# COLLABORATIVE ASTEROID PHOTOMETRY FROM UAI: 2025 JANUARY - MARCH

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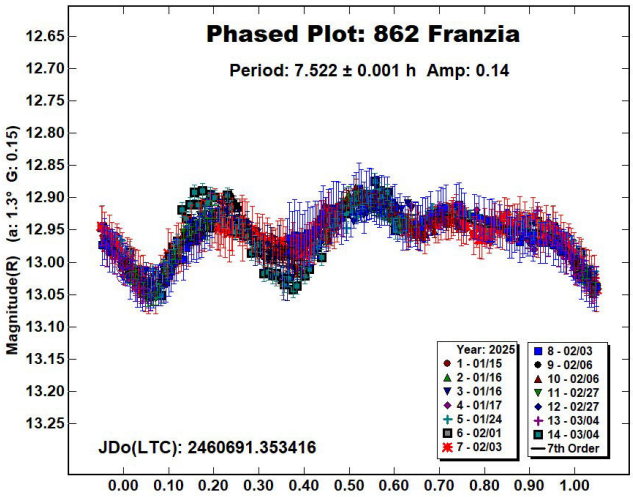
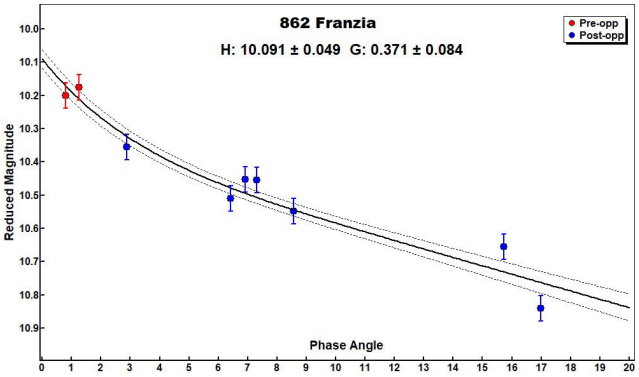
Photometric observations of seven asteroids were made in order to acquire lightcurves for shape/spin axis modeling. Lightcurves were acquired for 862 Franzia, 1318 Nerina, 1342 Brabantia, 4133 Heureka, 6239 Minos, (137126) 1999 CF9, and (137805) 1999 YK5.

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.

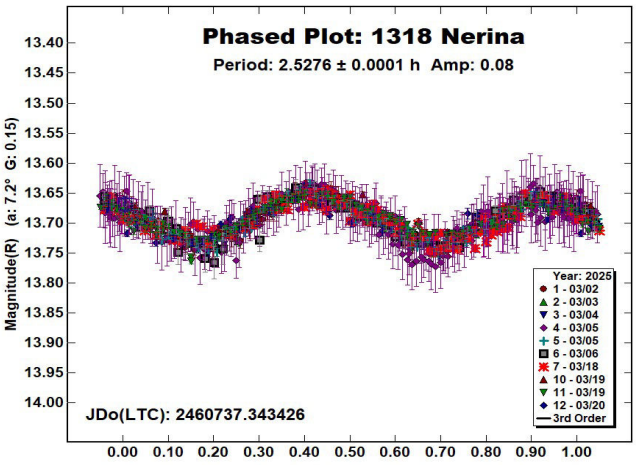
The CCD observations were made in 2025 January-March using the instrumentation described in the Table II. Lightcurve analysis was performed at the Balzaretto Observatory with *MPO Canopus* (Warner, 2023). All the images were calibrated with dark and flat frames and converted to standard magnitudes using 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).

862 Franzia is a S-type (Bus and Binzel, 2002) middle main-belt asteroid. Collaborative observations were made over nine nights. The period analysis shows a synodic period of $P = 7.522 \pm 0.001$ h with an amplitude $A = 0.14 \pm 0.03$ mag, close to the previously published results in the LCDB. For the H-G parameters, the half peak-to-peak R band magnitude of each session has been evaluated and converted to V band, using the color index found by Franco et al. (2024; 0.46 ± 0.01). We found $H = 10.09 \pm 0.05$ and $G = 0.37 \pm 0.08$.



