

ROTATION PERIOD DETERMINATION OF ASTEROIDS 7736 NIZHNIJ NOVGOROD AND (42701) 1998 MD13

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Photometric observations were made in 2018 of the main-belt asteroids 7736 Nizhnij Novgorod and (42701) 1998 MD13. Analysis of the data suggests a likely period of 2.858 ± 0.001 hr for 7736 Nizhnij Novgorod and a period of 2.603 ± 0.001 hr for (42701) 1998 MD13.

Photometric observations of the main-belt asteroids 7736 Nizhnij Novgorod and (42701) 1998 MD13 were made at the Astronomical Observatory of the University of Siena (K54), Italy, and at the Wild Boar Remote Observatory (K49), Italy. Exposure time was 300 seconds at both the observatories. Table I shows the main features of the instruments used while Table II gives the observation circumstances and results.

Obs	Telescope	Filter	CCD
K54	0.30 m f/5.6 MCT	Clear	SBIG STL-6303 2x2 2.3"/pixel
K49	0.24 m f/10 SCT	Clear	SBIG ST8-XME 2x2 1.6"/pixel

Table I. Main features of the instruments used at the observatories involved in the research. MCT: Maksutov-Cassegrain; SCT: Schmidt-Cassegrain.

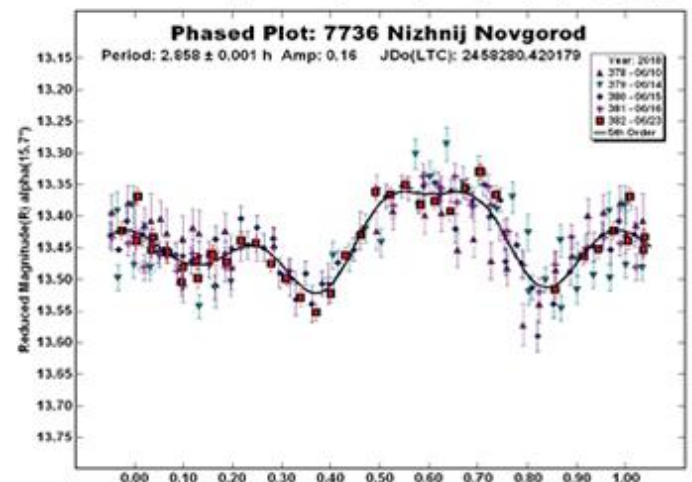
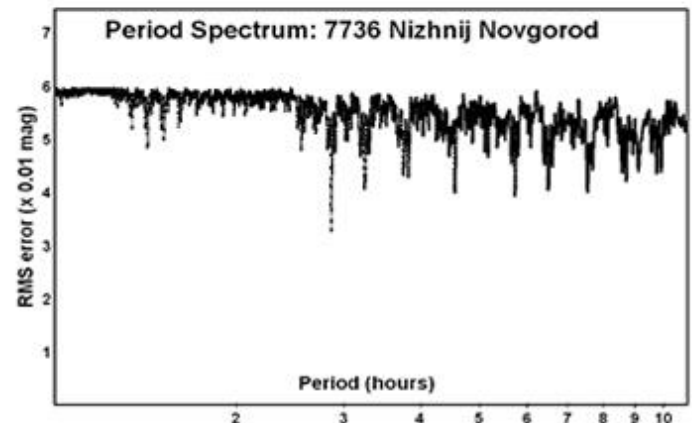
The authors performed differential photometry measurements using the Comp Star Selector (CSS) procedure in *MPO Canopus* (Warner, 2018) that allows selecting of up to five comparison stars of near-solar color. The magnitudes from the CMC-15 catalog (Munos, 2017) were used for the comparison stars. Period analysis was performed using *MPO Canopus* and its FALC (Fourier Analysis for Light Curves) algorithm (Harris *et al.*, 1989). In the end we carried out additional adjustments of the magnitude zero-points for each data set out in order to reach the minimum RMS value from the Fourier analysis and so achieve the best alignment among light curves.

A search of the Asteroid Light Curve Database (LCDB; Warner *et al.*, 2009) and literature found no previous entries.

7736 Nizhnij Novgorod is a main-belt asteroid that was discovered at Nauchnyj on 1981 September 8 by L.V. Zhuravleva. Nizhnij Novgorod is an old Russian city located at the confluence of the Volga and Oka rivers. Founded in 1221, the city is now a large industrial, scientific and cultural center. It is known for many

architectural monuments and the famous Nizhnij Novgorod Fair.

The asteroid orbits with a semi-major axis of about 2.586 AU, eccentricity 0.197, and a period of 4.16 years (JPL, 2018). Observations were made on four nights from 2018 June 10-23, collecting 175 useful data points. The period analysis yielded a few possible solutions with nearly comparable RMS values. We concluded that the most likely value of the synodic period is associated with a bimodal lightcurve phased to 2.858 ± 0.001 hr with an amplitude of 0.16 ± 0.03 mag.

