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SHORT-PERIOD OSCILLATIONS IN THE ALGOL-TYPE SYSTEMS V: SX DRACONIS

DIMITROV, D.; KRAICHEVA, Z.; POPOV, V.; GENKOV, V.

Institute of Astronomy, BAS, Tsarigradsko Shossee 72, 1784 Sofia, Bulgaria,
e-mail: dinko@astro.bas.bg; zk@astro.bas.bg; vpopov@astro.bas.bg; vgenkov@astro.bas.bg

In the course of a programme for search of short-period oscillations in newly discovered Algols based on NSVS data (Wozniak et al., 2004) we selected as candidates four already known Algols: SX Dra, RT UMi, V548 Cyg, and V728 Cyg. Only RT UMi was included in the catalogue of Soydugan et al. (2006) as candidate for a system with pulsations. The NSVS light curves of the stars are shown on Fig. 2. For SX Draconis, known to have very rapid period increase of 94.2 sec/century (Shengbang, 2002), an ephemeris, based on NSVS data is computed:

$$HJD(\mathrm{MinI}) = 2451275.9851(\pm 0.0013) + 5.169196(\pm 0.000062)E \qquad (1)$$

Time-series CCD observations of the selected stars were obtained at NAO Rozhen and AO Belogradchik. The astrometric and photometric data† for the variables and comparison stars (Table 1) are taken from NOMAD catalogue (Zacharias et al., 2005). The CCD photometry (in V and B bands) was carried out with the 60cm Cassegrain telescopes, equipped with the CCD cameras FLI PL09000 (3056×3056, 12μ pixel), and Bessell (1990) standard $UBVRI$ filters. Standard IDL procedures were used for the reduction of the photometric data. Several stars from the fields around the variables with $\sigma < 0.01$ mag were selected to create ensemble standard stars (Everett & Howell, 2001).

During the campaign short-period oscillations with a peak-to-peak amplitude up to 0.040 mag in V were detected in the time-series of SX Dra only (Table 2). Six of the V patrols of SX Dra are shown on Fig. 3. The frequency-analysis of the residual light curves of the variables, performed with the PERIOD-04 software (Lenz & Breger, 2005), revealed significant peaks in the power spectrum of SX Dra (Fig. 4). The frequency interval is $22 \div 24$ c/d or about 63 min.

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†Photometric data for SX Dra are available through the IBVS website as `5925-t3.txt`

Table 1. Data for the variables and comparison stars used in the CCD photometry

ID	Name	RA (J2000)	DEC (J2000)	V	$B-V$	$V-R$	Sp. type
Var	SX Dra	$18^h04^m33^s.87$	$+58°23'54''.2$	10.411	0.313	0.201	A9V
Std1	TYC 3915-588-1	$18^h05^m01^s.78$	$+58°27'01''.6$	11.007	1.343	0.827	
Std2	TYC 3915-696-1	$18^h04^m34^s.20$	$+58°27'19''.7$	11.707	0.669	0.447	
Std3	TYC 3915-966-1	$18^h03^m59^s.08$	$+58°23'05''.4$	11.976	0.135	0.076	
Std4	TYC 3915-1572-1	$18^h04^m42^s.51$	$+58°23'26''.2$	12.606	0.526	0.346	
Std5	GSC 3915-1086	$18^h04^m44^s.42$	$+58°23'14''.9$	13.110	0.200	0.350	
Var	RT UMi	$17^h04^m05^s.51$	$+80°19'45''.2$	10.893	0.238	0.153	F0
Std1	GSC 4576-0151	$17^h05^m14^s.62$	$+80°17'12''.9$	13.040	0.520	0.130	
Std2	GSC 4576-0121	$17^h07^m03^s.47$	$+80°21'26''.5$	12.770	0.570	0.330	
Std3	TYC 4576-137-1	$17^h08^m06^s.75$	$+80°20'16''.3$	12.922	0.821	0.532	
Std4	TYC 4576-118-1	$17^h09^m17^s.25$	$+80°13'00''.1$	11.310	0.414	0.270	
Var	V548 Cyg	$19^h56^m58^s.31$	$+54°47'58''.3$	8.617	0.092	0.047	A1V
Std1	TYC 3939-442-1	$19^h57^m15^s.31$	$+54°48'55''.7$	10.315	0.632	0.415	
Std2	TYC 3939-1332-1	$19^h56^m44^s.87$	$+54°52'35''.4$	10.749	1.003	0.619	
std3	GSC 3939-1357	$19^h56^m54^s.08$	$+54°52'05''.5$	12.680	0.190	0.680	
Var	V728 Cyg	$20^h26^m40^s.13$	$+58°46'47''.9$	10.514	0.207	0.134	A0
Std1	GSC 3949-0782	$20^h26^m22^s.72$	$+58°48'25''.4$	12.330	0.540	-0.580	
Std2	GSC 3962-1280	$20^h27^m01^s.49$	$+58°47'58''.6$	11.790	0.610	0.480	

