

Seven New Eclipsing Binaries

[A. V. Khruslov](#) ^{#1,2}, [A. V. Kusakin](#) ^{#3}, [I. Reva](#) ^{#3}

#1. Sternberg Astronomical Institute, Lomonosov Moscow State University, Moscow, Russia;

#2. Institute of Astronomy, Russian Academy of Sciences, Moscow, Russia;

#3. Fesenkov Astrophysical Institute, Almaty, Kazakhstan.

ISSN 2221-0474

DOI: [10.24411/2221-0474-2020-10017](https://doi.org/10.24411/2221-0474-2020-10017)

Received: 19.03.2020; accepted: 22.12.2020
(E-mail for contact: khruslov@bk.ru, un7ebd@gmail.com)

#	Name	Other	Coord.(J2000)	Type	Max	Min	System	Period	Epoch(JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1		USNO-B1.0 1466-0054614	01 32 41.85 +56 40 41.4	EW	17.45	17.98	V	0.4419	2456954.324	min		Comm. 1	lc_1.PNG	ch_1.PNG	dt1_B.txt dt1_V.txt dt1_R.txt
2		USNO-B1.0 1423-0437691	21 13 02.09 +52 20 45.6	EW	17.80	18.45	V	0.30162	2456870.111	min		Comm. 2	lc_2.PNG	ch_2.PNG	dt2_B.txt dt2_V.txt dt2_R.txt
3		2MASS 22014813+5452217	22 01 48.13 +54 52 21.7	EA	16.22	16.49	V	0.70125	2456955.220	min		Comm. 3	lc_3.PNG	ch_3.PNG	dt3_B.txt dt3_V.txt dt3_R.txt
4		USNO-B1.0 1446-0386135	22 02 16.44 +54 40 00.9	EA	15.28	15.49	V	2.10318	2457230.274	min		Comm. 4	lc_4.PNG	ch_4.PNG	dt4_B.txt dt4_V.txt dt4_R.txt
5		USNO-B1.0 1446-0386201	22 02 20.09 +54 36 59.3	EW	17.00	17.44	V	0.38808	2457200.055	min		Comm. 5	lc_5.PNG	ch_5.PNG	dt5_B.txt dt5_V.txt dt5_R.txt
6		USNO-B1.0 1447-0384861	22 02 50.86 +54 43 47.8	EA	16.20	16.78	V	0.53405	2456947.288	min		Comm. 6	lc_6.PNG	ch_6.PNG	dt6_B.txt dt6_V.txt dt6_R.txt
7		USNO-B1.0 1447-0384889	22 02 53.59 +54 46 17.4	EW	16.83	17.47	V	0.458232	2457006.139	min		Comm. 7	lc_7.PNG	ch_7.PNG	dt7_B.txt dt7_V.txt dt7_R.txt

Comments:

1. MinII = 17^m.95 (V). For the B band, 18^m.15 – 18^m.7, MinII = 18^m.7. for the R band, amplitude 0^m.50; MinII = 0^m.48 (delta R).
2. MinII = 18^m.40 (V). For the B band, 19^m.35 – 20^m.1, MinII = 19^m.9; for the R band, amplitude 0^m.63.
3. D = 0.16 P. MinII = 16^m.46 (V). For the B band, 17^m.52 – 17^m.76; for the R band, amplitude 0^m.24, MinII = 0^m.24 (delta R). Close companion (distance 6") 2MASS 22014778+5452166, in USNO-B1.0 catalog pair is not resolved.
4. D = 0.14 P. MinI exhibits s total eclipse, d = 0.06 P. MinII = 15^m.36 (V). For the B band, 15^m.78 – 15^m.99, MinII = 15^m.86; for the R band, amplitude 0^m.20, MinII = 0^m.09 (delta R).
5. MinII = 17^m.42 (V). For the B band, 17^m.81 – 18^m.32, MinII = 18^m.32; for the R band, amplitude 0^m.45, MinII = 0^m.42 (delta R);
6. D = 0.19 P. For the B band, 17^m.15 – 17^m.80; for the R band, amplitude 0^m.54.
7. MinII = 17.41 (V). For the B band, 17^m.85 – 18^m.5, MinII = 18^m.45; for the R band, amplitude 0^m.63, MinII = 0^m.57 (delta R)

Remarks:

We present our discovery of seven new eclipsing binaries. Our CCD observations in the Johnson B, V and R bands were performed at the Tien Shan Astronomical Observatory of the V.G. Fesenkov Astrophysical Institute, at the altitude of 2750 m above the sea level. Our observations were performed with the eastern Zeiss 1000-mm reflector (the focal length of the system was 6650 mm; the detector was an Apogee U9000 D9 CCD camera; the chip was cooled to – 40°C).

Reductions were performed using the MaxIm DL aperture photometry package. Magnitudes of the comparison stars (in Johnson's B and V bands) were taken from the AAVSO Photometric All-Sky Survey (APASS) catalog. The R-band observations could be presented only as magnitude differences with respect to the comparison star. In the Comments for the R band, the total variability amplitude is given.

These observations were analyzed using the period-search software developed by Dr. V.P. Goranskij. The coordinates were drawn from the Gaia DR2 catalog (Gaia Collaboration et al. 2018). All studied stars are not detected as a variables in Gaia DR2 project. The variables were classified according to the GCVS classifications (Samus et al. 2017).

The light elements for one star (No. 4) were calculated using [ASAS-SN](#) data (Shappee et al. 2014 and Kochanek et al. 2017)

Acknowledgments: The authors are grateful to Dr. V. P. Goranskij for providing light-curve analysis software. We wish to thank M.A. Krugov, N.V. Lichkanovsky, I.V. Rudakov, and R.I. Kokumbaeva for their assistance during the observations. This study was carried out within the framework of Project No. BR05236322 "Studies of physical processes in extragalactic and galactic objects and their subsystems", financed by the Ministry of Education and Science of the Republic of Kazakhstan.

References:

- Gaia Collaboration, Brown, A.G.A., Vallenari, A., et al., 2018, *Astron. and Astrophys.*, 616, A1
 Kochanek, C. S., Shappee, B. J., Stanek, K. Z., et al., 2017, *Publ. Astron. Soc. Pacific*, 129, 104502
 Samus, N.N., Kazarovets, E.V., Durlevich, O.V., Kireeva, N.N., Pastukhova, E.N., 2017, *General Catalogue of Variable Stars: Version GCVS 5.1*, *Astron. Rep.*, 61, No. 1, 80
 Shappee, B. J., Prieto, J. L., Grupe, D., et al., 2014, *Astrophys. J.*, 788, 48