

V-BAND PHOTOMETRIC MONITORING OF 782 MONTEFIORE

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Photometric monitoring of 782 Montefiore was carried out in 2020 February through a Johnson V filter. Based on 247 images collected over three nights, we find a best-fit rotation period of 4.073 ± 0.001 h and a V-band variability amplitude of 0.50 ± 0.02 mag, in good agreement with previous results.

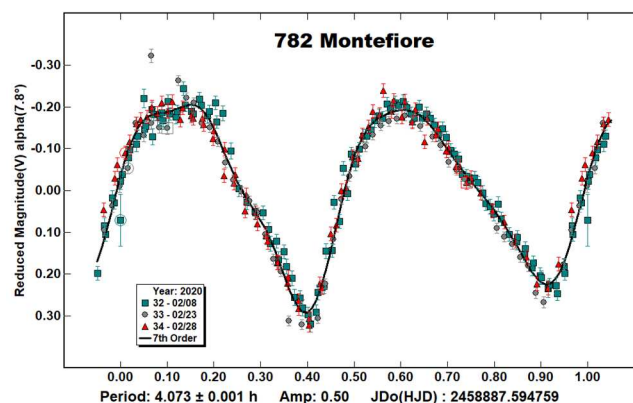
Asteroid 782 Montefiore was discovered on 1914 March 18 by Austrian astronomer Johann Palisa at Vienna Observatory (JPL, 2022). A member of the inner main belt (family 9104; Warner et al., 2009), 782 Montefiore is an S-type (stony) asteroid.

As part of the course work for the Georgia State University class *Astronomical Techniques and Instrumentation*, observations of 782 Montefiore were obtained at GSU's Hard Labor Creek Observatory near Rutledge, GA in 2020 February. Monitoring through the Johnson V filter was carried out with the 24-inch Miller Telescope, an $f/6.5$ Planewave Corrected Dall-Kirkham Astrogaph, equipped with an Apogee Alta CCD with 2048×2048 pixels, giving a field of view of $26.3 \text{ arcmin} \times 26.3 \text{ arcmin}$ and a pixel scale of 0.77 arcsec . A total of 247 individual images with exposure times of 4-5 min were obtained over the course of three separate nights: UT dates Feb 08, Feb 23, and Feb 28.

All images were reduced in *IRAF* following standard procedures, which included bias and overscan subtraction, dark subtraction, and flat fielding. Aperture photometry of the asteroid and several field stars was carried out in *IRAF* with an aperture radius of 11 pixels (Feb 08) or 9 pixels (Feb 23 and Feb 28). APASS V-band photometry of the field stars (Henden et al., 2009) was used to convert instrumental magnitudes to calibrated magnitudes.

The asteroid rotation period was determined from the calibrated magnitudes with *MPO Canopus*, which implements the Fourier Analysis of Light Curves (FALC) algorithm of Harris et al. (1989). The best-fit period was found to be 4.073 ± 0.001 h with a V-band variability amplitude of 0.50 ± 0.02 mag. Several high-quality measurements of the rotation period already exist, with values ranging from 4.069-4.08 h (Wisniewski et al., 1997; Behrend, 2007web; Galad, 2008; Han et al., 2013; Schmidt, 2015; Benishek, 2016; Āurech et al., 2020; Franco et al., 2020; Pál et al., 2020). While previous measurements of the rotation period have agreed quite well, the variability amplitude has been reported as ranging

from 0.31-0.54 mag. The higher end of this range is generally from filtered photometry (Bessel R), while unfiltered, near-infrared, or very wide-band photometry has led to smaller values of the variability amplitude. Our measurements appear to be the first reported for the Johnson V filter, and agree well with the upper end of previous amplitude measurements.



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Number	Name	yyyy mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
782	Montefiore	2020 02/08-02/28	*7.8, 6.8	150	7	4.073	0.001	0.50	0.02	9104

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).

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ROTATIONAL PERIOD OF SMALL NEA 2022 KK5

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We have observed minor planet 2022 KK5 during a close approach on 30th of May 2022 and determined that it is a fast rotator, having a rotational period of 0.0830 ± 0.0002 h, with uneven minima and maxima.

Minor planet 2022 KK5, discovered on May 27th, 2022, is small ($H = 25.1$) Apollo type NEA. It passed at a nominal distance of 0.00893 UA from the Earth two days after the discovery. This is part of the "observations on alert" program started using the telescope facilities owned by the Astronomical Institute of the Romanian Academy whose results were already published in the past (Gornea et al., 2018; Sonka et al., 2018, 2019, 2021).

Usually, small NEAs can be observed for a short period of time (Birlan et al., 2015), at their closest approach, at their maximum apparent brightness, but with a large sky motion. This object in particular will not become brighter than 24th magnitude in the foreseeable future. We observed the asteroid one night after the closest approach, during a 2-hour observing run.

Observations were made from Bucharest Observatory (IAU MPC 073 code), branch of The Astronomical Institute of the Romanian Academy. We used Riccardi Dall-Kirkham telescope, with a 0.5-m primary mirror and 3,500 mm focal length, a FLI CCD camera PL16803 with a 4096×4096 array, 9 μ m size pixels and 60% maximum Quantum Efficiency. The combination gives a visual field of 36'×36', with 1.07"/pixel at binning of 2×2 (Birlan et al., 2019).

We started to observe the asteroid on May 30th, 2022, in order to secure astrometry, with exposure time of 30 seconds, and no filter. During our observing run we noticed large brightness variations from one image to another and continued to observe the asteroid for 2.2 hours.

Our data was properly reduced (dark, bias, flat) and analyzed with *Tycho-Tracker* software (<https://www.tycho-tracker.com>). Comparison stars V magnitudes were automatically chosen from The ATLAS All-Sky Stellar Reference Catalog (Tonry et al., 2018).

The raw (unphased photometric data) lightcurve shows a large amplitude brightness variation and uneven minima and maxima, together with a very short rotational period.

Number	Name	yyyy mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
2022	KK5	2022 05/30	44.4, 44.1	242	22	0.0830	0.0002	0.81	0.30	NEA

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).