

PERIOD DETERMINATION FOR 703 NOEMI

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Collaborative lightcurve photometry observations of main-belt asteroid 703 Noemi were made over 16 nights in 2016 November thru 2017 January. The resulting synodic rotation period is 200 ± 1 h, amplitude 0.62 ± 0.10 mag, $H_R = 12.24 \pm 0.12$ and $G_R = 0.16 \pm 0.10$.

The main-belt asteroid 703 Noemi was discovered on 1910 October 3 by J. Palisa at Vienna. The primary orbital elements are $a = 2.175$ AU, $e = 0.138$, and $i = 2.46^\circ$. Its absolute magnitude is $H = 12.5$ (JPL, 2017). The NEOWISE survey (Nugent et al., 2016) used a value of 12.70 to find a diameter of $D = 9.85 \pm 1.42$ km. The gives an optical albedo of $p_V = 0.19 \pm 0.10$.

CCD photometric observations were made over 16 nights from 2016 November 15 to 2017 January 29 at the Balzaretto Observatory (A81), Fuligni Observatory, and the DSFTA Observatory (DSFTA, 2017) using the instrumentation described in Table I.

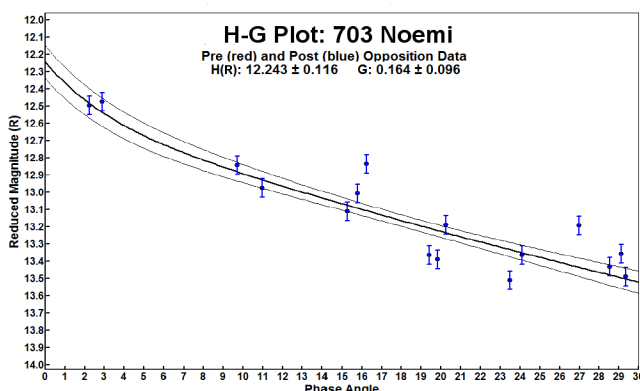
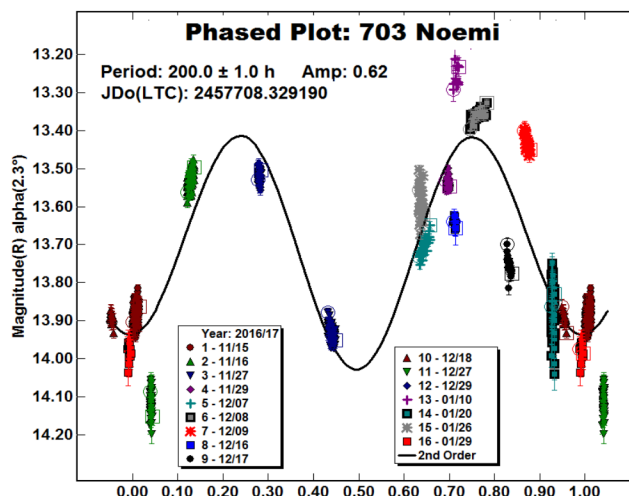
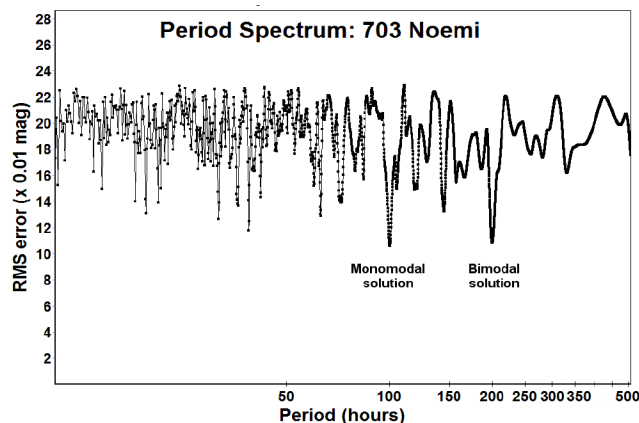
Observatory	Telescope, CCD	Exp (s)
Balzaretto (A81)	0.20-m f/5.5 SCT SBIG ST7xme	420
Fuligni (D06)	0.35-m f/10 SCT SBIG ST8-xe	120
DSFTA (K54)	0.30-m f/5.6 MCT SBIG STL-6303e (2x2)	300

Table II. Observing Instrumentation. SCT: Schmidt-Cassegrain Telescope, MCT: Maksutov-Cassegrain Telescope.