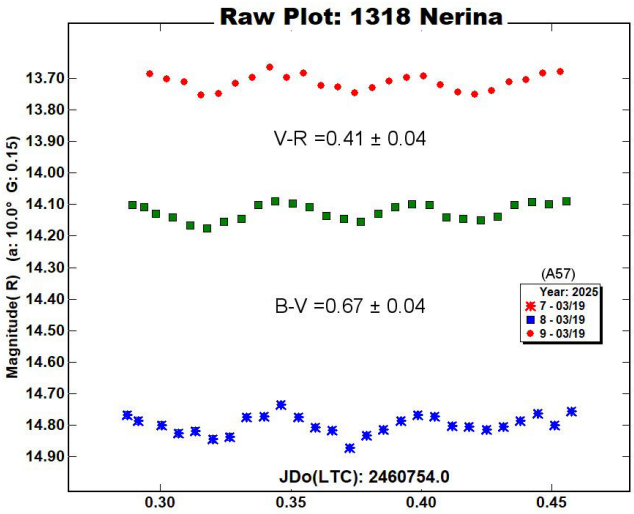




1318 Nerina is a medium albedo inner main-belt asteroid. Collaborative observations were made over seven nights. The period analysis shows a synodic period of $P = 2.5276 \pm 0.0001$ h with an amplitude $A = 0.08 \pm 0.03$ mag.

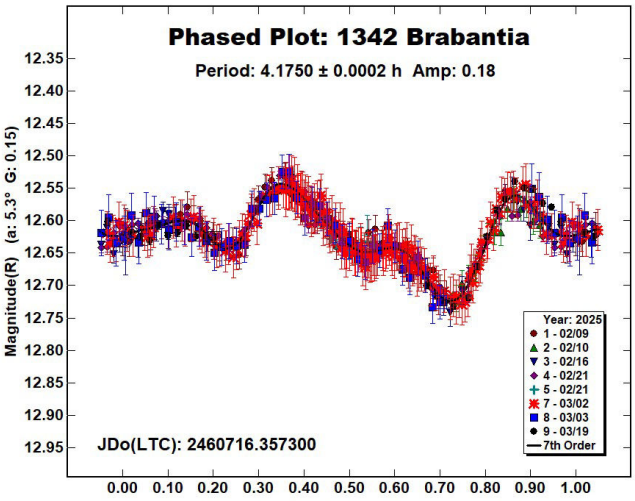



The period is close to the previously published results in the LCDB. Multiband photometry, obtained by N. Montigiani and M.

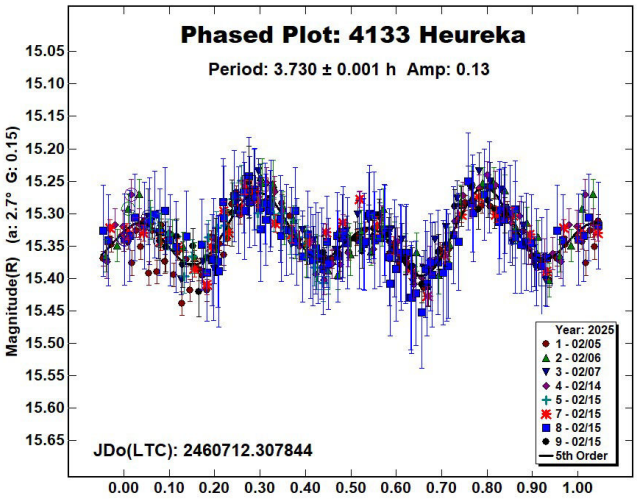
Mannucci (A57) on 2025 March 19, shows color indices B-V = 0.67 ± 0.04; V-R = 0.41 ± 0.04, both close to a M-type asteroid (Shevchenko and Lupishko, 1998; 0.72 ± 0.09; 0.42 ± 0.04).