Table 2. Observational runs of SX Dra, RT UMi, V548 Cyg, and V728 Cyg

Variable	Date	HJD(start)	Length	Filter	Exp.[s]	N	A_{osc}(max)	Telescope
SX Dra	25.08.2009	2455069.28986	03^h24^m	V	45	240	0.040	60cm Bel
SX Dra	22.09.2009	2455097.42745	01^h38^m	V	50	108	0.025	60cm Bel
SX Dra	23.09.2009	2455098.24907	03^h03^m	V	50	198	0.040	60cm Bel
SX Dra	24.10.2009	2455129.30177	01^h21^m	V	60	73	-	60cm NAO
SX Dra	22.11.2009	2455158.15639	03^h16^m	V	120	93	-	60cm NAO
SX Dra	23.11.2009	2455159.16581	03^h52^m	V	30	400	0.030	60cm NAO
SX Dra	25.11.2009	2455161.15522	02^h59^m	V	60	170	0.020	60cm NAO
SX Dra	26.11.2009	2455162.17403	02^h36^m	V	60	147	0.035	60cm NAO
RT UMi	23.06.2009	2455006.31125	03^h01^m	V	60	150	-	60cm NAO
RT UMi	22.08.2009	2455066.32643	03^h05^m	V	60	146	-	60cm Bel
RT UMi	27.08.2009	2455071.28892	03^h12^m	V	60	175	-	60cm Bel
RT UMi	29.08.2009	2455073.24592	08^h53^m	B	120	239	-	60cm NAO
RT UMi	22.09.2009	2455097.29443	02^h59^m	V	60	159	-	60cm Bel
RT UMi	26.09.2009	2455101.48473	01^h45^m	V	60	100	-	60cm Bel
V548 Cyg	22.08.2009	2455066.47921	02^h57^m	V	30	230	-	60cm Bel
V548 Cyg	27.08.2009	2455071.43507	03^h10^m	V	30	325	-	60cm Bel
V548 Cyg	24.09.2009	2455099.25112	03^h01^m	V	30	309	-	60cm Bel
V548 Cyg	26.09.2009	2455101.34676	02^h21^m	V	30	251	-	60cm Bel
V728 Cyg	25.08.2009	2455069.43906	03^h34^m	V	60	233	-	60cm Bel
V728 Cyg	24.09.2009	2455099.39883	03^h54^m	V	60	215	-	60cm Bel
V728 Cyg	25.09.2009	2455100.41488	03^h34^m	V	60	165	-	60cm Bel

References:

Bessell, M., S., 1990, *PASP*, **102**, 1181
Everett, M., Howell, S., 2001, *PASP*, **113**, 1428
Lenz, P., Breger, M., 2005, *CoAst*, **146**, 53
Shengbang, Q., 2002, *ApSS*, **282**, 399
Soydugan, E., Soydugan, F., Demircan, O., and Ibanoglu, C., 2006, *MNRAS*, **370**, 2013
Wozniak, P., Vestrand, W., Akerlof, C. et al., 2004, *AJ*, **127**, 2436
Zacharias, N., Monet, D., Levine, S. et al., 2004, *AAS*, **205**, 4815

