

LIGHTCURVE ANALYSIS FOR FOUR MAIN BELT ASTEROIDS

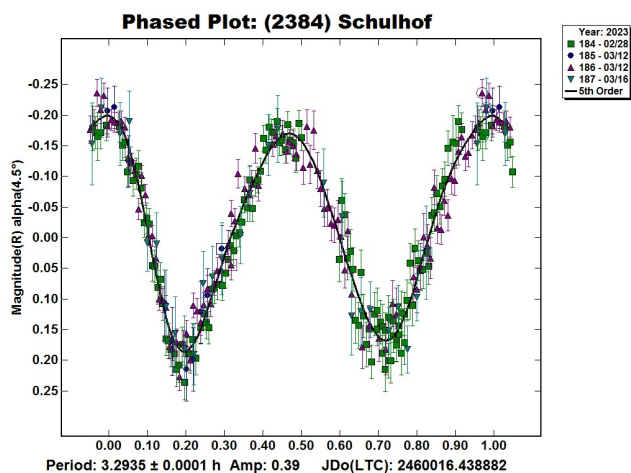
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(Received: 2023 April 4)

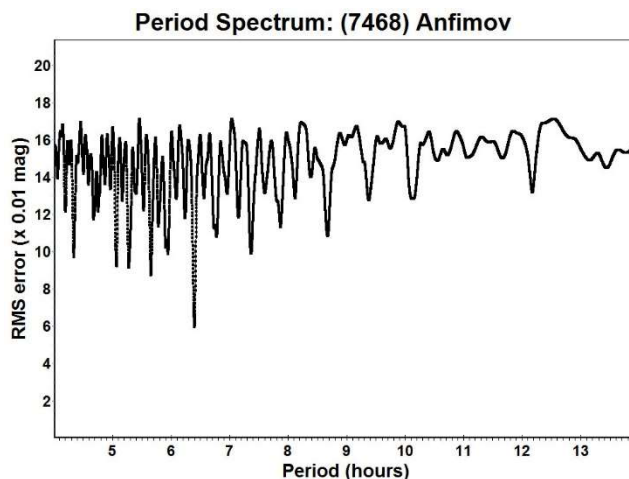
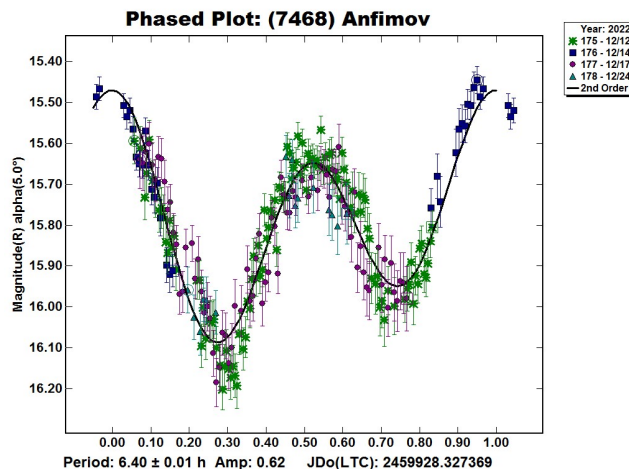
Photometric observations of four main-belt asteroids, 2384 Schulhof, 7468 Anfimov, (42790) 1998 XS93, and (53090) 1998 YS7, were made at the Filzi School Observatory (Laives - Italy) MPC code D12.

CCD photometric observations, were made at the Filzi School Observatory, all are with no filter (clear). All images were obtained with a 0.35-m reflector telescope reduced to $f/8.0$, a QHY9 CCD camera, and then calibrated with dark and flat-field frames. The pixel scale was 1.56 arcsec when binned at 4×4 pixels. All exposures were 120 seconds. The computer clock was synchronized with an Internet time server before each session. Differential photometry and period analysis were done using *MPO Canopus* version 10.8.1.1 (Warner, 2019). Solar type stars from CMC15 catalog in R band were used as comparison stars.

2384 Schulhof. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2023 March on the MinorPlanet.info web site (<https://www.minorplanet.info/php/calopplcdbquery.php>; hereafter referenced as MPI). It was discovered on March 2nd, 1943, by French astronomer Marguerite Laugier at Nice Observatory in France. The asteroid is dedicated to the Hungarian astronomer Lipót Schulhof. It is a main-belt asteroid with a semi-major axis of 2.61 AU, eccentricity 0.12, inclination 13.52 deg, and orbital period of 4.22 yr. Its absolute magnitude is $H = 11.95$ mag. It was observed for three nights (March 2023). The derived synodic period was $P = 3.2935 \pm 0.0001$ h with an amplitude of $A = 0.39 \pm 0.05$ mag. Images were taken with V and R photometric filters. The V and R band frames were acquired in sequence changing alternatively the filters (VR-VR-VR). This allowed us to find the color index of $V-R = 0.44 \pm 0.03$ mag (mean of 30 values). The lightcurve is symmetric bimodal. The result presented here is in very close agreement with the results reported by several other observers in the LCDB (Warner et al., 2009).



