, when it will be a little brighter than 15th magnitude and at a declination of about -17° , which will make it accessible to observers in both hemispheres. I would be very interested in hearing from other observers who would be willing to contribute to a world-wide campaign during that opposition, with the aim of accurately deriving the rotation period.

1840 Hus. This was another asteroid that was observed only when it was in the same field as another. The results were noisy but indicated an asymmetric lightcurve with a period of 4.78 hours.

(43064) 1999 VK114. This asteroid was observed on only one night as it passed through the field of an asteroid that I was targeting. The lightcurve is very asymmetric and further observations at the next opposition would be very useful.

(43595) 2001 QT101. This asteroid was observed on six nights and the resulting lightcurve indicated a period of just over 22 hours. This is another asteroid that would benefit from international collaboration at the next opposition, which will be in 2010 December. Unfortunately, at the time it will be a 17th magnitude object deep in the Auriga Milky Way, making it an extremely difficult object for photometry.

(52722) 1998 GK. Observations of this asteroid indicated a period of slightly less than half a day. As a result, the entire lightcurve could not be obtained. Although a double-peak lightcurve gives the most satisfactory results, a single peak lightcurve has been included for comparison.

79087 Scheidt. Observations were made on only two nights and indicated a lightcurve with an extremely large amplitude of almost 3 magnitudes and a period of a little less than 10 hours. Although the asteroid was clearly visible in the images, the faintness of the asteroid (18th magnitude) and the very large amplitude make the results more than a little suspicious.

(87228) 2000 OD42. Observations on two nights yielded a reasonably good, though incomplete, lightcurve with a period of just over 18 hours and a large amplitude of about 2 magnitudes.

Acknowledgments

I would like to thank Lance Taylor and Akira Fujii for access to the Chiro Observatory and Brian Warner for all of his work with the program *MPO Canopus*.

References

- Behrend, R. (2010). Observatoire de Geneve web site, http://obswww.unige.ch/~behrend/page_cou.html
- 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, 24, 60, 261, and 863.” *Icarus* **77**, 171-186.
- Warner, B.D. (2010). Collaborative Asteroid Lightcurve Link (CALL). <http://www.MinorPlanetObserver.com/astlc/default.htm>