

COLLABORATIVE ASTEROID PHOTOMETRY FROM UAI: 2023 OCTOBER-DECEMBER

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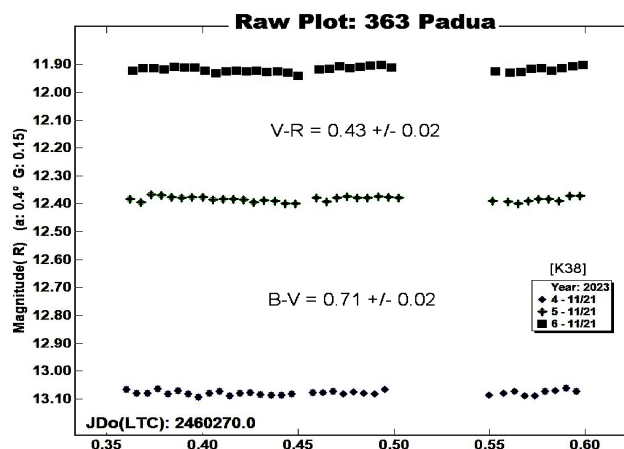
(Received: 2024 January 11)

Photometric observations of six asteroids were made to acquire lightcurves for shape/spin axis modeling. Lightcurves were produced for 363 Padua, 815 Coppelia, 1204 Renzia, 1675 Simonida, 3819 Robinson, and (139622) 2001 QQ142.

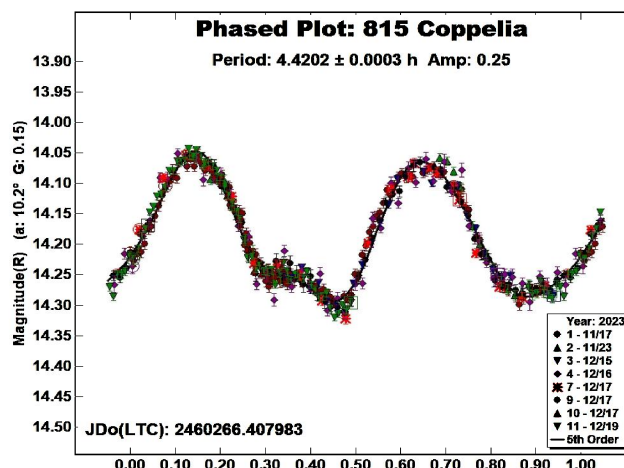
Collaborative asteroid photometry was done inside the Italian Amateur Astronomers Union (UAI, 2023) group. The targets were selected mainly in order to acquire lightcurves for shape/spin axis modeling. Table I shows the observing circumstances and results.

The CCD observations were made in 2023 October-December using the instrumentation described in the Table II. Lightcurve analysis was performed at the Balzaretto Observatory with *MPO Canopus* (Warner, 2023). All the images were calibrated with dark and flat frames and converted to standard magnitudes using solar colored field stars from CMC15 and ATLAS catalogues, distributed with *MPO Canopus*. For brevity, "LCDB" is a reference to the asteroid lightcurve database (Warner et al., 2009).

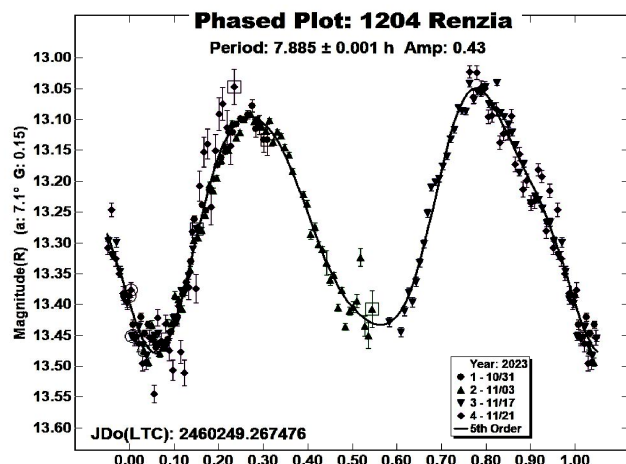
363 Padua is a X-type (Bus and Binzel, 2002) middle main-belt asteroid. Multiband photometry was made by G. Baj and M. Iozzi on 2023 November 16, 21, and 24. We found $B-V = 0.71 \pm 0.02$ and $V-R = 0.43 \pm 0.02$ after averaging three pairs of values. These are consistent with an M-type asteroid (Shevchenko and Lupishko, 1998).



