

## CCD LIGHTCURVE ANALYSIS OF 40 HARMONIA

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Filtered (Ic) CCD images for 40 Harmonia were obtained over six sessions from 2009 February to March. A folded lightcurve was produced and the synodic period estimated by Fourier analysis to be 8.9091 h.

First discovered in 1856, 40 Harmonia (107.2 km) is an S-type main belt asteroid. More recent investigations on this minor planet include those by Lagerkvist et al. (1986), McCheyne et al. (1985), Gallardo and Tancredi (1987), Mellilo (1995), and López-González and Rodríguez (1999) and Tedesco et al. (2004).

For this study, the equipment included a focal reduced ( $f/6.3$ ) 0.2-m Schmidt-Cassegrain telescope with a thermoelectrically cooled ( $5^{\circ}\text{C}$ ) SBIG ST 402ME CCD camera mounted at the Cassegrain focus. Filtered (Ic) imaging was conducted on six nights with exposures automatically taken every 45 seconds. Image acquisition (raw lights, darks and flats) was performed by *CCDSOFT 5* (SBIG) while calibration and registration were accomplished with *AIP4WIN* (Berry and Burnell, 2006). Further data reduction with *MPO Canopus* (Warner, 2008) used at least four non-varying comparison stars to generate lightcurves by differential aperture photometry. Data were light-time corrected but not reduced to standard magnitudes.

A total of 1407 photometric values were generated over 25 days. Relevant aspect parameters for 40 Harmonia taken at the mid-point from each session are tabulated below. *MPO Canopus* provided a period solution for the folded data sets using Fourier analysis (Harris, 1989). The calculated synodic period,  $P = 8.9091 \pm 0.0005$  h, is in good agreement with the most recent value for 40 Harmonia published by López-González and Rodríguez (1999) as well as that found at the JPL Solar System Dynamics website. The peak amplitude was estimated at  $0.33 \pm 0.02$  mag. Phased data are available by request at <http://underoakobservatory.com>.

### Acknowledgement

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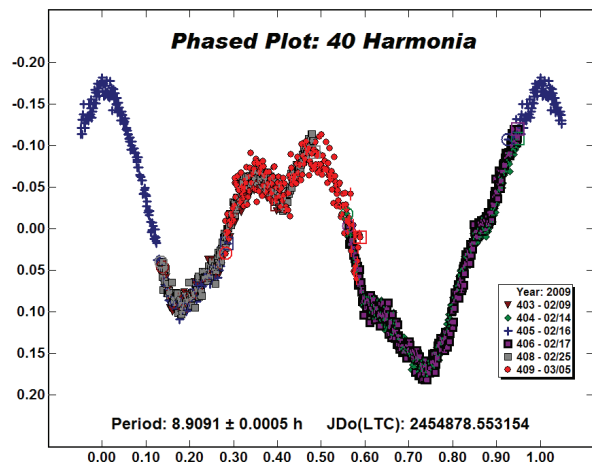
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UT Date (2009)	No. Obs.	Phase Angle	$L_{PAB}$	$B_{PAB}$
Feb 9	175	14.1	112.8	2.4
Feb 14	270	16.1	113.2	2.5
Feb 16	249	16.8	113.3	2.5
Feb 17	266	17.1	113.4	2.6
Feb 25	239	19.7	114.4	2.7
Mar 06	208	21.9	115.7	2.8

Observational circumstances for 40 Harmonia.