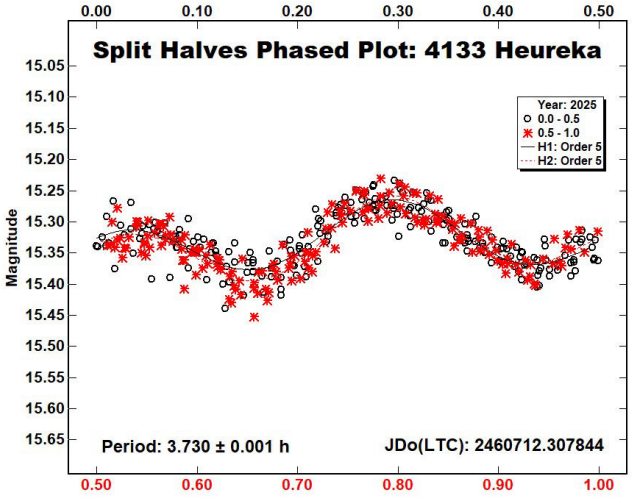


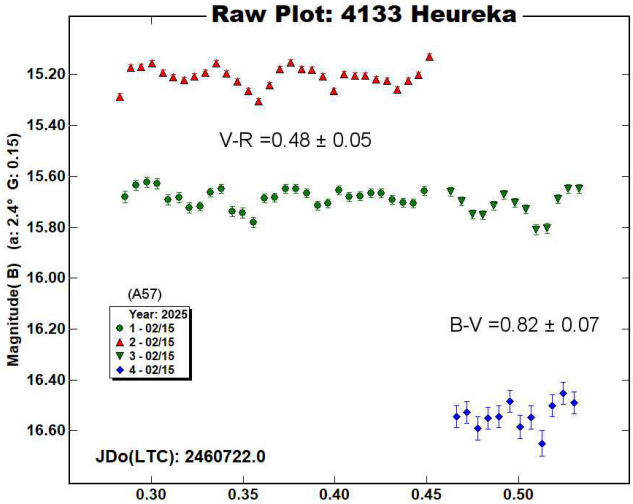

1342 Brabantia is a X-type (Tholen, 1984) inner main-belt asteroid. Collaborative observations were made over six nights. The period analysis shows a synodic period of $P$ = 4.1750 ± 0.0002 h with an amplitude $A$ = 0.18 ± 0.02 mag. The period is close to the previously published results in the LCDB.



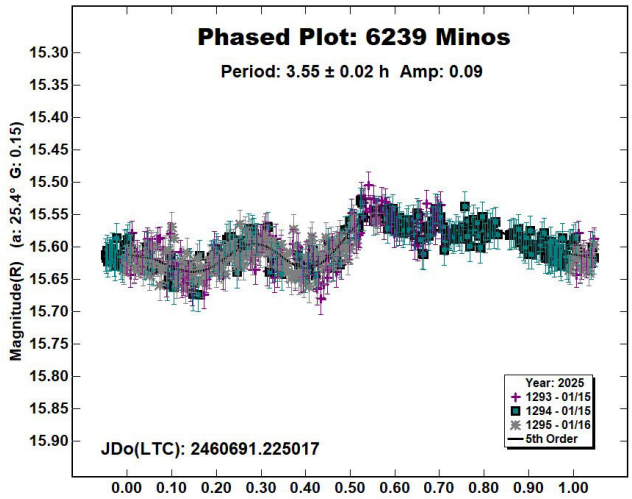

4133 Heureka is a medium-albedo middle main-belt asteroid. Collaborative observations were made over four nights. The split halves plot shows almost identical halves; we prefer the quadrimodal solution with $P$ = 3.730 ± 0.001 h and an amplitude $A$ = 0.13 ± 0.03 mag, below the spin barrier of 2.2 hours. This solution is close to Chelius (2023; 3.726 h ± 0.001). Multiband photometry was acquired by P. Bacci and M. Maestripieri (104), and by N.Montigiani and M. Mannucci (A57) on 2025 February 15, respectively in the V, R and B, V, R bands. We found the color indices B-V = 0.82 ± 0.07; V-R = 0.48 ± 0.05. This last is the result of averaging the two independent values. Both color indices are close to a S-type asteroid (Shevchenko and Lupishko, 1998; 0.86 ± 0.04; 0.49 ± 0.05).



