COLLABORATIVE ASTEROID PHOTOMETRY FROM UAI: 2024 OCTOBER-DECEMBER

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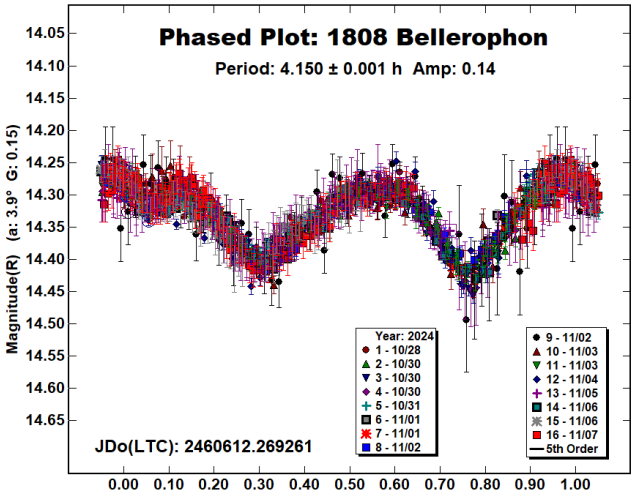
Photometric observations of four asteroids were made in order to acquire lightcurves for shape/spin axis modeling. Lightcurves were acquired for 1808 Bellerophon, 3672 Stevedberg, (36183) 1999 TX16, and (154589) 2003 MX2.

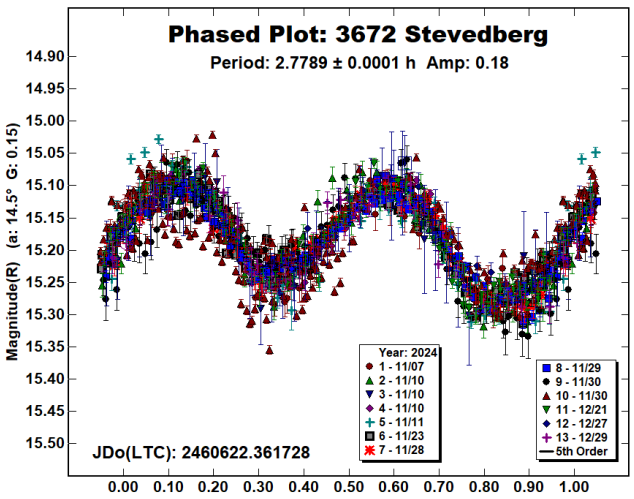
Collaborative asteroid photometry was done inside the Italian Amateur Astronomers Union (UAI; 2024) group. The targets were selected mainly in order to acquire lightcurves for shape/spin axis modeling. Table I shows the observing circumstances and results.

The CCD observations were made in 2024 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).

1808 Bellerophon is a medium albedo middle main-belt asteroid. Collaborative observations were made over ten nights. The period analysis shows a synodic period of P = 4.150 ± 0.001 h with an amplitude A = 0.14 ± 0.03 mag. The period is consistent with Dose (2025; 4.147 ± 0.002 h).



3672 Stevedberg is a medium albedo inner main-belt asteroid. Collaborative observations were made over eleven nights. The period analysis shows a synodic period of P = 2.7789 ± 0.0001 h with an amplitude A = 0.18 ± 0.04 mag. The period is close to the previously published results in the LCDB.



