

ROTATIONAL PERIOD AND LIGHTCURVE DETERMINATION OF 3390 DEMANET AND (18640) 1998 EF9

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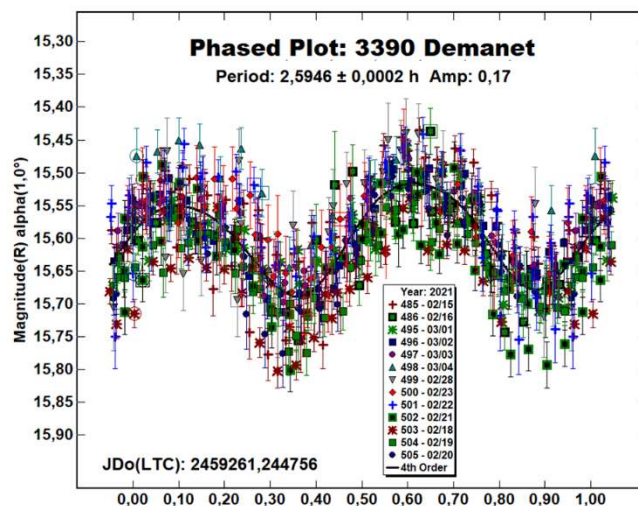
Photometric observations of two asteroids were performed in order to acquire lightcurves and to determine the rotational periods. The synodic period and lightcurve amplitude were found for 3390 Demanet and (18640) 1998 EF9

This asteroid photometry campaign was carried on by Amateur Astronomers belonging to AstroCampania Association. The targets were selected mainly in order to acquire lightcurves to determine rotational periods not reported before. All the images reported here were unbinned with no filter and had master flats and darks applied. The exposure time depended upon various experimental conditions such as magnitude of the target, sky motion, and Moon illumination. Image processing, measurement, and period analysis were done using *MPO Canopus* (Warner, 2019), which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris et al., 1989). The Comp Star Selector feature in *MPO Canopus* was used to limit the comparison stars to near solar color. Night-to-night calibration was done using field stars from the ATLAS catalog (Tonry et al., 2018).

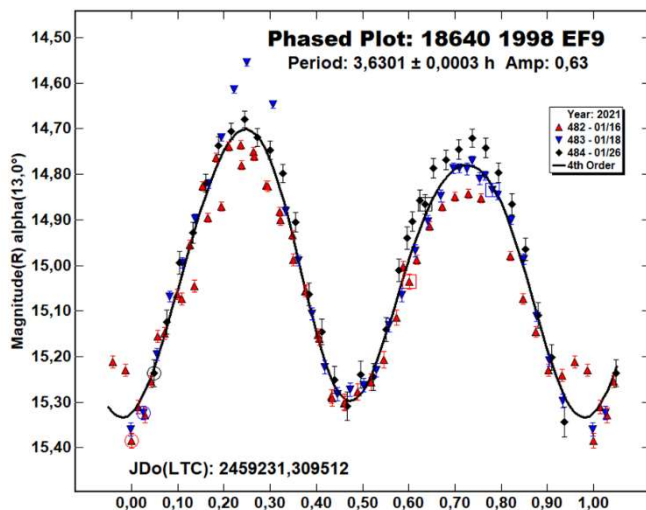
Observations of 3390 Demanet and (18640) 1998 EF9 were performed at Elianto Observatory (K68) located in the south of Italy (Pontecagnano) using a 0.3-m Newton telescope operating at $f/4$ equipped with a Moravian KAF1603 ME CCD camera (1536×1024 array of 9-micron pixels) with a clear filter.

(3390) *Demanet* was discovered on 1984 March 2 by H. Debehogne at La Silla. It is a main-belt asteroid with a semi-major axis of 2.25 AU, orbital period of 3.4 years, eccentricity of 0.115, and inclination of 3.389 deg. This asteroid has an estimated diameter of 5.1 kilometers and an absolute magnitude of 13.3 (JPL, 2021). There were no previous lightcurve entries in the LCDB for this this

asteroid. CCD photometric observations were performed between 2021 February 15 and March 4. Thirteen observation sessions produced 638 data points for lightcurve analysis. Exposure times ranged from 360 s to 420 s. Our observations led to a well-defined period of 2.5946 ± 0.0002 h with an amplitude of 0.17 mag.



