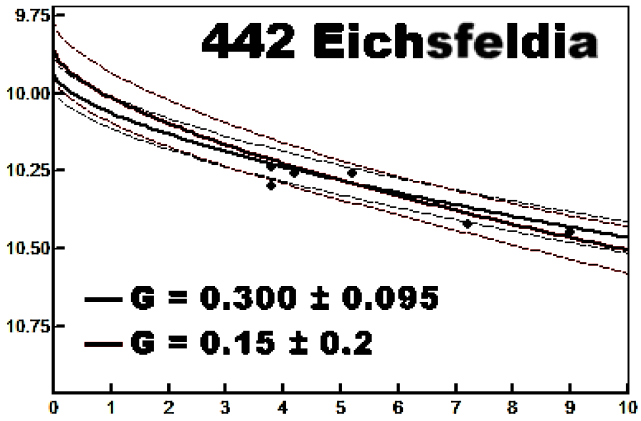

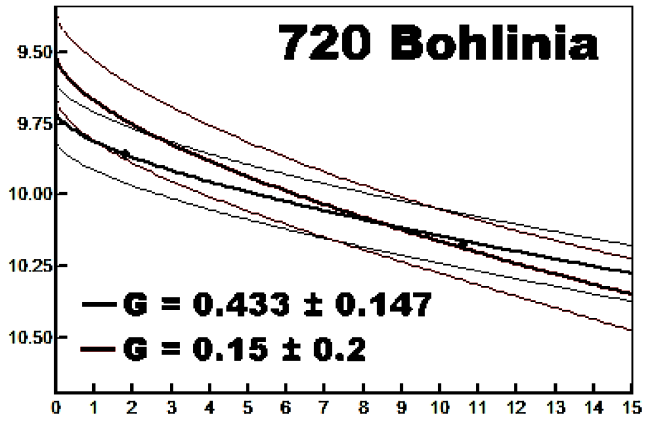

ASTEROID LIGHTCURVE ANALYSIS AT THE OAKLEY OBSERVATORY – MARCH/APRIL 2007

Jason Sauppe, Steven Torno, Robert Lemke-Oliver,
Richard Ditteon
Rose-Hulman Institute of Technology CM 171
5500 Wabash Avenue
Terre Haute, IN 47803
ditteon@rose-hulman.edu

(Received: 14 June)

Lightcurves for 24 asteroids were collected over six nights of observing during March and April of 2007 at the Oakley Observatory. The asteroids were: 234 Barbara, 279 Thule, 303 Josephina, 348 May, 621 Werdandi, 715 Transvaalia, 791 Ani, 1132 Hollandia, 1164 Kobolda, 1184 Gaea, 1385 Gelria, 1534 Nasi, 2341 Aoluta, 2582 Harimaya-Bashi, 2887 Krinov, 3166 Klondike, 3310 Patsy, 3451 Mentor, 3497 Innanen, 3575 Anyuta, 5484 Inoda, (7792) 1995 WZ3, (9873) 1992 GH, and (41577) 2000 SV2.

Twenty-four main-belt asteroids were observed over the course of six nights in March-April 2007. Twelve asteroids were observed on the nights of March 8 and 9, while another twelve were observed during April on the nights of the 17, 20, 21, and 22. The observations were taken from the Oakley Observatory at Rose-Hulman Institute of Technology in Terre Haute, Indiana. From the data that were collected, we were able to find lightcurves for 18 asteroids. Out of the 18 lightcurves, five were reasonably close to previously published periods, two differed significantly from previous results, and 11 were previously unrecorded results.

For the six nights of observing, three telescopes were used. Each telescope was a 14-inch Celestron optical tube assembly mounted on a Paramount ME. One telescope used an Apogee AP-8p camera. This CCD was unfiltered with an image scale of 2.00 arcseconds per pixel. The other two telescopes used SBIG STL-1001E cameras with a clear filter. One telescope had an image scale of 1.94 arcseconds per pixel while the other had an image pixel scale of 2.24 arcseconds per pixel. The exposure times varied from two to four minutes. Calibration of the images was done using master twilight flats, darks, and bias frames. All calibration frames were created using MaximDL and the images were calibrated using CCDSoft. MPO Canopus was used to measure the processed images.

Selection of asteroids was based on their sky position about one hour after sunset. Asteroids without previously published lightcurves were given higher priority than asteroids with known periods, but asteroids with uncertain periods were also selected in the hopes that we would be able to validate previous results.