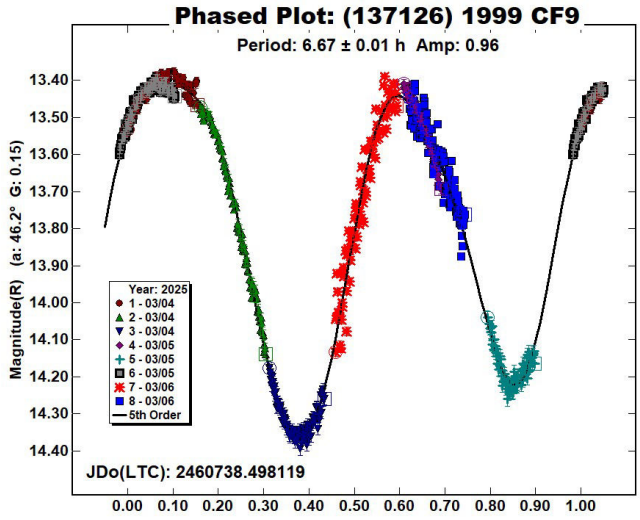



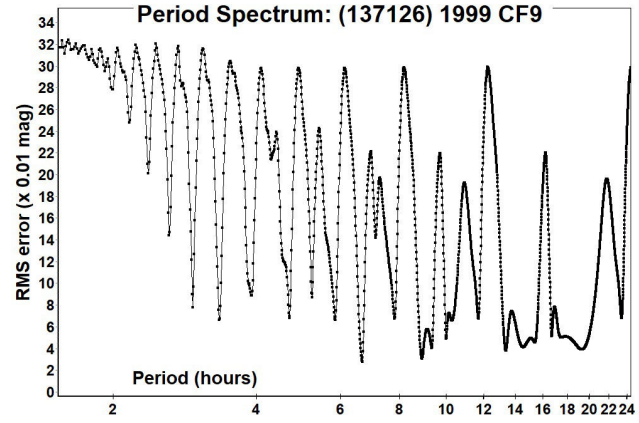




6239 Minos is an Apollo Near-Earth asteroid, classified as a Potentially Hazardous Asteroid (PHA). Observations by L. Buzzi were made over one night at the Schiaparelli Observatory (204). We found a synodic period of $P$ = 3.55 ± 0.02 h and an amplitude $A$ = 0.09 ± 0.03 mag. The period is close to the previously published results in the LCDB.

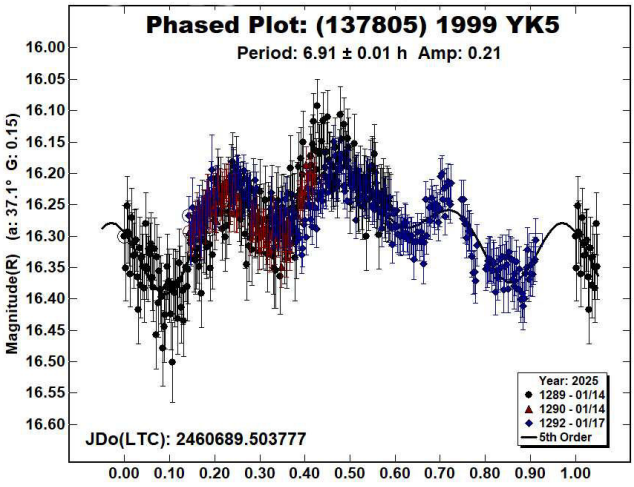


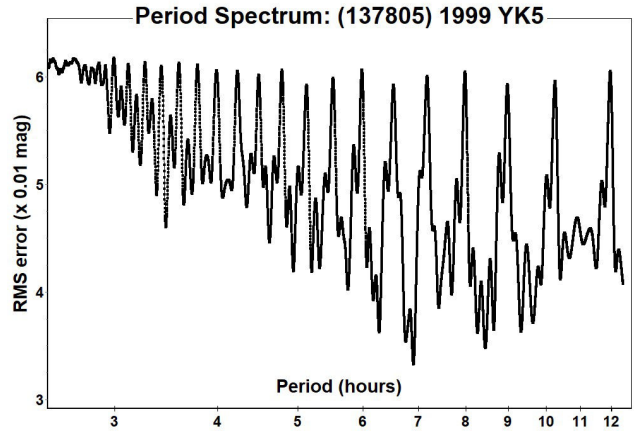

(137126) 1999 CF9 is an Apollo Near-Earth asteroid, classified as a Potentially Hazardous Asteroid (PHA). Collaborative observations were made over three nights. We found a bimodal solution with a synodic period of $P = 6.67 \pm 0.01$ h and an amplitude $A = 0.96 \pm 0.04$ mag. No others periods were found in the LCDB.