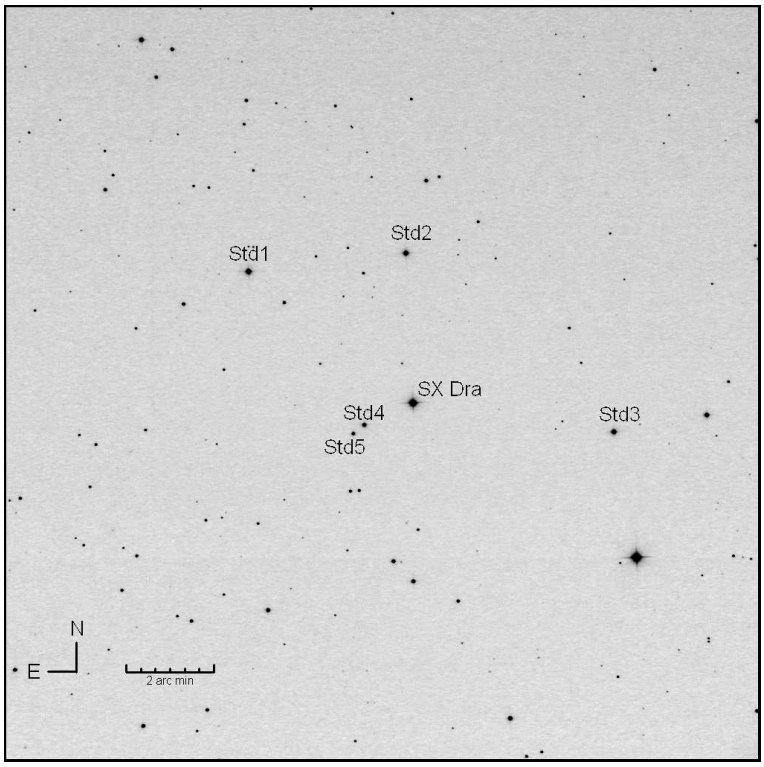

Figure 1. Field around the eclipsing binary SX Dra.

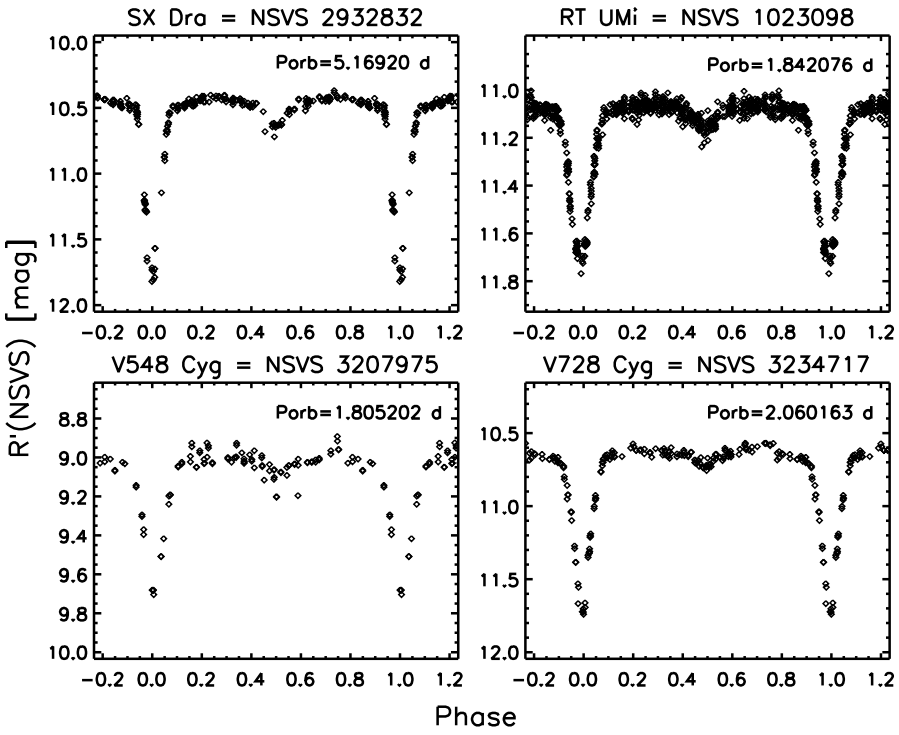

Figure 2. Light curves of SX Dra, RT UMi, V548 Cyg and V728 Cyg in the NSVS instrumental system R'.