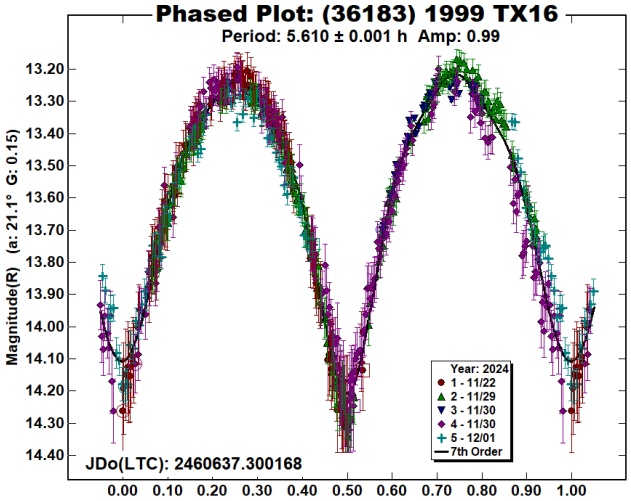
Number	Name	2024 mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
1808	Bellerophon	10/28-11/07	*3.9,1.6	43	1	4.150	0.001	0.14	0.03	MB-M
3672	Stevedberg	11/07-12/29	*14.5,18.2	68	8	2.7789	0.0001	0.18	0.04	MB-I
36183	1999 TX16	11/22-12/01	21.2,36.4	52	17	5.610	0.001	0.99	0.04	NEA
154589	2003 MX2	10/29-11/05	8.1,5.8	40	-5	42.6	0.1	0.59	0.03	NEA

Table I. Observing circumstances and results. The first line gives the results for the primary of a binary system. The second line gives the orbital period of the satellite and the maximum attenuation. 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).

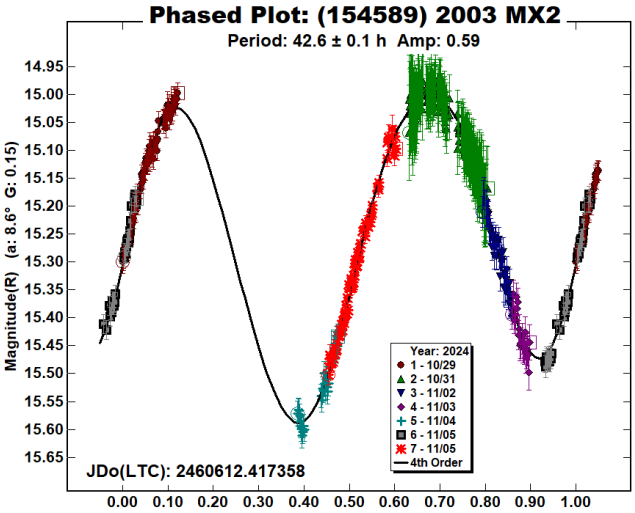
Observatory (MPC code)	Telescope	CCD	Filter	Observed Asteroids (#Sessions)
Iota Scorpii(K78)	0.40-m RCT f/6.1	CMOS QHY 268 (bin 4×4)	R, C	1808(1), 3672(1), 36183(3), 154589(1)
Filzi School Observatory (D12)	0.35-m RCT f/8.0	ASI 2600 MC PRO	C	1808(3), 3672(1), 36183(1)
Astronomical Observatory, University of Siena (K54)	0.30-m MCT f/5.6	SBIG STL-6303e (bin 2×2)	C	1808(3), 3672(2)
HOB Astronomical Observatory (L63)	0.20-m SCT f/6.0	ATIK 383L+ (bin 2×2)	C	1808(3), 3672(2)
San Marcello Pistoiese Observatory (104)	0.60-m NRT f/4.0	Apogee Alta	C	154589(4)
GiaGa Observatory (203)	0.36-m SCT f/5.8	Moravian G2-3200	C	1808(1), 3672(1), 154589(1)
Osservatorio Astronomico Margherita Hack (A57)	0.35-m SCT f/8.3	SBIG ST10XME (bin 2×2)	Rc	3672(3)
Osservatorio Astronomico Nastro Verde (C82)	0.35-m SCT f/6.3	SBIG ST10XME (bin 2×2)	C	1808(1), 3672(1)
Zen Observatory (M26)	0.30-m RCT f/7.4	ATIK 383L+ (bin 2×2)	C	3672(1), 36183(1)
Osservatorio Serafino Zani (130)	0.40-m RCT f/5.8	Moravian G4 16000 (bin 2×2)	C	3672(1)
M57 (K38)	0.35-m RCT f/5.5	SBIG STT1603ME	Rc	1808(1)
GAV	0-20-m SCT f/6.3	QSI683 (bin 2×2)	Rc	1808(1)

