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COLLABORATIVE ASTEROID PHOTOMETRY FROM UAI: 2024 JANUARY-MARCH

Lorenzo Franco
Balzaretto Observatory (A81), Rome, Italy
lor_franco@libero.it

Alessandro Marchini, Riccardo Papini
Astronomical Observatory, University of Siena (K54),
Via Roma 56, 53100 - Siena, Italy

Nello Ruocco
Osservatorio Astronomico Nastro Verde (C82), Sorrento, Italy

Paolo Fini, Guido Betti
Blessed Hermann Observatory (L73), Impruneta, Italy

Paolo Bacci, Martina Maestripieri
GAMP - San Marcello Pistoiese (104), Pistoia, Italy

Giulio Scarfi
Iota Scorpis Observatory (K78), La Spezia, Italy

Giorgio Baj
M57 Observatory (K38), Saltrio, Italy

Nico Montigiani, Massimiliano Mannucci
Osservatorio Astronomico Margherita Hack (A57),
Lastra a Signa, Italy

Giovanni Battista Casalnuovo
Filzi School Observatory (D12), Laives, Italy

Marco Iozzi
HOB Astronomical Observatory (L63),
Capraia Fiorentina, Italy

Gianni Galli
GiaGa Observatory (203), Pogliano Milanese, Italy

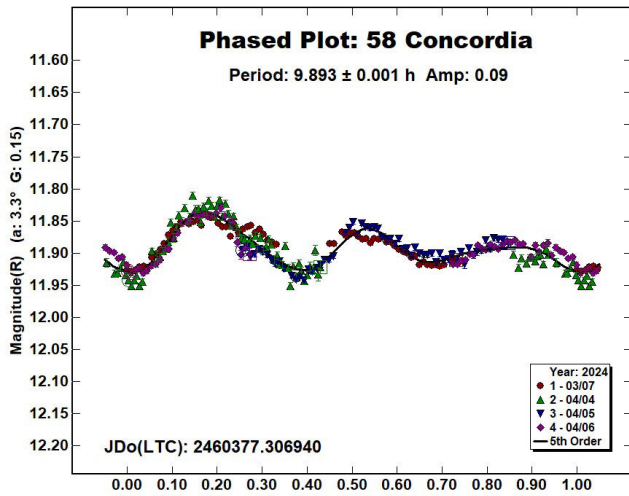
(Received: 2024 April 7)

Photometric observations of eight asteroids were made in order to acquire lightcurves for shape/spin axis modeling. Lightcurves were acquired for 58 Concordia, 78 Diana, 462 Eriphyla, 3223 Forsius, 4673 Bortle, 6460 Bassano, (187026) 2005 EK70, and 2023 SP1.

Collaborative asteroid photometry was done within 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.

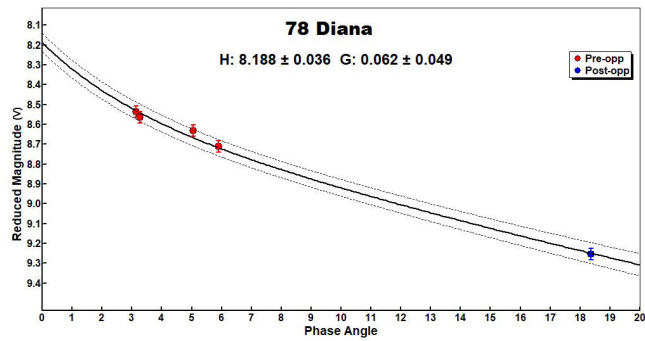
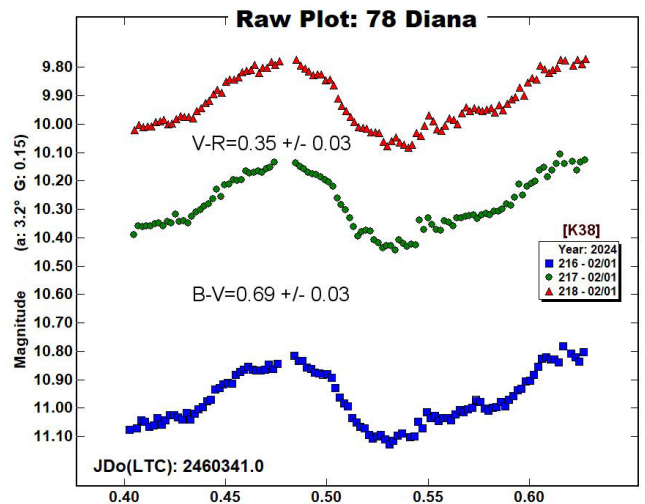
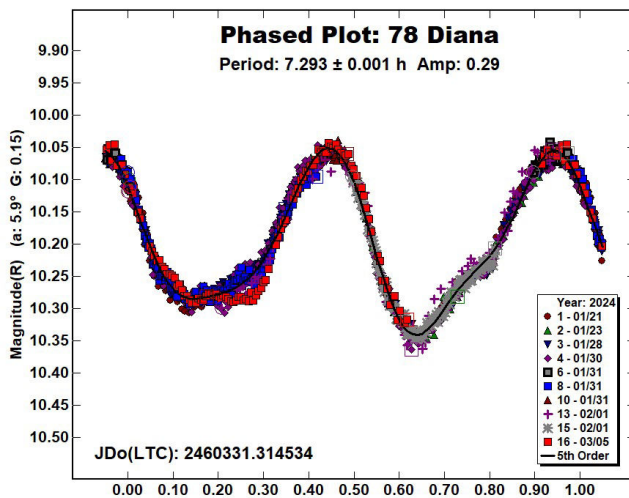
The CCD observations of eight asteroids were made in 2024 January-March using the instrumentation described in the Table II. Lightcurve analysis was performed at the Balzaretto Observatory with *MPO Canopus* (Warner, 2023). All the images were calibrated with dark and flat frames and converted to standard 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).

