

LIGHTCURVE ANALYSIS OF L5 TROJAN ASTEROIDS AT THE CENTER FOR SOLAR SYSTEM STUDIES: 2022 JUNE

Robert D. Stephens

Center for Solar System Studies (CS3)

11355 Mount Johnson Ct., Rancho Cucamonga, CA 91737 USA

rstephens@foxandstephens.com

Daniel R. Coley

Center for Solar System Studies (CS3)

Corona, CA

Brian D. Warner

Center for Solar System Studies (CS3)

Eaton, CO

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Lightcurves for three Jovian Trojan asteroids were obtained at the Center for Solar System Studies (CS3) in 2022 June.

For several years, the Center for Solar System Studies (CS3, MPC U81) has been conducting a study of Jovian Trojan asteroids. This paper reports CCD photometric observations of three Trojan asteroids from the L₅ (Trojan) Lagrange point starting in 2022 June.

All observations were made using either a 0.35-m f/10 or 0.4-m f/10 Schmidt-Cassegrain telescope with an FLI Proline 1001E CCD camera. Images were unbinned with no filter and had master flats and darks applied. The exposures were 300 seconds.

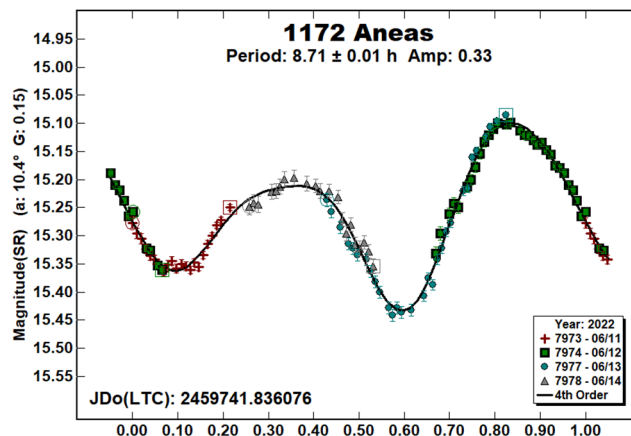
Image processing, measurement, and period analysis were done using *MPO Canopus* (Bdw Publishing), which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris et al., 1989). The Comp Star Selector feature in *MPO Canopus* was used to limit the comparison stars to near solar color. Night-to-night calibration was done using field stars from the ATLAS catalog (Tonry et al., 2018), which has Sloan *griz* magnitudes that were derived from the GAIA and Pan-STARR catalogs and are the “native” magnitudes of the catalog.

The Y-axis of lightcurves gives ATLAS SR “sky” (catalog) magnitudes. During period analysis, the magnitudes were normalized to the phase angle and value for *G* given in the parentheses. The X-axis rotational phase ranges from −0.05 to 1.05.

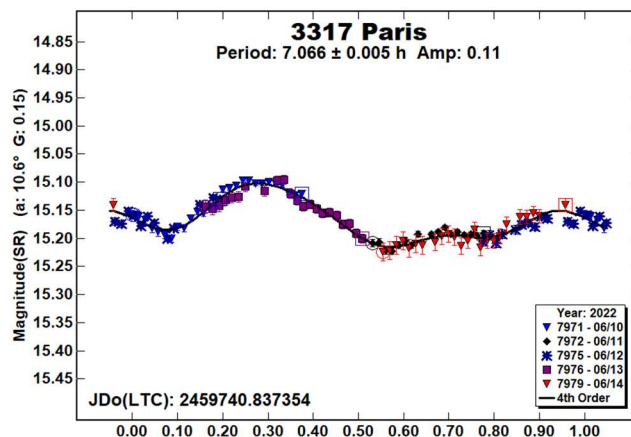
The amplitude indicated in the plots (e.g., Amp. 0.23) is the amplitude of the Fourier model curve and not necessarily the adopted amplitude of the lightcurve.

For brevity, only some of the previously reported rotational periods may be referenced. A complete list is available at the lightcurve database (LCDB; Warner et al., 2009).

1172 Aneas. This L₅ Trojan has been observed many times in the past (Stephens 2017, and references therein.; Pál et al. 2020; McNeill et al. 2021). Using data from the ATLAS survey, Āurech et al. (2020) found a sidereal period of 8.7024 h. The results this year are in good agreement with those prior findings.



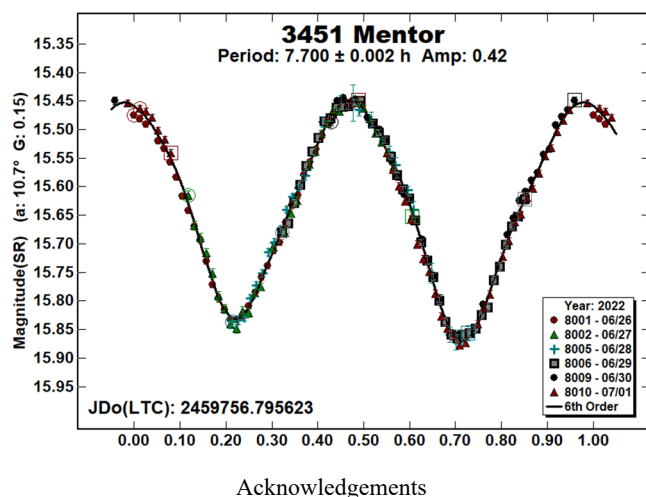
3317 Paris. This L₅ Trojan has been observed several times in the past (Mottola et al., 2011; Stephens et al., 2021, and references therein). All of these previous periods were near 7.08 h. Our result this year is in good agreement with the prior results.



3451 Mentor. We observed Mentor several times in the past (Stephens and Warner; 2020, and references therein), each time finding a period near 7.7 h. More recently, using ATLAS data, McNeill et al. (2021) found a period of 7.697 h. Finally, using Gaia and Lowell data, Āurech et al. (2019) found a sidereal period of 7.69659 h. Our result this year is in good agreement with those prior results.

Number	Name	2022/mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.
1172	Aneas	06/11–06/13	10.5, 10.2	310	15	8.71	0.01	0.33	0.02
3317	Paris	06/10–06/14	10.6, 10.1	309	7	7.066	0.005	0.11	0.02
3451	Mentor	06/26–07/01	10.7, 10.2	329	16	7.7	0.002	0.42	0.01

Table I. Observing circumstances and results. The phase angle is given for the first and last dates. If preceded by an asterisk, the phase angle reached an extremum 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).



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