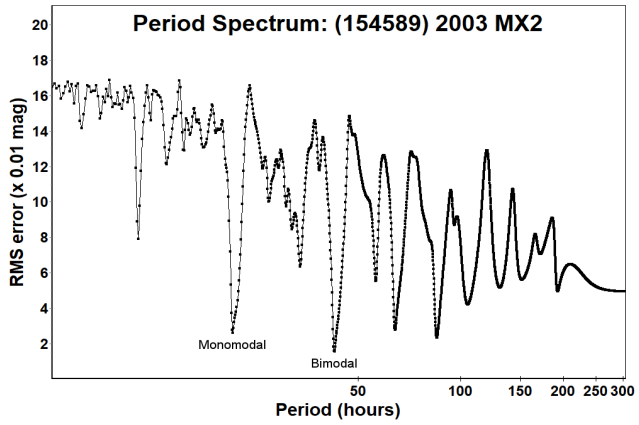
Table II. Observing Instrumentations. MCT: Maksutov-Cassegrain, NRT: Newtonian Reflector, RCT: Ritchey-Chretien, SCT: Schmidt-Cassegrain.

(36183) 1999 TX16 is an Amor Near-Earth asteroid of Ld-type (Bus and Binzel, 2002). Collaborative observations were made over seven nights. The period analysis shows a synodic period of P = 5.610 ± 0.001 h with an amplitude A = 0.99 ± 0.04 mag. The period is close to the previously published results in the LCDB.



(154589) 2003 MX2 is an Amor Near-Earth asteroid. Collaborative observations were made over six nights. We found a bimodal solution with a synodic period of $P = 42.6 \pm 0.1$ h and an amplitude $A = 0.59 \pm 0.03$ mag. This solution differs from the one found by Warner (2018; 1.611 ± 0.002 h).





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PHOTOMETRY OF NEAS (187026) 2005 EK70 AND (152787) 1999 TB10

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Near-Earth asteroids (187026) 2005 EK70 and (152787) 1999 TB10 were observed over five nights in February 2024 and four nights in March 2024, respectively, using the Prompt 3 telescope at the Cerro Tololo Inter-American Observatory. The rotational period for (187026) 2005 EK70 is 6.966 ± 0.001 hours and the lightcurve amplitude is 0.20 ± 0.02 magnitude. The rotational period for (152787) 1999 is 2.876 ± 0.001 hours and the amplitude is 0.29 ± 0.05 magnitude. A search of the Asteroid Lightcurve Database provided no previously published results for either NEA.

Observations

LINEAR at Socorro discovered NEA (187026) 2005 EK70 on 2005 March 08, and NEA (152787) 1999 TB10 on 1999 October 07. We obtained CCD photometric observations during the close approach of (187026) 2005 EK70 on 2024 February 25-29, and during close approach of (152787) 1999 TB10 on 2024 March 25-28. Neither of these NEAs have published photometric data in the Asteroid Lightcurve Database (Warner et al., 2009).

Observations were collected from Prompt 3 at the Cerro Tololo Inter-American Observatory (CTIO) (MPC: code 807). Prompt 3 is a 0.6m f/6 Planewave Ritchey-Chrétien on a Planewave HR200 with a FLI 13.5µm 2048×2048 camera. Images were taken using the broadband Clear filter and binned 2×2. The exposure times for (187026) 2005 EK70 were 20-30 seconds, and (152787) 1999 TB10 exposure times were 30-40 seconds. The observing cadence was separated by the read-out time of the CCD. A total of 3,294 science images of (187026) 2005 EK70 were acquired, and we included 2,681 in our analysis. Similarly, for (152787) 1999 TB10, we obtained a total of 1,323 science frames and included 1,010 images in our analysis. A total of 926 images were excluded due to star contamination, wind or meridian flip-induced trails, and intermittent clouds. Flat, bias, and dark frames were obtained each night under similar operating conditions as the science frames. The dark frame exposures were 80 seconds and taken sets of ten using