

THE LIGHTCURVES OF 1146 BIARMIA AND 5598 CARLMURRAY

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The lightcurves of asteroids 1146 Biarmia and 5598 Carlmurray were measured during the first half of 2009. 1146 Biarmia was found to have a synodic rotation period of 5.4700 ± 0.0002 h with an amplitude of 0.20 ± 0.02 mag. 5598 Carlmurray was found to have a synodic rotation period of 2.9226 ± 0.0002 h and an amplitude of 0.32 ± 0.03 mag.

Observations of asteroid 1146 Biarmia and 5598 Carlmurray were made in 2009 at the Shed of Science Observatory with a 0.35-m Schmidt-Cassegrain (SCT) operating at f/8.5 using an SBIG ST10XE and Celestron UHC light pollution filter. Images for 1146 Biarmia were binned 2x2, producing a scale of 0.94 arcsec/pixel. Images of 5598 Carlmurray were binned 3x3, resulting in an image scale of 1.41 arcsec/pixel.

1146 Biarmia. This asteroid was observed over seven nights in 2009 June. It was previously observed by Warner (2000), who reported a period of 11.514 h based on two night's data. Our data provided significantly more coverage. Initial measurements supported the longer period, but as double coverage of the lightcurve was obtained for its lower amplitude portions, the shorter solution of $P = 5.4700 \pm 0.0002$ h became dominant and was adopted. The period spectrum covering both periods is shown below. The solution is rated as $U = 3$ (see Warner et al., 2009, for the definition of the U rating).

5598 Carlmurray. This asteroid was initially selected for observation as part of the Photometric Survey for Asynchronous Binary Asteroids by Petr Pravec (Pravec et al., 2006). It was observed over three nights in 2009 January. The derived period of $P = 2.9226 \pm 0.0002$ h is unique and rated as $U = 3$ (Pravec, 2009).

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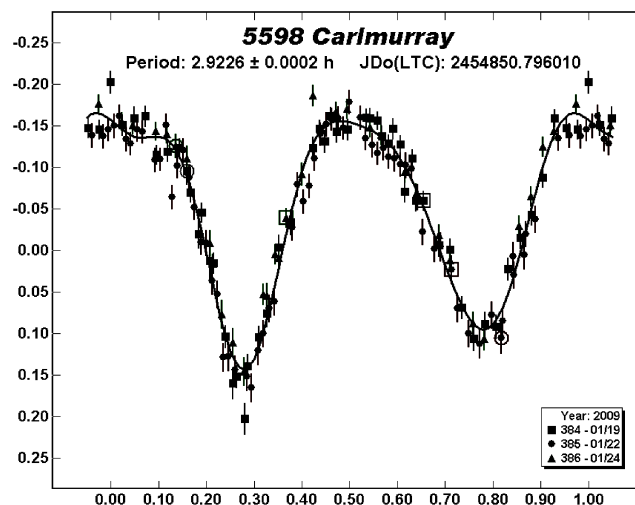
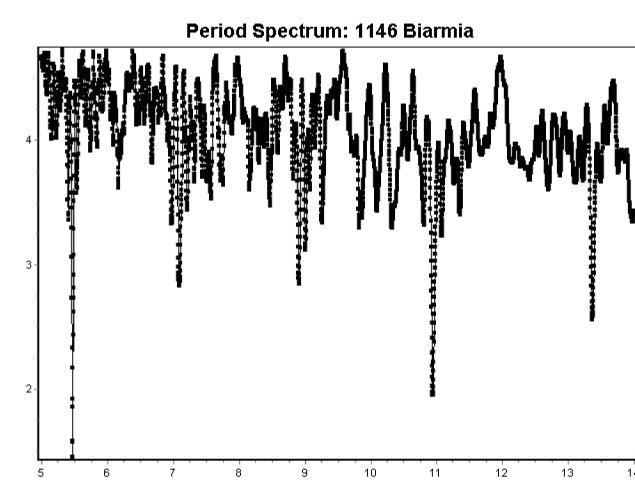
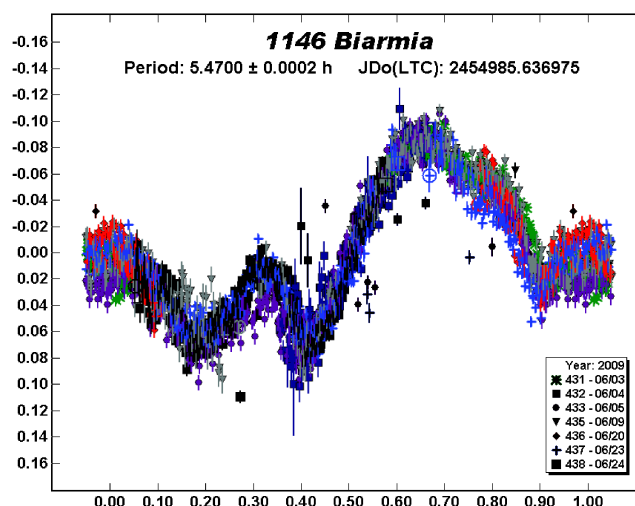
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LIGHTCURVES OF 4285 HULKOWER, 6867 KUWANO, AND (93768) 2000 WN22

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Analysis of their lightcurves revealed the following periods and amplitudes for three asteroids: 4285 Hulkower, 6.149 ± 0.001 h, 0.68 ± 0.05 mag; 6867 Kuwano, 7.367 ± 0.001 h, 0.55 ± 0.05 mag; and (93768) 2000 WN22, 2.679 ± 0.002 h, 0.33 ± 0.03 mag.

Photometric data for three asteroids were collected using a 36-cm Celestron C-14, SBIG ST-10XME camera, and clear filter at Stonegate Observatory. The camera was binned 3x3, resulting in an image scale of 1.9 arcsec/pixel. Exposures ranged from 60-120 s at -15°C depending upon conditions. All photometric data were obtained and analyzed using *MPO Canopus* (Warner, 2008). Previous asteroid lightcurve data was reviewed in *The Asteroid Lightcurve Database*, (LCDB, Warner, B.D., Harris, A.W., Pravec, P., 2009) with latest revisions at the *Collaborative Asteroid Lightcurve Link* web site (Warner, 2009).

4285 Hulkower. Data were collected from 2009 May 13 through June 27 resulting in 7 data sets and 266 data points. A period of 6.149 ± 0.001 h was determined. Previous data reported by Pravec (2009) indicate a period of 6.150 h and amplitude of 0.58 mag.

6867 Kuwano. Data were collected from 2009 June 24 through July 9 resulting in 5 data sets and 364 data points. A period of 7.367 ± 0.001 h was determined. There were no previously reported data on this asteroid.

(93768) 2000 WN22. Data were collected on 2009 May 13 and May 15 resulting in 117 data points. The short visibility and sky conditions precluded any further observations. A period of 2.679 ± 0.002 h was determined. Previous data reported by Pravec (2009) indicate a period of 2.6821 h and amplitude of 0.29.

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