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LIGHTCURVE ANALYSIS OF THREE ASTEROIDS

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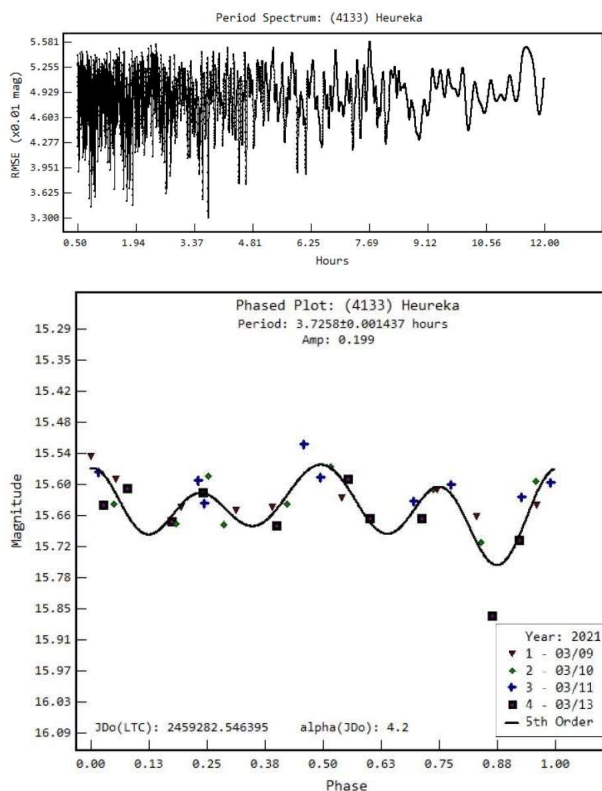
(Received: 2022 September 2 Revised: 2022 November 11)

Photometric observations were made of three main-belt asteroids in 2021 March at the Las Campanas Remote Observatory. The rotational period and amplitude of each asteroid were determined.

Photometric observations of three main-belt asteroids were taken on four nights over the span of five days in 2021 March using the Las Campanas Remote Observatory. The observatory uses a 0.3 m f8 Astro Physics Maksutov Cassegrain telescope. It uses a FLI Proline 16803 CCD Camera with FLI focuser and Filter wheel. The field of view is 52'×52' with a plate scale of 0.76" per pixel. Exposures were 300 seconds.

Data processing and analysis was done through *Tycho* v9.2 software (Parrott, 2022) to produce lightcurves. Comparison stars were used from the ATLAS catalog (Tonry et al., 2018). Previous data and measurements were found through the asteroid lightcurve database (LCDB, Warner et al., 2009).

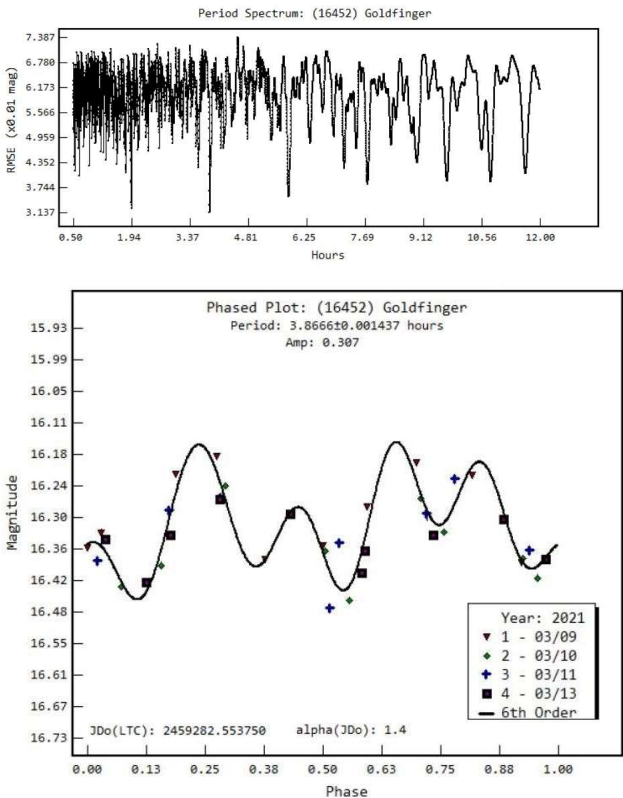
4133 Heureka. This main-belt asteroid was discovered by L. Oterma at Turku in 1942. 38 images were taken on four nights producing a rotational period of 3.725 ± 0.001 h with an amplitude of 0.20 ± 0.03 mag. There were no previous LCDB measurements found for the period of this asteroid.



