

LIGHTCURVE ANALYSIS FOR THREE MAIN BELT ASTEROIDS

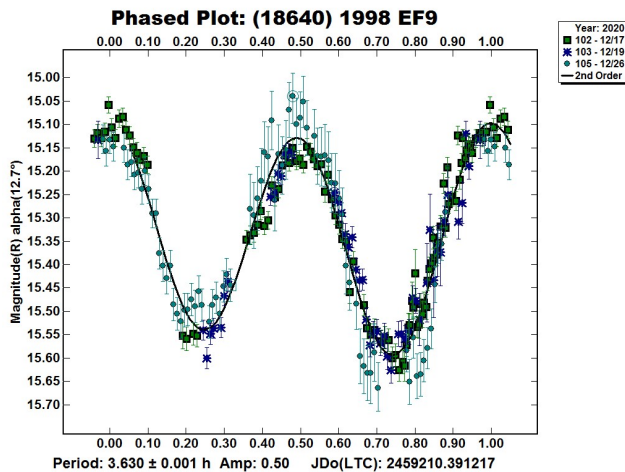
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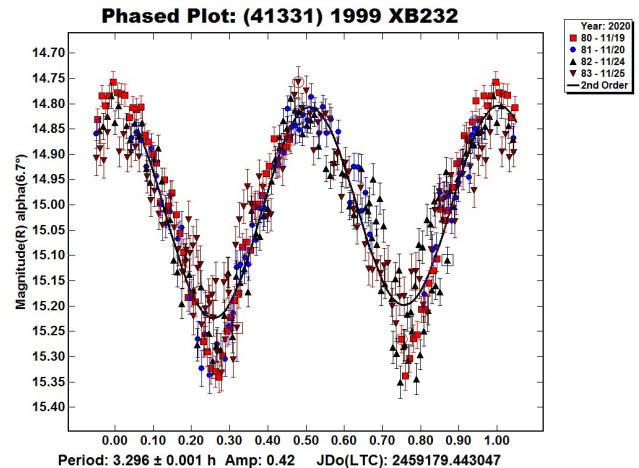
Photometric observations of three main-belt asteroids, (18640) 1998 EF9, (41331) 1999 XB232, (50713) 2000 EZ135, were made at the Filzi School Observatory (School in country Laives - Italy) MPC code D12.

CCD photometric observations, were made at the Filzi School Observatory, all are without filter (clear). All images were obtained with a 0.35-m reflector telescope reduced to $f/8.0$, a QHY9 CCD camera, and then calibrated with dark and flat-field frames. The pixel scale was 1.56 arcsec when binned at 4×4 pixels. All exposures were 120 seconds. The computer clock was synchronized with an Internet time server before each session. Differential photometry and period analysis were done using *MPO Canopus* version 10.7.12.9 (Warner, 2018). Solar type stars from CMC15 catalog in R band were used as comparison stars.

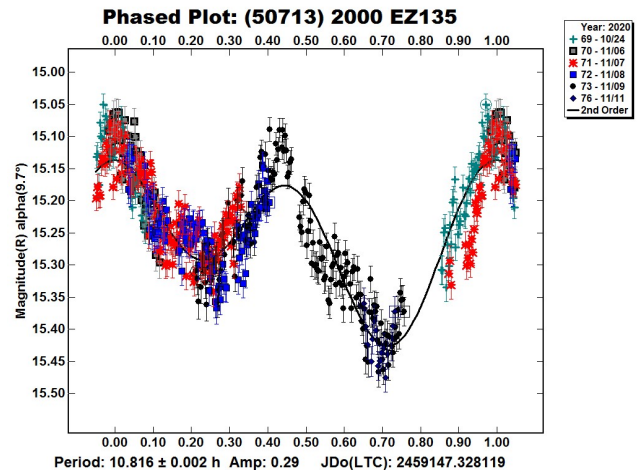
(18640) 1998 EF9. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2020 October on the MinorPlanet.info web site (<http://www.MinorPlanet.info/lightcurvedatabase.html>; hereafter referenced as MPI). It was discovered in the year 2000 by *Loneos* at Anderson Mesa. It is a main belt asteroid with a semi-major axis of 2.42 AU, eccentricity 0.29, inclination 20.37° , and orbital period of 3.78 yr. Its absolute magnitude is $H = 13.20$. This asteroid was studied for three nights (for a total of 230 images), the derived synodic period was $P = 3.630 \pm 0.001$ h with an amplitude of $A = 0.50 \pm 0.08$ mag. There were no entries in the LCDB (Warner et al., 2009) for this asteroid.



(41331) 1999 XB232. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2020 November on the MPI. It was discovered in the year 1999 by *Linear* at Socorro. It is a main belt asteroid with a semi-major axis of 2.34 AU, eccentricity 0.17, inclination 23.53° and orbital period of 3.58 yr. Its absolute magnitude is $H = 13.50$. This asteroid was studied for four nights (for a total of 353 images), The derived synodic period was $P = 3.296 \pm 0.001$ h with an amplitude of $A = 0.42 \pm 0.07$ mag. The V and R band frames were acquired in sequence changing alternatively the filters (VR VR VR). This allowed us to find the color index of $V-R = 0.54 \pm 0.05$. There were no entries in the LCDB (Warner et al., 2009) for this asteroid.



