

ROTATION PERIOD DETERMINATION FOR
(13832) 1999 XR13

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(Received: 2021 July 14, Revised: 2021 July 31)

Photometric observations of the outer main belt asteroid
(13832) 1999 XR13 were conducted in order to determine
its synodic rotation period. It revealed to be a very slow
rotator with $P = 98.53 \pm 0.04$ h, $A = 0.31 \pm 0.03$ mag.

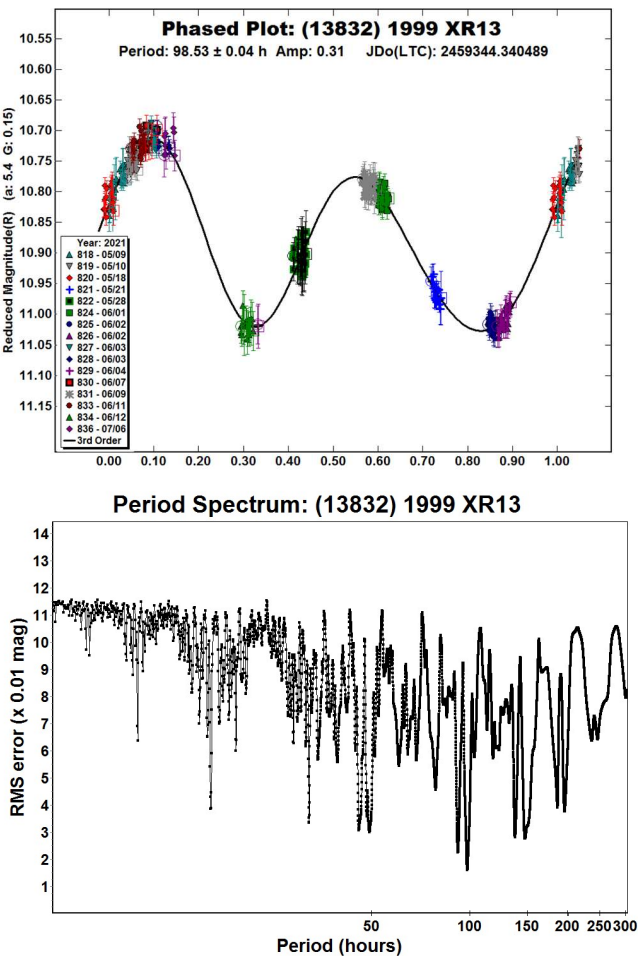
CCD photometric observations of an outer main-belt asteroid were
carried out in 2021 May - July at the Astronomical Observatory of
the University of Siena (K54), a facility inside the Department of
Physical Sciences, Earth and Environment (DSFTA, 2021). We
used a 0.30-m $f/5.6$ Maksutov-Cassegrain telescope, 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.

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 this asteroid.

(13832) 1999 XR13 was discovered on 1999 December 5 by
LINEAR at Socorro. It is an outer main-belt asteroid with a semi-
major axis of 3.365 AU, eccentricity 0.112, inclination 16.301° , and
an orbital period of 6.17 years. Its absolute magnitude is $H = 10.8$
(JPL, 2021). The WISE/NEOWISE satellite infrared radiometry
survey (Masiero et al., 2014) found a diameter $D = 37.54 \pm 0.34$ km
using an absolute magnitude $H = 10.5$.

Observations were conducted over sixteen nights and collected 312
data points. The observation of this asteroid was a challenging task:
period is quite long and therefore time demanding; nights were very
short at the end of the spring and the brightness was quickly fading
after the opposition. Despite the collected data points cover less
than full coverage, they seem sufficient to stabilize the period
spectrum and the model fit is quite good. The period analysis shows
a possible solution for the rotational period of $P = 98.53 \pm 0.04$ h
with an amplitude $A = 0.31 \pm 0.03$ mag as the most likely bimodal
solution for this asteroid. Further observations are strongly
encouraged to nail down the actual period.



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Number	Name	2021/mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
13832	1999 XR13	05/09–07/06	*5.4, 15.4	239	8	98.53	0.04	0.31	0.03	MB-O

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).