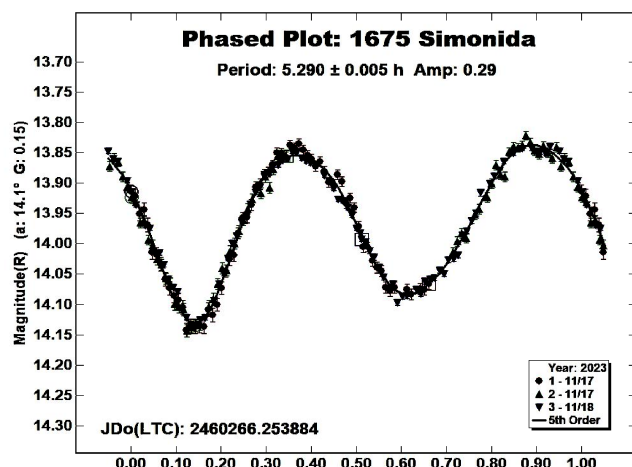
815 Coppelia is an Xe-type (Bus and Binzel, 2002) middle main-belt asteroid. Collaborative data from six nights produced a synodic period of 4.4202 ± 0.0003 h, close to other LCDB results, and an amplitude 0.25 ± 0.02 mag. Multiband photometry by G. Baj on 2023 Dec 17 found $B-V = 0.78 \pm 0.04$ and $V-R = 0.49 \pm 0.04$. The latter is consistent with an Xe-type asteroid (Pravec et al., 2012).



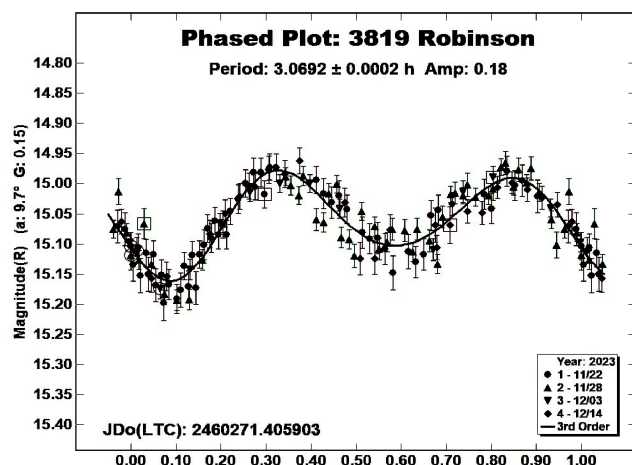
1204 Renzia is an S-type (Bus and Binzel, 2002) inner main-belt asteroid. Analysis of observations by L. Tinelli during four nights showed a synodic period of $P = 7.885 \pm 0.001$ h, close to other LCDB results, with an amplitude $A = 0.43 \pm 0.03$ mag.



1675 Simonida is an inner main-belt asteroid. Collaborative observations over two nights led to a synodic period of $P = 5.290 \pm 0.005$ h, close to other LCDB results, and $A = 0.29 \pm 0.02$ mag.

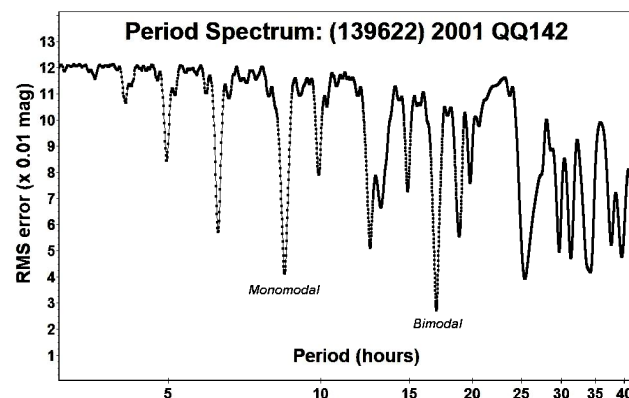
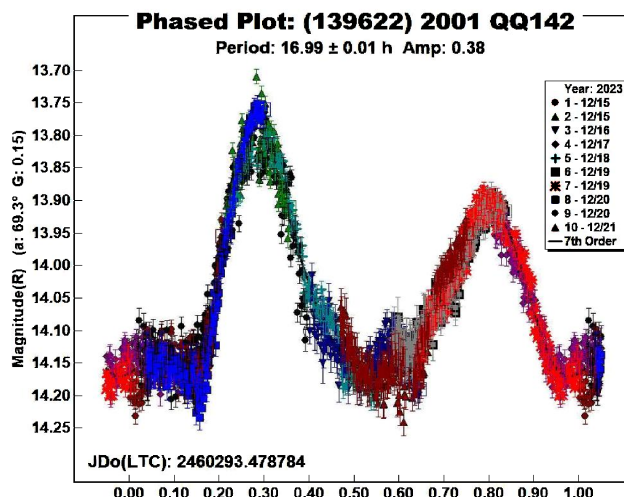


3819 Robinson is an Sr-type (Bus and Binzel, 2002) middle main-belt asteroid.



Analysis of collaborative observations over four nights found a synodic period of $P = 3.0692 \pm 0.0002$ h, also close to other LCDB results, with an amplitude $A = 0.18 \pm 0.03$ mag.