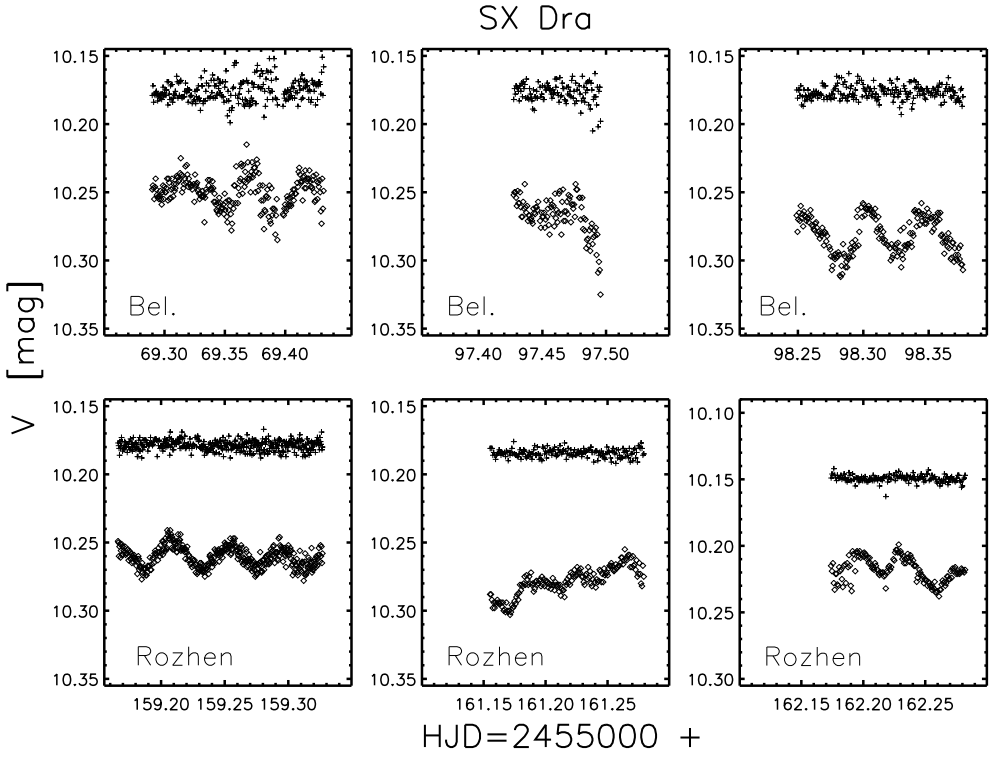

Figure 3. Sample V light curves of SX Dra (diamonds), and properly shifted Std4 for the Belogradchik data and Std2 for Rozhen data (crosses).

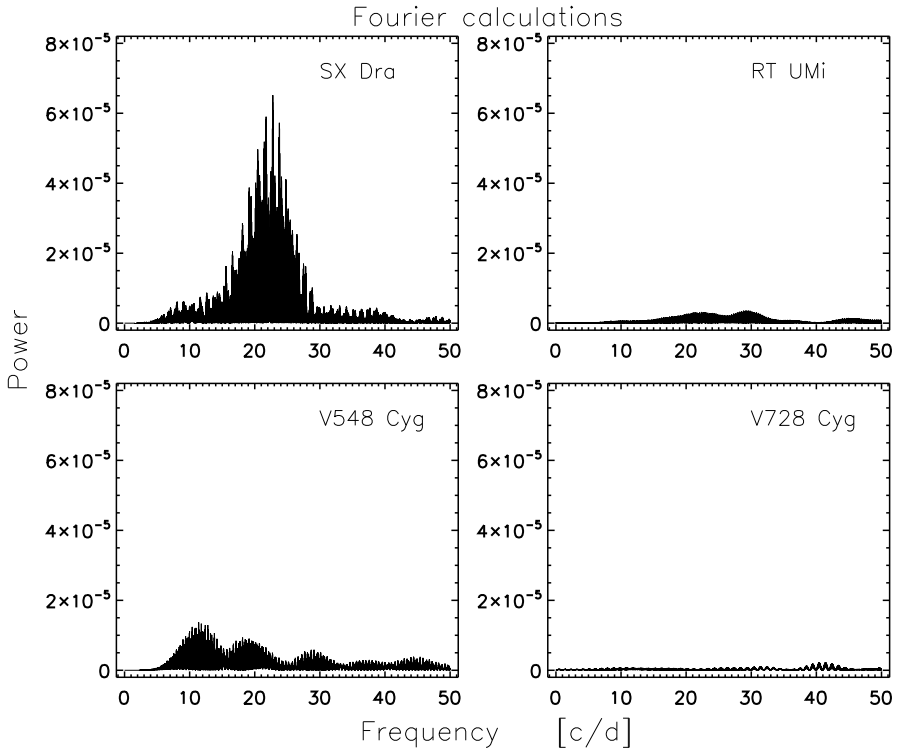

Figure 4. Power spectra of SX Dra, RT UMi, V548 Cyg, and V728 Cyg Rozhen data after subtracting the corresponding trends.