58 Concordia is a Ch-type (Bus and Binzel, 2002) middle main-belt asteroid. Observations were made over four nights by A. Marchini (K54). The period analysis shows a synodic period of $P = 9.893 \pm 0.001$ h with an amplitude $A = 0.09 \pm 0.02$ mag. The period is close to the previously published results in the LCDB.

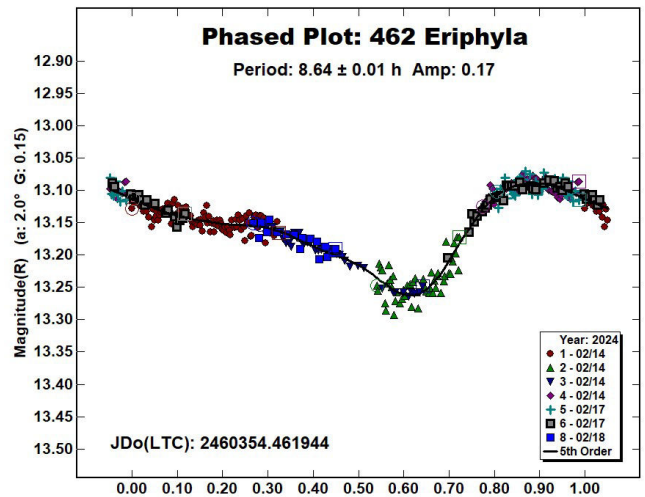


78 Diana is a Ch-type (Bus and Binzel, 2002) middle main-belt asteroid. Collaborative observations were made over six nights. The period analysis shows a synodic period of $P = 7.293 \pm 0.001$ h with an amplitude $A = 0.29 \pm 0.01$ mag. The period is close to the previously published results in the LCDB. Multiband photometry was made by G. Galli (203) and G. Baj (K38), respectively on 2024 January 31 and February 1. We found $B-V = 0.69 \pm 0.03$ and $V-R = 0.35 \pm 0.03$ averaging the two independent acquired values. These color indices are consistent with a C-type asteroid (Shevchenko and Lupishko, 1998).

For H-G parameters the R band magnitudes were evaluated, for each lightcurve, as half peak-to-peak amplitude and converted to V band adding the color index V-R. We found $H_V = 8.19 \pm 0.04$ and $G = 0.06 \pm 0.05$. This last is consistent with C-type asteroid (Shevchenko and Lupishko, 1998).



462 Eriphyla is an S-type (Bus and Binzel, 2002) outer main-belt asteroid. Collaborative observations were made over three nights. The period analysis shows a synodic period of $P = 8.64 \pm 0.01$ h with an amplitude $A = 0.17 \pm 0.02$ mag. The period is close to the previously published results in the LCDB.