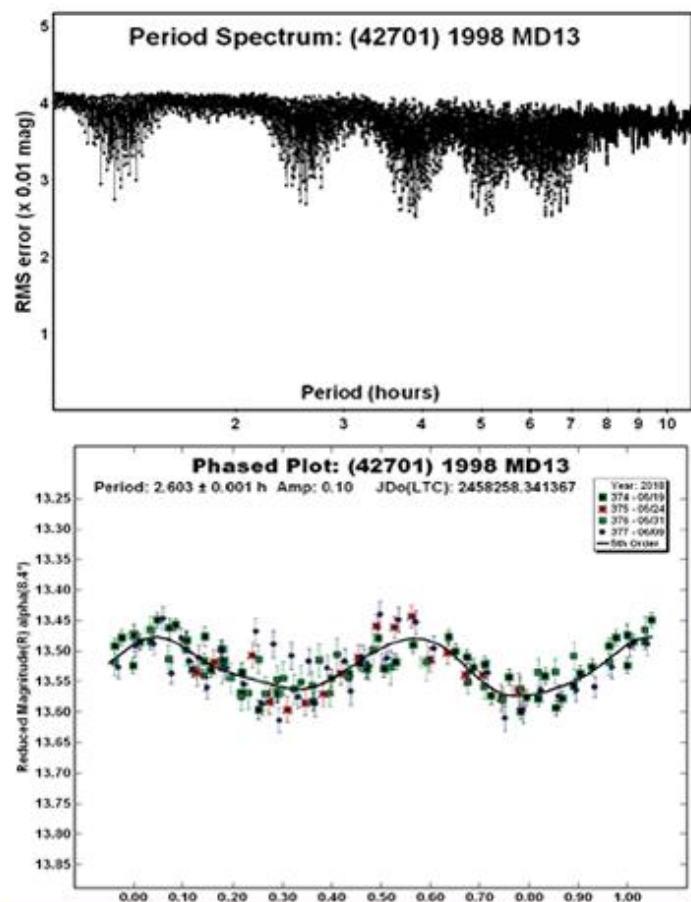


(42701) 1998 MD13 is a main-belt asteroid discovered on 1998 June 19 by LINEAR at Socorro. It orbits with a semi-major axis of about 2.534 AU, eccentricity 0.214, and a period of 4.03 years (JPL, 2018). Observations were made on three nights from 2018 May 19 through June 9 with 135 data points collected.

The period analysis yielded several possible solutions with comparable RMS errors. We concluded that the most likely value of the synodic period is associated with a bimodal lightcurve phased to 2.603 ± 0.001 hr with an amplitude of 0.10 ± 0.03 mag.

Number	Name	2018 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
7736	Nizhnij Novgorod	06/10-06/23	175	15.7, 12.5	281	19	2.858	0.001	0.16	0.03	MB
42701	1998 MD13	05/19-06-09	135	8.4, 13.9	240	13	2.603	0.001	0.10	0.03	MB

Table II. 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).



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LIGHTCURVE PHOTOMETRY OPPORTUNITIES: 2019 JANUARY-MARCH

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We present lists of asteroid photometry opportunities for objects reaching a favorable apparition and have no or poorly-defined lightcurve parameters. Additional data on these objects will help with shape and spin axis modeling via lightcurve inversion. We also include lists of objects that will or might be radar targets. Lightcurves for these objects can help constrain pole solutions and/or remove rotation period ambiguities that might not come from using radar data alone.

We present several lists of asteroids that are prime targets for photometry during the period 2019 January-March.

In the first three sets of tables, "Dec" is the declination and "U" is the quality code of the lightcurve. See the asteroid lightcurve data base (LCDB; Warner et al., 2009) documentation for an explanation of the U code:

<http://www.minorplanet.info/lightcurvedatabase.html>

The ephemeris generator on the CALL web site allows you to create custom lists for objects reaching $V \leq 18.0$ during any month in the current year, e.g., limiting the results by magnitude and declination.

http://www.minorplanet.info/PHP/call_OppLCDBQuery.php

We refer you to past articles, e.g., *Minor Planet Bulletin* **36**, 188, for more detailed discussions about the individual lists and points of advice regarding observations for objects in each list.

Once you've obtained and analyzed your data, it's important to publish your results. Papers appearing in the *Minor Planet Bulletin* are indexed in the Astrophysical Data System (ADS) and so can be referenced by others in subsequent papers. It's also important to make the data available at least on a personal website or upon request. We urge you to consider submitting your raw data to the ALCDEF database. This can be accessed for uploading and downloading data at

<http://www.alcdef.org>