Data processing and analysis were done at the Balzaretto Observatory with *MPO Canopus* (Warner, 2016). All the images, acquired with clear-filter, were calibrated with dark and flat frames and converted to the Cousins-R magnitudes using solar colored field stars from CMC15 catalogue (VizieR, 2014) by the relationship $R = r' - 0.22$ (Dymock and Miles, 2009). No offset adjustment was applied to the lightcurves. The period analysis shows a bimodal solution for $P = 200 \pm 1$ hours and amplitude $A = 0.62 \pm 0.10$ magnitudes.

The absolute magnitude H (R-band) and slope parameter G were found using the *H-G* Calculator function of *MPO Canopus*. For each lightcurve the average R mag was measured removing the

rotational effects, using a Fourier fit model (Buchheim, 2010). We found H (R-band) = 12.24 ± 0.12 mag, $G = 0.16 \pm 0.10$. For 703 Noemi, the taxonomic class and the color index are unknown. We assume it is S-type asteroid, according to SMASSII taxonomic class distribution vs semi-major axis (Bus and Binzel, 2002) with a color index $V-R = 0.49 \pm 0.05$ (Shevchenko and Lupishko, 1998). We then derive $H = 12.73 \pm 0.13$, close to the $H = 12.7$ listed by Nugent et al. (2016).



Number	Name	20xx/mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E	Amp	A.E.
703	Noemi	16/11/15-17/01/29	724	1.7, 29.3	55	-2	200	1	0.62	0.10

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle values are for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris et al., 1984).

References

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ROTATION PERIOD DETERMINATION FOR 9671 HEMERA

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Photometric observations of main-belt asteroid 9671 Hemera were made at the Astronomical Observatory of the University of Siena (Italy) in 2017 March. Analysis of the data revealed a bimodal lightcurve with a synodic period of 2.532 ± 0.001 h as the most likely solution. Some anomalies in the lightcurve suggest that 9671 Hemera could be binary.

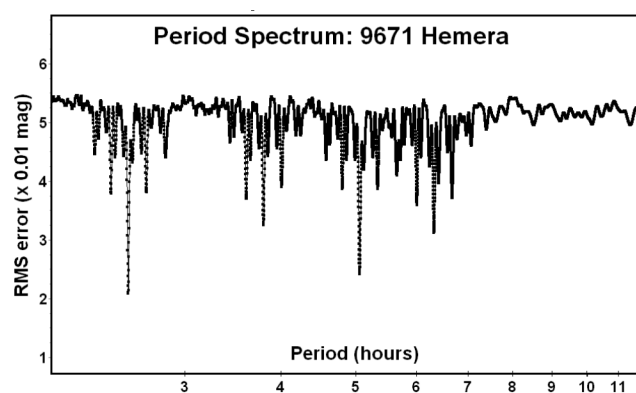
The main-belt asteroid 9671 Hemera was discovered on 1997 October 5 by L. Sarounova at Ondrejov. The Greek goddess of bright day, Hemera, meaning “day” in Greek, gives rise to the word “ephemeris” largely used in astronomy. The primary orbital elements are $a = 2.691$ AU, $e = 0.436$, and $i = 4.84$ degrees. The absolute magnitude is $H = 13.9$ (JPL, 2016; MPC, 2016).

CCD photometric observations were carried out in 2017 March at the Astronomical Observatory of the University of Siena (K54) using a 0.30-m $f/5.6$ Maksutov-Cassegrain telescope, SBIG STL-6303E CCD camera, and clear filter; the pixel scale was 2.30 arcsec in 2x2 binning mode. Exposures were 300 s for all images

(DSFTA, 2016).

Data processing and analysis were done with *MPO Canopus* (Warner, 2016). All the images were calibrated with dark and flat-field frames and converted to R magnitudes using solar-colored field stars from a version of CMC15 catalogue distributed with *MPO Canopus*. Table I shows the observing circumstances and results. A search of the asteroid lightcurve database (LCDB; Warner et al., 2009) indicates that our results might be the first reported for this object.

Observations of this asteroid were conducted on six nights, collecting a total of 357 data points. The period analysis shows a bimodal solution for $P = 2.532 \pm 0.001$ h and amplitude $A = 0.17 \pm 0.01$ mag. During period analysis, we found some attenuation events in the lightcurves that cannot be confirmed with the limited data set. Future observations will be required to verify the possibility of the asteroid being binary.



Number	Name	2016 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E	Amp	A.E.
9671	1997 TU9	03/25-03/31	357	10.5, 6.7	195	-4	2.532	0.001	0.17	0.01

Table I. Observing circumstances. The phase angle (α) is given at the start and end of each date range, unless it reached a minimum, which is the second of three values. If a single value is given, the phase angle did not change significantly and the average value is given. L_{PAB} and B_{PAB} are each the average phase angle bisector longitude and latitude (see Harris *et al.*, 1984).