

PERIOD DETERMINATION OF SIX MAIN BELT ASTEROIDS

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Observations of six main-belt asteroids (MBA) produced lightcurve parameters of: 487 Venetia, $P = 13.34 \pm 0.01$ h, $A = 0.20$ mag; 684 Hildburg, $P = 15.89 \pm 0.01$ h, $A = 0.22$ mag; 772 Tanete, $P = 8.629 \pm 0.001$ h, $A = 0.18$ mag; 1181 Lilith, $P = 15.04 \pm 0.01$ h, $A = 0.11$ mag; 1246 Chaka, $P = 25.44 \pm 0.01$ h, $A = 0.25$ mag; and 2834 Christy Carol, $P = 12.79 \pm 0.01$ h, $A = 0.39$ mag.

Starting from late 2013 till 2014 April, six main-belt asteroids were observed at the Bigmuskie Observatory. For one of them, 684 Hildburg, it was impossible to distinguish between two periods, one of which is almost exactly half an Earth day.

The standard setup for the observations is a Marcon 0.30-m $f/8$ Ritchey-Chretien telescope coupled to an SBIG ST-9 CCD camera with a pixel array of 512x512x20 microns. Images were taken using an Astrodon R filter. *MPO Canopus* v10.4.1.9 (Warner, 2012) was used for image calibration and photometric measurements. Night-to-night zero-point calibration was done using the Comparison Star Selector utility in *MPO Canopus* and from three to five solar-colored comparison stars from the APASS catalog. This combination produces, in good sky conditions, a very precise linkage between the sessions, in the range of ± 0.03 , or even 0.02 mag. Only in case of foggy nights or in presence of the moon, do these values increase by a factor to two or three times.

487 Venetia. For this target, it was possible to reach a secure result with four sessions. A period of 13.34 ± 0.01 h and amplitude 0.20 mag leaves no room for other possibilities.

684 Hildburg. This target shows two different periods, both with good chance to be correct. The first is $P = 15.89 \pm 0.01$ h and amplitude $A = 0.22$ mag, while the second, almost equal to half the earth rotation, is $P = 11.92 \pm 0.01$ h and amplitude $A = 0.21$ mag. *MPO Canopus* has a slight preference for the longer period, evident from the period spectrum, but the difference is so tiny that it is not sure which period is right.

772 Tanete. Because of the location of the observatory, it was possible to work on this target only in the second part of the night with fairly short sessions of three or four hours in the beginning and five hours at the end. Because of this, the period of 8.629 ± 0.001 h with an amplitude $A = 0.18$ mag was found only after ten sessions. The lightcurve is an unusual monomodal curve.

1181 Lilith. Even if the period shows no alias, the strange attenuation at phase 0.90-1.00 is very interesting. It seems to be the evidence of a second asteroid orbiting around 1181 Lilith. After a specific investigation to find the smaller component, worked together with Lorenzo Franco of Balzaretto Observatory, it seems that the bump is only scattering in the data. Unfortunately the target became too faint to go on with observations to erase any doubts. The final period is 15.04 ± 0.01 h with an amplitude $A = 0.11$ mag.

1246 Chaka. This target required ten sessions over a span of almost five months because of bad weather. A little portion of the curve was not covered with observations, but the final lightcurve is well-determined, with a period of 25.44 ± 0.01 h and amplitude $A = 0.25$ mag.

2834 Christy Carol. Despite this target showing a period $P = 12.79 \pm 0.01$ h with an amplitude $A = 0.39$ mag, very close to half of an Earth day, it was possible to cover the entire curve with six sessions spaced over a period of about a month.

Acknowledgments

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References

Warner, B.D. (2012). *MPO Software, MPO Canopus v10.4.1.9*. Bdw Publishing, Eaton, CO.