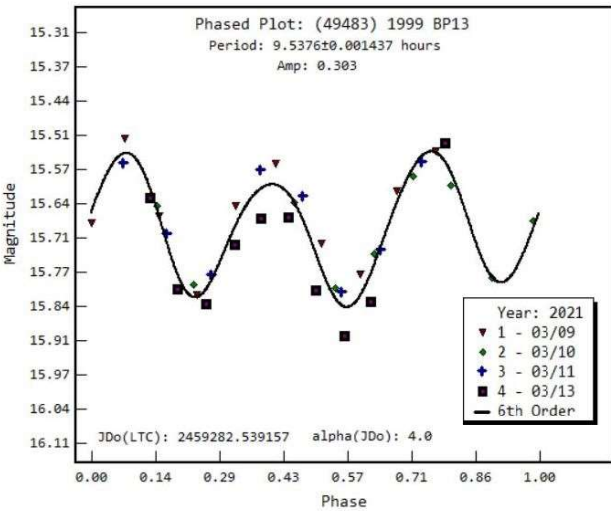
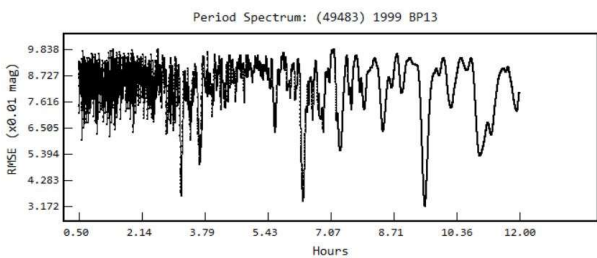
Number	Name	yyyy mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
4133	Heureka	2021/03/09-03/13	*5.2, 6.0	163	-5	3.726	0.001	0.20	0.03	MB
16452	Goldfinger	2021/03/09-03/13	*1.3, 1.6	169	-1	3.867	0.001	0.31	0.03	MB
49483	1999 BP13	2021/03/09-03/13	*4.0, 6.2	162	0	9.538	0.001	0.30	0.03	MB

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).

16452 Goldfinger. This is another main-belt asteroid and was discovered by C.S. Shoemaker and E.M. Shoemaker at Palomar in 1989. A total of 37 images were taken on four nights to find a rotational period of 3.867 ± 0.001 h and an amplitude of 0.30 ± 0.03 mag. This is similar to the previous measurement on the LCDB of 3.884 ± 0.001 h by Dose (2021).



(49483) 1999 BP13. This main-belt asteroid was discovered by K. Korlevic at Visnjan in 1999. A total of 37 images from four nights were used to find a rotational period. The best solution derived from these measurements was a period of 9.538 ± 0.001 h and an amplitude of 0.30 ± 0.06 mag. The period spectrum also shows two other solutions with similar RMS. One is a period of 6.359 ± 0.001 h and the other is a period of 3.178 ± 0.001 h. A period of 6.359 ± 0.001 h would agree with the previous measurement found in the LCDB of 6.365 ± 0.005 h by Marchini et al. (2021).



Acknowledgements

Funding was provided by the University of Wisconsin River Falls URSCA Undergraduate Stipends and Expenses (USE) Grant. The author would like to express his gratitude towards all those who helped in the learning process. This includes Dr. Matthew Vonk and Dr. Lowell McCann from the University of Wisconsin River Falls. This also includes the people from the Las Campanas Remote Observatory: Howard Hedlund, Andy Monson, Bryan Penprase, Michael Long, John E. Hoot, and Dave Jurasevich.

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