(18640) 1998 EF9 is a main belt asteroid, discovered by Beijing Schmidt CCD Asteroid Program at Xinglong on 1998 March 7. It has a semi-major axis of 2.429 AU, orbital period of 3.79 years, eccentricity of 0.296, and inclination of 20.375 deg. This about 6.7 kilometers body has an absolute magnitude of 13.23 and a geometric albedo of 0.271. No rotational period and lightcurve were reported for this object at the best of our knowledge (JPL, 2021). A total of 124 lightcurve data points were collected in three observing sessions between 2021 January 16-26, with 360 s exposure times. Our observations led to period of 3.6301 ± 0.0003 h with an amplitude of 0.63 mag.



Number	Name	20yy mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
3390	Demanet	21/02/15-21/03/04	638	1.03, 8.69	149	1	2.5946	0.0002	0.17	0.02	MB
18640	1998 EF9	21/01/16-21/01/26	124	13.00, 18.11	107	16	3.6301	0.0003	0.63	0.02	MB

Table I. Observing circumstances and results. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).

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ROTATION PERIOD DETERMINATION FOR ASTEROIDS 2243 LONNROT, (10859) 1995 GJ7, (18640) 1998 EF9 AND (49483) 1999 BP13

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Photometric observations of four main-belt asteroids were conducted in order to determine their synodic rotation periods. For 2243 Lonnrot we found $P = 3.813 \pm 0.004$ h, $A = 0.14 \pm 0.05$ mag; for (10859) 1995 GJ7 we found $P = 2.956 \pm 0.001$ h, $A = 0.17 \pm 0.05$ mag; for (18640) 1998 EF9 we found $P = 3.630 \pm 0.001$ h, $A = 0.63 \pm 0.02$ mag; for (49483) 1999 BP13 we found $P = 6.365 \pm 0.005$ h, $A = 0.24 \pm 0.03$ mag.

CCD photometric observations of four main-belt asteroids were carried out in 2021 January - March at two Italian observatories. At the Astronomical Observatory of the University of Siena (K54), a facility inside the Department of Physical Sciences, Earth and Environment (DSFTA, 2021), we used a 0.30-m $f/5.6$ Maksutov-Cassegrain telescope, SBIG STL-6303E NABG CCD camera, and clear filter; the pixel scale was 2.30 arcsec when binned at 2×2 pixels and all exposures were 300 seconds. At the Wild Boar Remote Observatory (K49) data were obtained with a 0.235-m $f/10$ (SCT) telescope, a SBIG ST8-XME NABG CCD camera unfiltered; the pixel scale was 1.60 arcsec in binning 2×2 and all exposures were 300 seconds.

Data processing and analysis were done with *MPO Canopus* (Warner, 2018). All images were calibrated with dark and flat-field frames and the instrumental magnitudes converted to R magnitudes using solar-colored field stars from a version of the CMC-15 catalogue distributed with *MPO Canopus*. Table I shows the observing circumstances and results.

A search through the asteroid lightcurve database (LCDB; Warner et al., 2009) indicates that our results may be the first reported lightcurve observations and results for these asteroids.

2243 Lonnrot (1941 SA1) was discovered on 1941 September 25 by Y. Vaisala at Turku and named after Elias Lonnrot (1802-1884), a physician in Kajaani and later professor of the Finnish language in Helsinki. [Ref: Minor Planet Circ. 7944] It is a main-belt asteroid with a semi-major axis of 2.248 AU, eccentricity 0.197, inclination 6.843° , and an orbital period of 3.37 years. Its absolute magnitude is $H = 12.5$ (JPL, 2021). The WISE/NEOWISE satellite infrared radiometry survey (Masiero et al., 2014) found a diameter $D = 8.628 \pm 0.113$ km using an absolute magnitude $H = 12.8$.

Observations were conducted over two nights and collected 106 data points. The period analysis shows a possible solution for the rotational period of $P = 3.813 \pm 0.004$ h with an amplitude $A = 0.14 \pm 0.05$ mag as the most likely bimodal solution for this asteroid. The asteroid crossed by serendipity the same field of