(50713) 2000 EZ135. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2020 November on the MPI. It was discovered in the year 2000 by *Loneos* at Anderson Mesa. It is a main belt asteroid with a semi-major axis of 2.36 AU, eccentricity 0.24, inclination 26.07° , and orbital period of 3.65 yr; absolute magnitude is $H = 14.00$. It was studied for six nights (for a total of 510 images). The derived synodic period was $P = 10.816 \pm 0.002$ h with an amplitude of $A = 0.29 \pm 0.08$ mag. There were no entries in the LCDB (Warner et al., 2009) for this asteroid.



Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
18640	1998 EF9	2020 12/17-12/26	13.0 9.5	103.7	-8.9	3.630	0.001	0.50	0.08	MB
41331	1999 XB232	2020 11/19-11/25	6.6 3.6	66.5	-3.5	3.296	0.001	0.42	0.07	MB
50713	2000 EZ135	2020 10/24-11/11	9.7 13.9	38.2	13.7	10.816	0.002	0.29	0.08	MB

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

References

Harris, A.W.; Young, J.W.; Scaltriti, F.; Zappala, V. (1984). "Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis." *Icarus* **57**, 251-258.

Warner, B.D.; Harris, A.W.; Pravec, P. (2009). "The Asteroid Lightcurve Database." *Icarus* **202**, 134-146. Updated 2018 June. <http://www.minorplanet.info/lightcurvedatabase.html>

Warner, B.D. (2014). MPO Software Canopus, version 10.7.12.9. Bdw Publishing, Colorado Springs, CO. <http://minorplanetobserver.com>

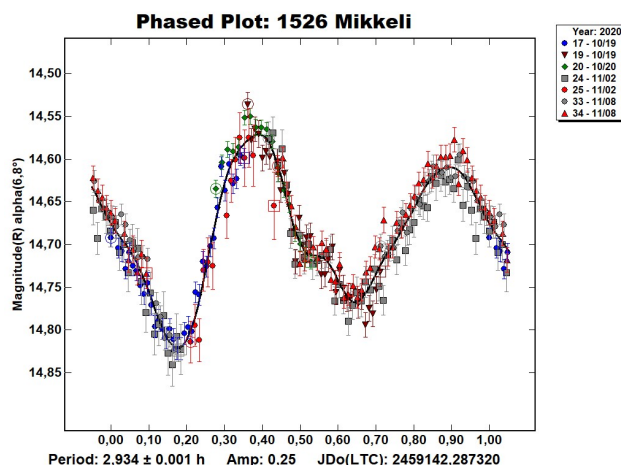
ROTATIONAL PERIOD DETERMINATION OF 1526 MIKKELI

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The main-belt asteroid 1526 Mikkeli was observed over seven nights throughout 2020 October-November in order to determine its synodic rotational period. Lightcurve analysis was done using differential photometry technique using MPO Canopus (Warner, 2012). The observations were carried out from "F. Fuligni" Observatory using a 0.35-m f/10 ACF telescope and SBIG ST8-XE CCD camera unfiltered. All images were dark and flat-field calibrated with Maxim DL.

Asteroid 1526 Mikkeli was discovered in 1939 by the Finnish astronomer Yrjö Väisälä. This main-belt asteroid was selected from Warner et al. (2020). The name of the asteroid is derived from the Finnish city of Mikkeli. The observations were carried out from "F. Fuligni" Observatory during seven nights throughout 2020 October-November. All the images were calibrated with dark and flat frames. Differential photometry and period analysis has been performed using *MPO Canopus* (Warner, 2012). The derived synodic period is $P = 2.934 \pm 0.001$ h with an amplitude of $A = 0.25$ mag.



Acknowledgement

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References

Harris, A.W.; Young, J.W.; Scaltriti, F.; Zappala, V. (1984). "Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis." *Icarus* **57**, 251-258.

Warner, B.D.; Harris, A.W.; Pravec, P. (2009). "The Asteroid Lightcurve Database." *Icarus* **202**, 134-146. Updated 2020 Aug. <http://www.minorplanet.info/lightcurvedatabase.html>

Warner, B.D. (2012). MPO Software, MPO Canopus v10.4.1.9. Bdw Publishing. <http://minorplanetobserver.com/>

Warner, B.D.; Harris, A.W.; Āurech, J.; Benner, L.A.M. (2020). "Lightcurve Photometry Opportunities: October-December 2020." *The Minor Planet Bulletin* **47**, 330-335.

Number	Name	yyyy mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
1526	Mikkeli	2020 10/19-11/08	264	6.8, 17.1	20.4	7.1	2.934	0.001	0.25	0.1	FLOR

Table I. Observing circumstances and results. Pts is the number of data points. 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 (see Harris *et al.*, 1984). Grp is the asteroid family/group (Warner *et al.*, 2009). FLOR = Flora.