LIGHTCURVE OF KORONIS FAMILY MEMBER (993) MOULTONA

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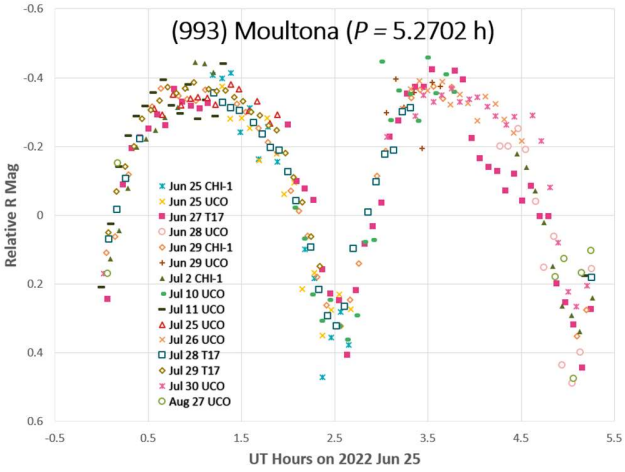
Using three telescopes, a lightcurve was made for the asteroid (993) Moultona. There is no previously published lightcurve for this Koronis Family member. Based upon our lightcurve, the period is 5.2702 ± 0.0004 h, with amplitude 0.80 ± 0.06 mag.

Based on the observable Koronis family members during Summer 2022, our target (993) Moultona was chosen by using the Koronisfamily.com web tool (Slivan, 2003). It also appears prominently in a list of the first 1000 numbered asteroids lacking reliable periods (Álvarez, 2015).

Observations were conducted with three telescopes on three continents: The Union College Observatory (UCO) in Schenectady, NY, and remote facilities through iTelescope.net (T17) in Coonabarabran, Australia, and Telescope.Live (CHI-1) in Rio Hurtado, Chile. Exposure times were 300 s and binning 2×2. Filters used are given in Table I. In total, there were 15 observing sessions.

Images were processed for bias, dark, and flat field corrections. *AstroImageJ* was used to perform the photometry. Corrections for light travel time were applied using ephemerides from the NASA Horizons web application. Individual lightcurves were shifted in brightness to form a consistent composite lightcurve. The observed amplitude 0.80 ± 0.06 mag (trough to peak) is large enough to indicate that Moultona is sufficiently elongated to reject a singly-periodic lightcurve. Our doubly-periodic lightcurve yields a best-fit period of 5.2702 ± 0.0004 h.



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References

Álvarez, E.M. (2015). "Voids and Question Marks in the Present-Day Data Concerning the Rotation Period of the First 1000 Numbered Asteroids." *Minor Planet Bull.* **42**, 127-129.

NASA Horizons. *https://ssd.jpl.nasa.gov/horizons/app.html#/*

Slivan, S.M. (2003). "A Web-based tool to calculate observability of Koronis program asteroids." *Minor Planet Bull.* **30**, 71-72.

Name	Site	Telescope	Camera	Array	Filter	FOV(')	Scale ("/pix)
UCO	Schenectady, NY	0.50-m RC f/8.1	SBIG STXL-11002	2004×1336x9µm	R	30×20	0.93
T17	Coonabarabran, Aus	0.43-m CDK f/6.8	FLI-PL E2V	3072×2048x13µm	r2′	15.5×15.5	1.84
CHI-1	Rio Hurtado, Chile	0.61-m RC f/6.8	FLI-PL9000	3056×3056x12µm	r′	31.8×31.8	1.22

Table I. Telescopes and Cameras. RC=Ritchey-Chrétien; CDK = Planewave with f/4.5 focal reducer. UCO = Union College Observatory Filters: R, Cousins R; r', Sloan r'; r2', Astrodon Sloan Gen 2 r', 562-695 nm.

Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
993	Moultona	2022 06/25-08/27	*12.2,11.4	305	2	5.2702	0.0004	0.80	0.06	Kor

Table II. 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 extremum during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude/latitude at mid-date range.