As far as we are aware, these are the first reported observations for the period of the following asteroids: 715 Transvaalia, 791 Ani, 2341 Aoluta, 2582 Harimaya-Bashi, 2887 Krinov, 3166 Klondike, 3310 Patsy, 3451 Mentor, 3575 Anyuta, 5484 Inoda, and (41577) 2000 SV2. No repeatable pattern was found for the following asteroids: 234 Barbara, 279 Thule, 303 Josephina, 1184 Gaea, 1385 Gelria, or (7792) 1995 WZ3. This was due to noisy data and a less-than-ideal number of data points.

All results are listed in the table below. Comments have been included if they were necessary.

348 May. Our data gives a derived period matching the period given by Behrend (2006).

621 Werdandi. While the data seem to indicate a period that is different than that of Almeida, et al. (2004), the small number of data points that we have means our result may be incorrect.

1132 Hollandia. Although our data are somewhat noisy, it agrees fairly well with the reported period in Behrend (2006).

1164 Kobolda. Our result agrees with the period 4.141 ± 0.002 h given by Higgins and Oey (2007).

1534 Nasi. Our data are a little noisy, but they don't appear to agree with De Sanctis, et al. (1994)

3497 Innanen. Our result is close to the period 7.310 ± 0.001 h given by Fleenor (2007).

(9873) 1992 GH. The data are fairly noisy, but they support the period reported by Warner (2007).

Number	Name	Dates (2007)	Data Points	Period (h)	P.E. (h)	Amp. (mag)	A.E. (mag)
234	Barbara	3/8-3/9	63	Not Found		0.04	0.01
279	Thule	3/8-3/9	28	Not Found		0.14	0.04
303	Josephina	3/8-3/9	26	Not Found		0.11	0.02
348	May	4/17,4/20-4/22	82	7.385	0.004	0.16	0.03
621	Werdandi	3/8-3/9	27	14.82	0.05	0.54	0.05
715	Transvaalia	3/8-3/9	73	11.80	0.04	0.24	0.03
791	Ani	4/17,4/20-4/21	83	16.72	0.03	0.32	0.05
1132	Hollandia	3/8-3/9	64	5.326	0.015	0.2	0.1
1164	Kobolda	3/8-3/9	52	4.154	0.011	0.22	0.03
1184	Gaea	3/8-3/9	28	Not Found		0.25	0.05
1385	Gelria	4/17,4/20-4/22	78	Not Found		0.36	0.15
1534	Nasi	4/17,4/20-4/22	72	7.94	0.02	0.40	0.05
2341	Aoluta	3/8-3/9	59	3.00	0.02	0.30	0.08
2582	Harimaya-Bashi	4/17,4/20-4/21	60	7.238	0.004	0.24	0.04
2887	Krinov	4/17,4/20-4/22	80	16.71	0.02	0.65	0.08
3166	Klondike	4/17,4/20-4/22	76	11.72	0.05	0.12	0.04
3310	Patsy	3/8-3/9	61	9.36	0.04	0.18	0.06
3451	Mentor	4/17,4/20-4/22	74	7.70	0.02	0.50	0.05
3497	Innanen	4/17,4/20-4/21	80	7.177	0.003	0.52	0.03
3575	Anyuta	4/17,4/20-4/22	77	6.321	0.003	0.38	0.07
5484	Inoda	4/17,4/20-4/22	48	23.41	0.06	0.3	0.1
(7792)	1995 WZ3	3/8-3/9	71	Not Found		0.30	0.08
(9873)	1992 GH	3/8-3/9	64	2.92	0.01	0.3	0.1
(41577)	2000 SV2	4/17,4/20-4/21	90	34.59	0.03	0.36	0.04

Acknowledgement

This research was supported in part by NASA through the American Astronomical Society's Small Research Grant Program.

References

Almeida, R., Angeli, C.A., Duffard, R., Lazzaro, D. (2004). "Rotation periods for small main-belt asteroids". *Astron. Astrophys.* **415**, 403-406.

Behrend, R. (2006).
http://obswww.unige.ch/~behrend/page_cou.html

De Sanctis, M.C., Barucci, M.A., Angeli, C.A., Fulchignoni, M., Burchi, R., Angelini, P. (1994). "Photoelectric and CCD observations of 10 asteroids." *Planet. Space Sci.* **42**, 859-864.

Fleenor, M. (2007). "Asteroid Lightcurve Analysis from Volunteer Observatory December 2006 to April 2007," *Minor Planet Bulletin,* **34**, 66-67.

Higgins, D., and Oey, J. (2007). "Asteroid Lightcurve Analysis at Hunters Hill Observatory and Collaborating Stations – December 2006 – April 2007." *Minor Planet Bulletin,* **34**, 79-80.

Warner, B.D. (2007). "Asteroid Lightcurve Analysis at the Palmer Divide Observatory – December 2006 – March 2007," *Minor Planet Bulletin,* **34**, 72-77.