

CCD LIGHTCURVE ANALYSIS OF 216 KLEOPATRA

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Filtered (Ic) CCD images for 216 Kleopatra were obtained over six sessions in 2008 November. A folded lightcurve was produced and the synodic period, $P = 5.386$ h, calculated.

216 Kleopatra (124 km) is a main belt asteroid first discovered by J. Palisa in 1880. This asteroid, which can exhibit large changes in lightcurve amplitude (> 1 mag), has a dog-bone (bi-lobed) shape. Its morphology has been extensively studied by radar (Ostro et al., 2000), interferometry (Tanga et al., 2001), and ground-based adaptive optics (Hestroffer et al., 2002).

The equipment used at UnderOak Observatory included a focal reduced ($f/6.3$) 0.2-m Schmidt-Cassegrain telescope with a thermoelectrically cooled SBIG ST-402ME CCD camera operating at 5°C . Filtered (Ic) imaging was carried out on a total of six nights with unbinned, 45-second exposures taken automatically at least every 60 seconds. Image acquisition (raw lights, darks and flats) was performed with SBIG *CCDSOFT 5* while calibration and registration were accomplished with *AIP4WIN* (Berry and Burnell, 2006). Further image reduction with *MPO Canopus* (Warner, 2008) used at least two non-varying comparison stars to generate light curves by differential aperture photometry. Data were light-time corrected but not reduced to standard magnitudes.

A total of 1280 photometric readings were collected over 23.1 days. Relevant aspect parameters for 216 Kleopatra taken at the mid-point from each session are given in Table I. *MPO Canopus* provided a period solution for the folded data sets using Fourier analysis (Harris et al., 1989). The synodic period, determined to be $P = 5.386 \pm 0.001$ h is in good agreement with rotational periods for 216 Kleopatra recently published by Warner (2006) and that found at the JPL Solar System Dynamics website. Phased data are available by request at <http://underoakobservatory.com>.

Acknowledgement

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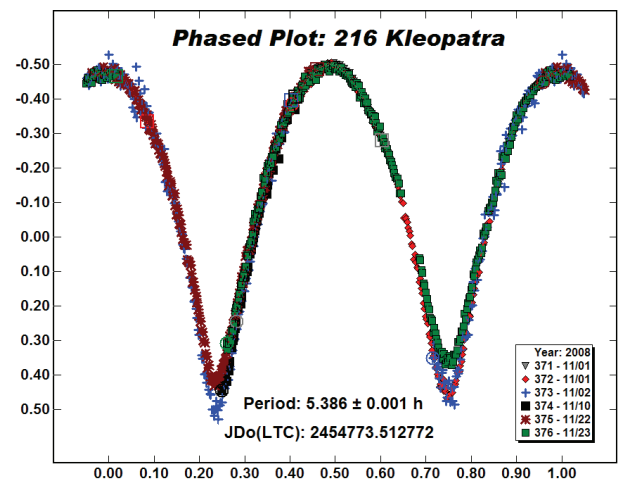
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UT Date (2008)	No. Obs.	Phase Angle	L_{PAB}	B_{PAB}
Nov 1	135	21.7	357.2	7.9
Nov 2	285	21.9	357.4	7.8
Nov 3	288	22.2	357.6	7.7
Nov 10	64	23.9	359.1	6.9
Nov 23	208	26.2	2.4	5.4
Nov 24	300	26.3	2.7	5.3

Table I. Observation circumstances for 216 Kleopatra.