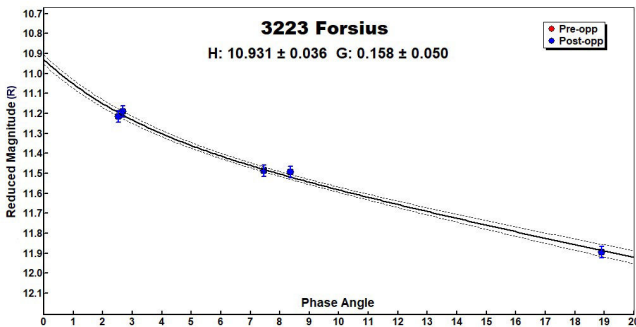
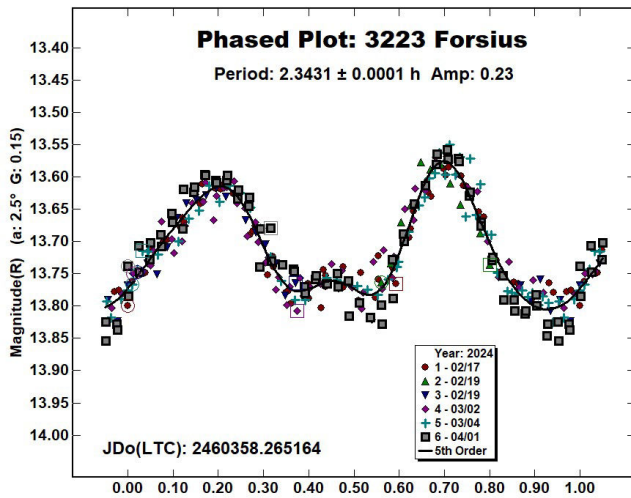


3223 Forsius is a high albedo middle main-belt asteroid. Collaborative observations were made over five nights. The period analysis shows a synodic period of $P = 2.3431 \pm 0.0001$ h with an amplitude $A = 0.23 \pm 0.03$ mag. The period is close to the previously published results in the LCDB.

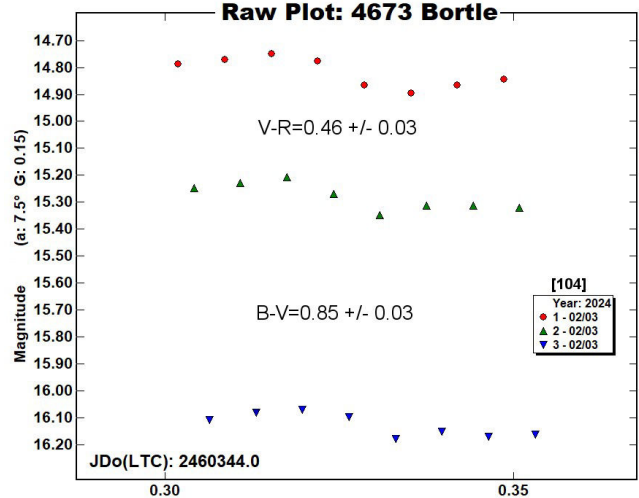
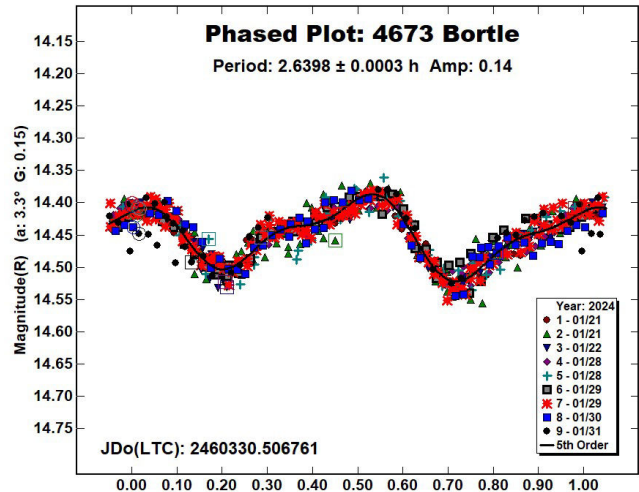
Number	Name	2024 mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
58	Concordia	03/07-04/06	3.2, 15.3	161	1	9.893	0.001	0.09	0.02	MB-M
78	Diana	01/21-03/05	*5.9, 18.3	130	4	7.293	0.001	0.29	0.01	MB-M
462	Eriphyla	02/14-02/18	2.2, 3.7	140	2	8.64	0.01	0.17	0.02	MB-O
3223	Forsius	02/17-04/01	2.5, 18.8	149	-3	2.3431	0.0001	0.23	0.03	MB-M
4673	Bortle	01/21-01/31	3.2, 6.2	121	7	2.6398	0.0003	0.14	0.02	MB-M
6460	Bassano	01/11-02/16	*6.2, 14.9	122	0	2.9126	0.0001	0.37	0.04	MB-I
187026	2005 EK70	02/13-02/14	24.6, 20.6	152	12	4.9	0.1	0.24	0.03	NEA
	2023 SP1	02/18-02/21	17.8, 14.8	148	9					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).

For H-G parameters the R band magnitudes were evaluated, for each lightcurve, as half peak-to-peak amplitude. We found $H_R = 10.93 \pm 0.04$ and $G = 0.16 \pm 0.05$.



