Observations of this asteroid were conducted in the night across 6/1/2019 and 7/1/2019, and provided 79 data points distributed in about 8 hours. The period analysis shows a bimodal solution for the rotational period P = 3.1324 ± 0.0354 hr with an amplitude A = 0.32, AE = 0.06mag (Figure 3).

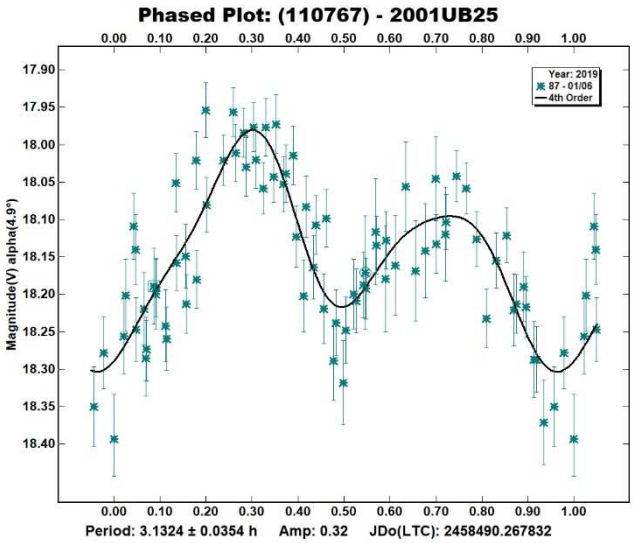

Figure 3. Phased lightcurve of (110767) – 2001 UB25

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TRAPPIST LIGHTCURVES OF MAIN-BELT ASTEROIDS 31 EUPHROSYNE, 41 DAPHNE, AND 89 JULIA

Marin Ferrais, Emmanuël Jehin, Jean Manfroid, Youssef Moulane, Francisco J. Pozuelos, Michaël Gillon.
Space Sciences, Technologies &
Astrophysics Research (STAR) Institute
University of Liège
Allée du 6 Août 17, 4000 Liège, Belgium
m.ferrais@student.uliege.be

Zouhair Benkhaldoun
Oukaïmenden Observatory
Cadi Ayyad University
Marrakech, Morocco

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Densely sampled lightcurves of three large main-belt asteroids were obtained with the TRAPPIST-South (TS) and TRAPPIST-North (TN) telescopes from 2017 September to 2018 July. We found their synodic rotation periods and amplitudes to be: 31 Euphrosyne, 5.5312 ± 0.0007 h and 0.07 mag; 41 Daphne, 5.9912 ± 0.0028 h and 0.18 mag; and 89 Julia, 11.3844 ± 0.0002 h and 0.19 mag. All data have been submitted to the ALCDEF database.

Observations of the three large and bright main-belt asteroids (MBAs), 31 Euphrosyne, 41 Daphne, and 89 Julia, were obtained with the robotic telescopes TRAPPIST-North (TN, Z53) and TRAPPIST-South (TS, I40) of the Liège University (Jehin et al., 2011). They are located, respectively, at the Oukaimeden Observatory in Morocco and the ESO La Silla Observatory in Chile. Both are a 0.6-m Ritchey-Chrétien telescope operating at *f*/8 on German Equatorial mounts. At TN the camera is an Andor IKONL BEX2 DD (0.60 arcsec/pixel) and at TS it is a FLI ProLine 3041-BB (0.64 arcsec/pixel).

The photometric measurements were made with *IRAF* scripts after proper calibration with corresponding flat fields, bias, and dark frames. The differential photometry and lightcurve construction were made with Python scripts. For the differential photometry, all the stars with a sufficient SNR were used and checked to discard any variable stars. Various apertures were tested to maximize the SNR. In the lightcurves below, the normalized relative flux is plotted against the rotational phase. The rotation periods were determined with the software *Peranso* (Vanmunster, 2018), which implements the FALC algorithm (Harris et al., 1989). The reported amplitudes are from the Fourier model curves.

Rotation periods for the three targets have already been reported multiple times. A compilation of these results can be found in the asteroid lightcurve database (LCDB; Warner et al., 2009).

