LIGHTCURVE ANALYSIS OF 235 CAROLINA

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The lightcurve of main-belt asteroid 235 Carolina was obtained by an international group of observers in January-February 2007. The synodic period was found to be 17.1600 ± 0.0004 hr with the lightcurve having an amplitude of 0.30 ± 0.02 mag.

Initial observations made in January 2007 by observers in the group lead by Behrend indicated the possibility that this object might be a contact synchronous binary asteroid. Authors Warner and Stephens began observations to supplement those from the Behrend group in order to confirm that possibility. Those supplemental observations found no evidence of eclipse or occultation events or a lightcurve shape that might otherwise indicate a binary. This prompted a re-examination of the original Behrend group data, which showed that that the suspected events were the result of reduction errors and did not represent actual eclipse events. Despite this, the effort shows how collaboration among observers can quickly resolve any uncertainties.

The two figures show the data sets of Warner-Stephens and the Behrend group. The Warner-Stephens data set is not as complete and found a period of 17.613 ± 0.002 hr. The more complete data set from Behrend et al shows a slightly more precise period of 17.6100 ± 0.0004 hr, which is the one adopted for this paper. These agree with a previous result of 17.56 hr (Schroll 1983).

Acknowledgements

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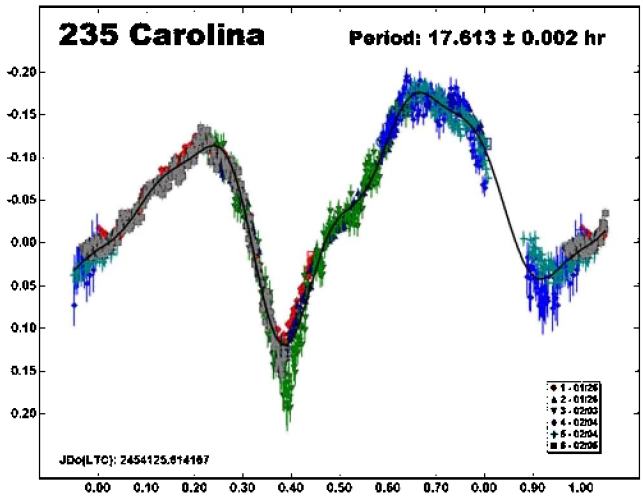

Fig. 1. Lightcurve for 235 Carolina based on Warner/Stephens.

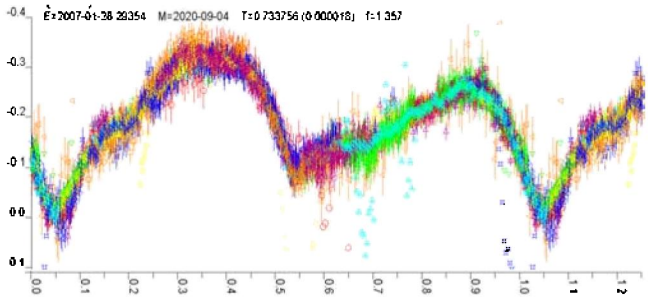

Fig. 2. Lightcurve for 235 Carolina based on Behrend et al.

6615 PLUTARCHOS, A SUSPECT BINARY ASTEROID

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6615 Plutarchos was observed from Leura and Carbuncle Hill Observatories in April and May 2007. The synodic period is reported to be 2.3247 ± 0.0001 h. This asteroid also has a partial solution as a binary with asynchronous orbital period of 40.02h ± 0.1h.

6615 Plutarchos was selected from the list of suggested targets for the Photometric Survey of Asynchronous Binary Asteroids, Pravec (2006). Observations were started on April 10, 2007, from Leura Observatory. By then the asteroid was past opposition and receding. Since the target was fading, it was possible with the available instruments to follow it until only the end of May. At that time it was no longer possible to reach the level of detection required by the survey. All nightly observations were sent to Pravec for analysis, which included checking for signs of attenuations of more then 0.02 magnitude (see Fig. 2). In this lightcurve, the attenuations are plotted into a half orbit for clarity. In a near-zero eccentricity orbit, these attenuations are caused by a primary and secondary event. In addition to that, at moderate solar phase angle, when these events occurred, the incidences of both occultations and eclipses were unlikely. This, in effect, explained the similarity in the depth of the attenuations observed on the three occasions.

During this recent campaign, the three attenuations that were captured consisted of two transit events and one occultation event or vice versa. Therefore, from the above observations, it was deduced that the orbital period is 40.02h ± 0.10h and the amplitude of the events is 0.07 mag. An orbital period of 20h or less is not likely due to geometrical constraints. The lightcurve in Fig. 1 shows the rotation period of the primary body to be 2.3247h ± 0.0001 hr with an amplitude of 0.06m ± 0.01m. September 2008 and February 2010 are the dates of the next close approaches of this asteroid.

The location and instruments used at Leura Observatory have been previously described (Oey 2006). Pray joined in the search when it was determined that the asteroid was a suspect binary. His data are shown as sessions 8 and 9. Carbuncle Hill Observatory's location and its instrumentation were documented by Pray et al (2006).

Acknowledgement

Thanks are given to Brian Warner for his tireless work in improving the Canopus program and great support for its users.

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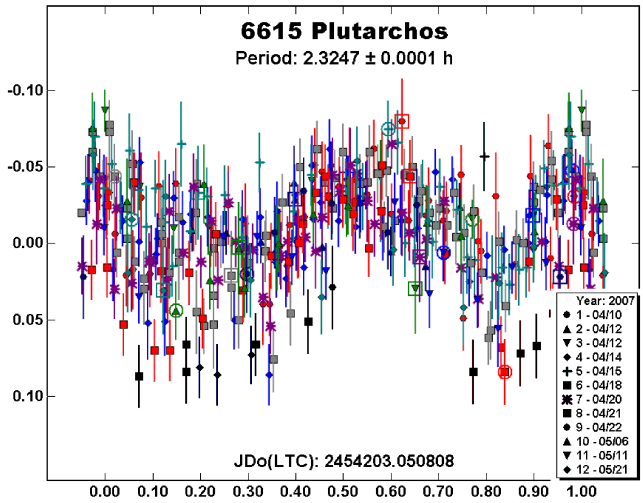

Fig. 1 Rotation period of the main body showing signs of primary or secondary events around phase 0.20.

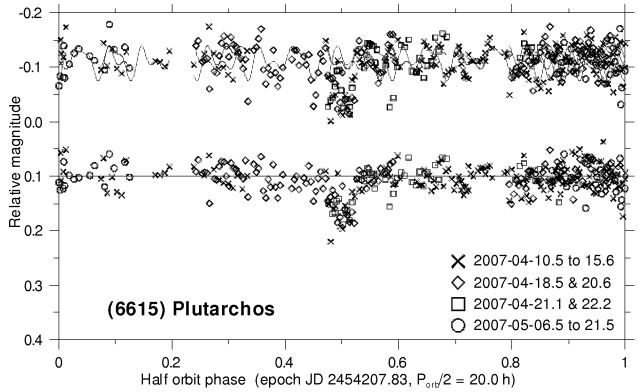

Fig. 2 The lightcurve illustrating the event captured during the campaign as shown in phase 0.50.

Date (2007)	Session	PA	LPAB	BPAB
April 10	1	13.5	179.9	2.2
April 14	4	15.7	180.4	2.2
April 18	6	17.7	181.0	2.3
April 21	8	19.2	181.4	2.3
May 21	12	29.0	188.4	2.2

Table 1. Aspects of 6615 Plutarchos during the start, the three observed events, and the end of campaign.