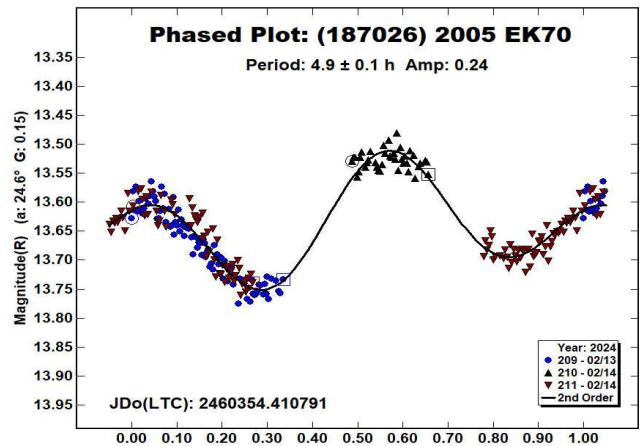
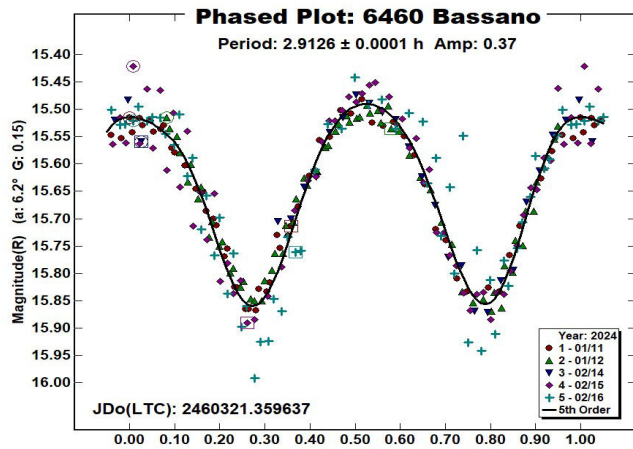
4673 Bortle is a medium albedo middle main-belt asteroid. Collaborative observations were made over five nights. The period analysis shows a synodic period of $P = 2.6398 \pm 0.0003$ h with an amplitude $A = 0.14 \pm 0.02$ mag. The period is close to the previously published results in the LCDB. Multiband photometry was made by P. Bacci and M. Maestriperri (104) on 2024 February 3. We found $B-V = 0.85 \pm 0.03$ and $V-R = 0.46 \pm 0.03$. These color indices are consistent with a S-type asteroid (Shevchenko and Lupishko, 1998).



6460 Bassano is a low-medium albedo inner main-belt asteroid. Collaborative observations were made over five nights. The period analysis shows a synodic period of $P = 2.9126 \pm 0.0001$ h with an amplitude $A = 0.37 \pm 0.04$ mag. The period is close to the previously published results in the LCDB.

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 2x2)	C,Rc	3223 (2), 58 (4), 78 (5)
Osservatorio Astronomico Nastro Verde (C82)	0.35-m SCT f/6.3	SBIG ST10XME (bin 2x2)	C	3223 (2), 6460 (2), 4673 (3)
Blessed Hermann Observatory (L73)	0.30-m SCT f/6.0	QHY 174MGPS (bin 2x2)	Rc	462 (4), 3223 (1)
San Marcello Pistoiese Observatory (104)	0.60-m NRT f/4.0	Apogee Alta	B,V,Rc	4673 (4)
Iota Scorpii (K78)	0.40-m RCT f/8.0	SBIG STXL-6303e (bin 2x2)	Rc	4673 (1), 462 (2)
M57 (K38)	0.35-m RCT f/5.5	SBIG STT1603ME	B,V,Rc	4673 (2), 78 (1)
Osservatorio Astronomico Margherita Hack (A57)	0.35-m SCT f/8.3	SBIG ST10XME (bin 2x2)	C	6460 (3)
Filzi School Observatory (D12)	0.35-m RCT f/8.0	ASI 2600 MC PRO	C	187026 (2)
HOB Astronomical Observatory (L63)	0.20-m SCT f/6.0	ATIK 383L+	V,Rc	2023 SP1 (2)
GiaGa Observatory (203)	0.36-m SCT f/5.8	Moravian G2-3200	V,Rc	78 (1)

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



(187026) 2005 EK70 is an Aten Near-Earth asteroid. Observations were made over two nights by G. Casalnuovo (D12) on 2024 February 13, 14. The period spectrum shows a deeper minimum with a bimodal solution of $P = 4.9 \pm 0.1$ h with an amplitude $A = 0.24 \pm 0.03$ mag. No others periods were found in the LCDB.

