

LIGHTCURVES OF MAIN-BELT ASTEROID 7939 ASPHAUG AND NEAR-EARTH ASTEROID 2015 JD1

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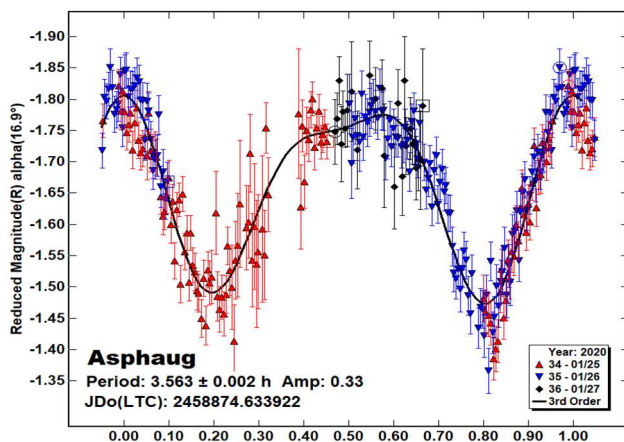
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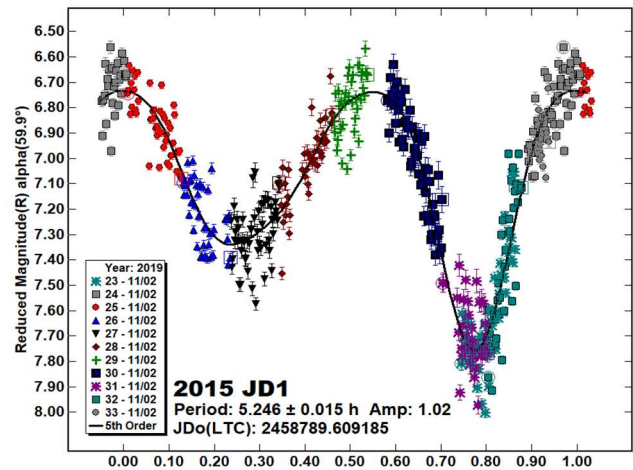
Photometric observations were conducted on main-belt asteroid 7939 Asphaug (1991 AP1) and potentially hazardous asteroid 2015 JD1. Results reveal rotation periods of $P = 3.563 \pm 0.002$ h and $P = 5.246 \pm 0.015$ h, respectively.

Photometric observations at the National Undergraduate Research Observatory (NURO) of the Lowell Observatory in Flagstaff, AZ, have been made. The observatory is equipped with a $2K \times 2K$ thermoelectrically cooled CCD camera coupled to a 31-inch telescope. The data, collected using an R-band filter, was bias subtracted, and combined to bias-subtracted flat fields using the *Image Reduction and Analysis Facility* (IRAF) software package. Photometric measurements and lightcurves analysis were performed using *MPO Canopus* (v10.7.12.12; Warner, 2018).

7939 Asphaug (1991 AP1). First seen at Palomar Observatory on 1991 January 14 by E. F. Helin, Asphaug is a main-belt asteroid of $D = 2.95$ km in diameter and an absolute magnitude of $H = 14.61$ (JPL, 2021). The asteroid was studied for three nights from 2020 January 25-27. Observed for a total of 5 hours and with 45 second exposures, 275 data points were produced for analysis. The lightcurve shows a bimodal solution for the rotation period of $P = 3.563 \pm 0.002$ h for an amplitude of $A = 0.33 \pm 0.05$ mag. After a search on the lightcurve database (LCDB; Warner et al., 2009), it seems this is the first reported rotation period for Asphaug.



2015 JD1 is an Apollo-class near-Earth and potentially hazardous asteroid of $D = 260$ m, discovered in 2015 May. Its next visit is on 2023 May 5 at a nominal distance of 0.37 AU (JPL, 2021). The asteroid was studied on the night of 2019 November 2 for 6 hours. With 30 second exposures, 476 data points were produced for analysis. Here we see the bimodal solution for a rotation period of $P = 5.246 \pm 0.015$ h for an amplitude of $A = 1.02 \pm 0.18$ mag. This result is consistent with previous reported rotational periods: Pravec et al. (2019web; $P = 5.20$ h, $A = 0.58$), Skiff (2019web; $P = 5.31$ h, $A = 1.08$ mag) found on the *Collaborative Asteroid Lightcurve Link* (CALL), and Warner et al. (2020; $P = 5.21$ h, $A = 0.94$ mag).



Acknowledgements

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Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
7939	Asphaug	2020 01/25-01/27	16.9	97	1	3.563	0.002	0.33	0.05	MBA
	2015 JD1	2019 11/02	59.9	185	-11	5.246	0.015	1.02	0.18	PHA

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).