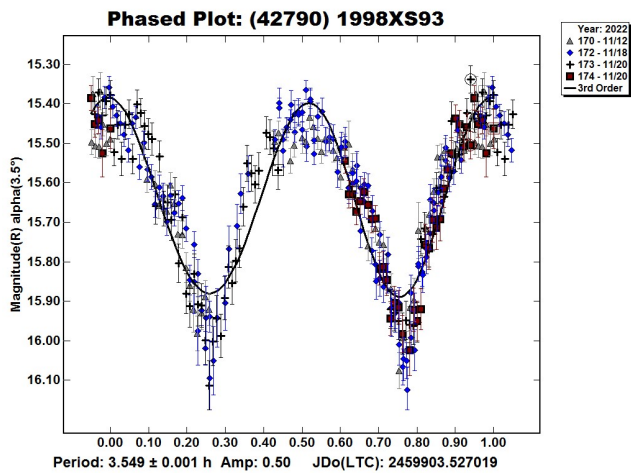
7468 Anfimov. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2022 December on the MPI. Discovered on 1990 Oct. 17 by L.I. Chernykh at the Crimean Astrophysical Observatory, dedicated to Nikolaj Apollonovich Anfimov, a well-known scientist in space technology and the theory of heat mass exchange. It is a main-belt asteroid with a semi-major axis of 3.04 AU, eccentricity 0.12, inclination 4.37 deg, and orbital period of 5.30 yr. Its absolute magnitude is $H = 12.40$ mag. It was observed for four nights. The derived synodic period was $P = 6.40 \pm 0.01$ h with an amplitude of $A = 0.67 \pm 0.05$ mag. For this asteroid, Durech (2020) reports a period of 5.65126 h. The period spectrum, in this work, from 4 measurement groups spanning all four nights, shows the most significant RMS minima in 6.40 ± 0.01 h.



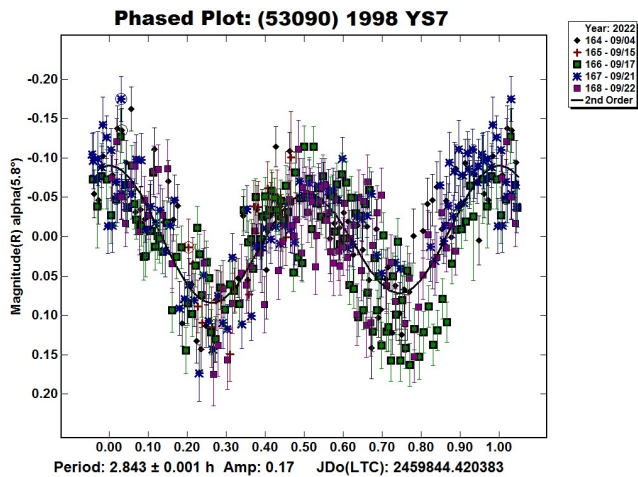
(42790) 1998 XS93. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2022 November on the MinorPlanet.info. It was discovered in 1998-12-15 by LINEAR at Socorro. It is a main-belt asteroid with a semi-major axis of 2.55 AU, eccentricity 0.13, inclination 14.09 deg, orbital period of 4.07 year, and absolute magnitude of $H = 13.33$. It was observed for four nights (November 2022). The derived synodic period was $P = 3.549 \pm 0.001$ h with amplitude of $A = 0.58 \pm 0.05$ mag. There were no entries in the LCDB (Warner et al., 2009) for this asteroid.

Number	Name	yyyy mm/dd	Phase		L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
2384	Schulhof	2023 02/28-03/16	4.6	7.1	162.7	7.6	3.2935	0.0001	0.39	0.05	MB
7468	Anfimov	2022 12/12-12/24	4.5	9.3	69.1	1.3	6.40	0.01	0.67	0.05	MB
42790	1998 XS93	2022 11/12-11/20	3.0	7.1	43.9	1.0	3.549	0.001	0.58	0.05	MB
53090	1998 YS7	2022 09/04-09/22	5.7	13.4	343.1	10.1	2.843	0.001	0.20	0.05	MB

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).



(53090) 1998 YS7. This main-belt asteroid was reported as a lightcurve photometry opportunity for 2022 September on the MinorPlanet.info. It was discovered in 1998-12-24 by CSS at Catalina. It is a main-belt asteroid with a semi-major axis of 2.29 AU, eccentricity 0.26, inclination 23.19 deg, orbital period of 3.48 year, and absolute magnitude of H = 13.91 mag. It was observed for five nights (September 2022). The derived synodic period was $P = 2.843 \pm 0.001$ h with amplitude of $A = 0.20 \pm 0.05$ mag. There were no entries in the LCDB (Warner et al., 2009) for this asteroid.



Acknowledgements

We thank student of “Fabio Filzi” School, in Laives (Italy): Ciatto, E.; Debiasi, V.; Fernandez, V.; Pergher, D.; Dotta, C.; Turra, G.; Montes, E.; Pellegrini, G.; Tripodi, G.; Stranieri, E.; Spadoni, D.; Tomasi, E. The students were supported by Prof. Casalnuovo, G.B.; Chinaglia, R.; Volani, S. The students illustrated lightcurve (2384) Sculhof, in the Science Day “Subzero” at “Eurac Research” in Bolzano (Italy)

References

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