(139622) 2001 QQ142 is an Sq-type (Bus and Binzel, 2002) Apollo Near-Earth asteroid, classified as Potentially Hazardous Asteroid (PHA). Collaborative observations were made over seven nights, following its close approach to the Earth. The period spectrum shows a deeper minimum with a bimodal solution of $P = 16.99 \pm 0.01$ h with an amplitude $A = 0.38 \pm 0.08$ mag. No others periods were found in the LCDB.



References

Bus S.J.; Binzel R.P. (2002). "Phase II of the Small Main-Belt Asteroid Spectroscopic Survey - A Feature-Based Taxonomy." *Icarus* **158**, 146-177.

Harris, A.W.; Young, J.W.; Scaltriti, F.; Zappala, V. (1984). "Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis." *Icarus* **57**, 251-258.

Pravec, P.; Harris, A.W.; Kušnirák, P.; Galád, A.; Hornoch, K. (2012) "Absolute magnitudes of asteroids and a revision of asteroid albedo estimates from WISE thermal observations." *Icarus* **221**, 365-387.

Shevchenko V.G.; Lupishko D.F. (1998). "Optical properties of Asteroids from Photometric Data." *Solar System Research*, **32**, 220-232.

Number	Name	2023 mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
363	Padua	11/16-11/24	*2.2,1.5	59	-1					MB-M
815	Coppelia	11/17-12/19	*10.2,6.2	77	6	4.4202	0.0003	0.25	0.02	MB-M
1204	Renzia	10/31-11/21	7.1,17.8	29	1	7.885	0.001	0.43	0.03	MB-I
1675	Simonida	11/17-11/18	14.1,14.6	32	2	5.290	0.005	0.29	0.02	MB-I
3819	Robinson	11/22-12/14	9.6,17.9	42	1	3.0692	0.0002	0.18	0.03	MB-M
139622	2001 QQ142	12/15-12/21	69.3,61.3	120	10	16.99	0.01	0.38	0.08	NEA

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).

Observatory (MPC code)	Telescope	CCD	Filter	Observed Asteroids (#Sessions)
Astronomical Observatory, University of Siena (K54)	0.30-m MCT f/5.6	SBIG STL-6303e (bin 2×2)	C	139622 (6)
HOB Astronomical Observatory (L63)	0.20-m SCT f/6.0	ATIK 383L+	C, B, V, R _c	363 (1), 815 (1), 3819 (2)
M57 (K38)	0.35-m RCT f/5.5	SBIG STT1603ME	B, V, R _c	363 (3), 815 (1)
GAV	0.20-m SCT f/7.0	SXV-H9	R _c	1204 (4)
Iota Scorpii (K78)	0.40-m RCT f/8.0	SBIG STXL-6303e (bin 2×2)	R _c	815 (2), 3819 (1)
Virgil Observatory (M60)	0.30-m NRT f/4.0	ASI 533 MM	C	139622 (3)
GiaGa Observatory (203)	0.36-m SCT f/5.8	Moravian G2-3200	R _c	815 (1), 1675 (1)
Seveso Observatory (C24)	0.30-m SCT f/10.0	Moraviann KAF 8300 (bin 3×3)	R	815 (1), 3819 (1)
Blessed Hermann Observatory (L73)	0.30-m SCT f/6.0	QHY 174MGPS (bin 2×2)	R _c	363 (2)
Osservatorio Astronomico Nastro Verde (C82)	0.35-m SCT f/6.3	SBIG ST10XME (bin 2×2)	C	1675 (1)
Zen Observatory (M26)	0.30-m RCT f/7.4	ATIK 383L+	C	815 (1)

Table II. Observing Instrumentations. MCT: Maksutov-Cassegrain, NRT: Newtonian Reflector, RCT: Ritchey-Chretien, SCT: Schmidt-Cassegrain.

UAI (2023), “Unione Astrofili Italiani” web site.
<https://www.uai.it>

Warner, B.D. (2023). MPO Software, MPO Canopus v10.8.6.20.
Bdw Publishing. <http://minorplanetobserver.com>

Warner, B.D.; Harris, A.W.; Pravec, P. (2009) “The asteroid lightcurve database.” *Icarus* **202**, 134-146. Updated 2024 January.
<https://minplanobs.org/alcdef/index.php>