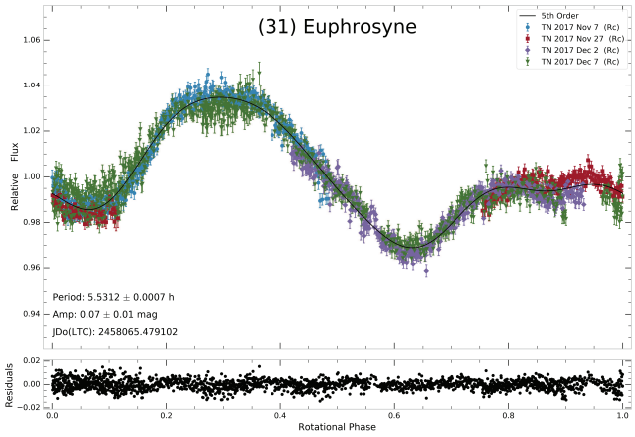
These three asteroids were observed in the framework of the ESO Large Programme ID 199.C-0074 (Vernazza et al., 2018) using

Number	Name	yyyy	mm/dd	Pts	Phase	L_{PAB}	B_{PAB}	Period (h)	P.E.	Amp	A.E.	Grp
31	Euphrosyne	2017	11/07-12/07	1836	19.8,14.8	90	27	5.5312	0.0007	0.07	0.01	MB-O
41	Daphne	2018	07/08-07/09	1158	19.3,19.1	338	9	5.9912	0.0028	0.18	0.01	MB-O
89	Julia	2017	09/20-12/23	4411	11.4,27.5	88	24	11.3844	0.0002	0.19	0.01	MB-I

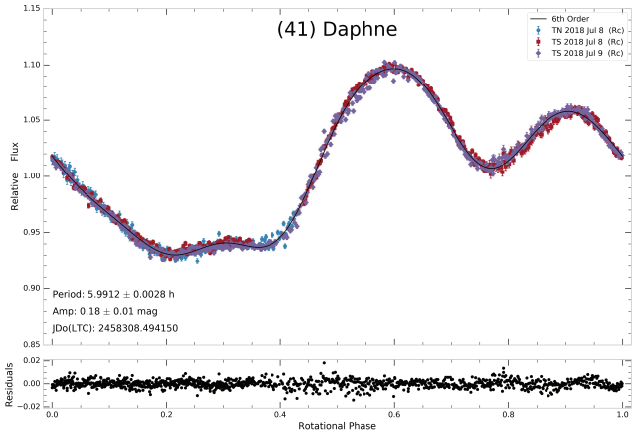
Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid orbital group (see Warner et al., 2009). MB-I/O = main-belt inner/outer.

the new SPHERE AO facility of the ESO VLT to model the precise volume of a substantial fraction of the largest MBAs.

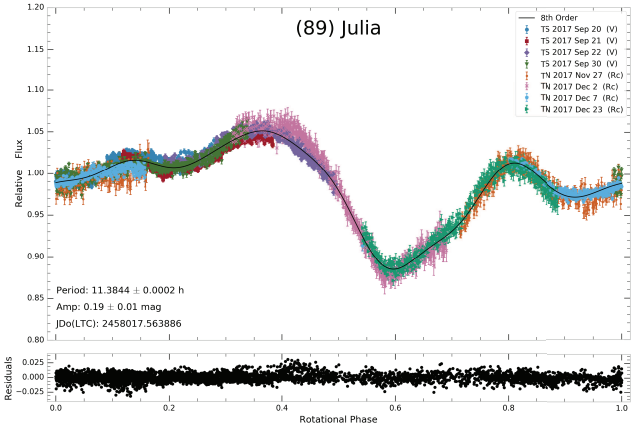
31 Euphrosyne was observed with TN on four nights between 2017 Nov 7 and Dec 7. We used a Rc filter, no binning, and exposure time of 10 s. The period best fitting our data is 5.5312 h, which in agreement with values in the LCDB.



41 Daphne was observed on 2018 July 8 by TN and TS and then by TS only on July 9. It had a V mag of 12. We used an exposure of 30 s with the Rc filter. About 100 comparison stars were used. We derived a period of 5.9912 h, in agreement with values in the LCDB. Those measurements were used by Carry et al. (2019) in the multi-data sources modeling aimed at the characterization of 41 Daphne and its satellite.



89 Julia. This large inner main-belt asteroid was observed for a total of eight nights, first by TS between 2017 Sep 20-30 and then by TN between Nov 27 - Dec 23. The TS observations were made with the V filter while the Rc filter was used at TN. We used exposure of 10 s and about 50 comparison stars. A very dense phased lightcurve was constructed using 4411 individual measurements. The derived rotation period of 11.3844 h is in agreement with values in the LCDB, including Warner (2018). This lightcurve has been used in the shape modelling of 89 Julia in Vernazza et al. (2018).



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