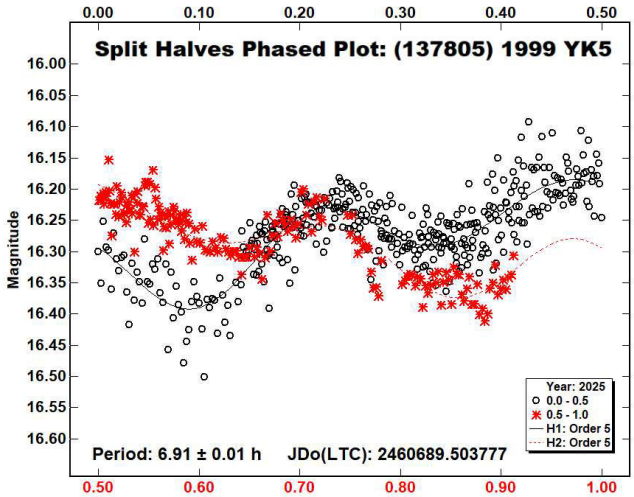



(137805) 1999 YK5 is an Aten Near-Earth asteroid. Observations by L. Buzzi were made over two nights at the Schiaparelli Observatory (204). We found a quadrimodal solution with a synodic period of $P = 6.91 \pm 0.1$ h and an amplitude $A = 0.21 \pm 0.07$ mag. This period is almost double compared to the previously published results in the LCDB.



| Number | Name | 2025 mm/dd | Phase | $L_{PAB}$ | $B_{PAB}$ | Period(h) | P.E. | Amp | A.E. | Grp |
|---|---|---|---|---|---|---|---|---|---|---|
| 862 | Franzia | 01/15-03/04 | *1.2,16.9 | 118 | -1 | 7.522 | 0.001 | 0.14 | 0.03 | MB-M |
| 1318 | Nerina | 03/02-03/20 | *7.2,10.5 | 166 | 7 | 2.5276 | 0.0001 | 0.08 | 0.03 | MB-I |
| 1342 | Brabantia | 02/09-03/19 | *5.2,22.2 | 146 | -10 | 4.1750 | 0.0002 | 0.18 | 0.02 | MB-I |
| 4133 | Heureka | 02/05-02/15 | *2.7,2.5 | 142 | 1 | 3.730 | 0.001 | 0.13 | 0.03 | MB-M |
| 6239 | Minos | 01/15-01/15 | 25.3,25.9 | 105 | 13 | 3.55 | 0.02 | 0.09 | 0.03 | NEA |
| 137126 | 1999 CF9 | 03/04-03/06 | 46.1,62.0 | 192 | 10 | 6.67 | 0.01 | 0.96 | 0.04 | NEA |
| 137805 | 1999 YK5 | 01/14-01/17 | 37.1,37.7 | 111 | 33 | 6.91 | 0.01 | 0.21 | 0.07 | 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 | Filters | Observed Asteroids (#Sessions) |
|---|---|---|---|---|
| Astronomical Observatory, University of Siena (K54) | 0.30-m MCT f/5.6 | SBIG STL-6303e (bin 2×2) | Rc,C | 862(3), 1318(1), 1342(3), 4133(1) |
| GiaGa Observatory (203) | 0.36-m SCT f/5.8 | Moravian G2-3200 | Rc,C | 862(3), 1318(2), 4133(1) |
| Iota Scorpii(K78) | 0.40-m RCT f/6.1 | CMOS QHY 268 (bin 4x4) | Rc | 862(2), 1318(1), 1342(1), 4133(1) |
| Osservatorio Astronomico Margherita Hack (A57) | 0.35-m SCT f/8.3 | SBIG ST10XME (bin 2x2) | B,V,Rc | 1318(2), 4133(2) |
| Schiaparelli Observatory (204) | 0.84-m NRT f/3.5 | Moravian C3-61000 PRO (bin 4×4) | C | 6239(1), 137805(3) |
| San Marcello Pistoiese Observatory (104) | 0.60-m NRT f/4.0 | Apogee Alta | V,Rc,C | 4133(1), 137126(2) |
| HOB Astronomical Observatory (L63) | 0.20-m SCT f/6.0 | ATIK 383L+ (bin 2x2) | C | 1318(1), 1342(1) |
| Osservatorio Astronomico Nastro Verde (C82) | 0.35-m SCT f/6.3 | SBIG ST10XME (bin 2x2) | C | 1318(2) |
| Zen Observatory (M26) | 0.30-m RCT f/7.4 | ATIK 383L+ (bin 2x2) | C | 137126(1) |
| M57 (K38) | 0.35-m RCT f/5.5 | SBIG STT1603ME | Rc | 862(1) |
| GAV | 0-20-m SCT f/6.3 | QSI683 (bin 2x2) | Rc | 1342(1) |

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

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