

Five High-Amplitude RS CVn Stars

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1		TYC 4099 1925 1	06 13 46.97, +63 35 10.0	RS	10.47	10.74	R	22.3	2451264.4	max		Comm. 1	tyc4099-1925.gif	tyc4099-1925ch.jpg	NSVS 2247366
2		TYC 0759 0307 1	06 47 15.56, +14 34 39.2	RS	10.71	11.06	R	11.1	2451538.6	max		Comm. 2	tyc0759-0307.gif	tyc0759-0307ch.jpg	NSVS 9851360
3		TYC 2645 0156 1	18 38 25.32, +34 06 44.4	RS	10.15	10.42	R	19.7	2451359.8	max		Comm. 3	tyc2645-0156.gif	tyc2645-0156ch.jpg	NSVS 8227869
4		GSC 3555-00876	19 23 44.98, +51 16 11.8	RS	12.20	12.75	R	13.3	2451318.9	max		Comm. 4	gsc3555-0876.gif	gsc3555-0876ch.jpg	NSVS 5589398 NSVS 5618608
5		TYC 1173 1002 1	23 46 43.49, +10 33 35.6	RS	10.82	11.37	R	18.9	2451353.8	max		Comm. 5	tyc1173-1002.gif	tyc1173-1002ch.jpg	NSVS 9070589

Comments:

- 1RXS J061347.4+633514 (HR1 = 1.00, HR2 = 0.26). J-K = 0.834 (2MASS).
- 1RXS J064715.8+143435 (HR1 = 0.61, HR2 = 0.19). J-K = 0.717 (2MASS). ASAS 064716+1434.7; discovered as MISC/DCEP by Pojmanski et al. (2005).
- 1RXS J183824.9+340642 (HR1 = 0.86, HR2 = 0.31). J-K = 0.641 (2MASS).
- 1RXS J192345.6+511608 (HR1 = 0.70, HR2 = 0.28). J-K = 0.699 (2MASS). M-m = 0.42P. Discovered as variable by Akerlof et al. (2000), who classify ROTSE1 J192344.95+511611.8 as a Cepheid variable, which is unlikely given the significant X-ray flux from the star.
- 1RXS J234644.1+103338 (HR1 = 1.00, HR2 = 0.31). J-K = 0.724 (2MASS). M-m = 0.44P. ASAS 234643+1033.6, not included into the ASAS-3 catalog of variable stars. The ASAS data obtained in 2002-2003 show the variability amplitude not exceeding 0.15 mag.

Remarks:

During the systematic search for optical identifications of poorly studied X-ray sources from the 1RXS catalogue (Voges et al., 1999), five new variables of RS CVn type were found using the publicly available NSVS data (Wozniak et al., 2004). All of them have periods from 10 days to one month and variability amplitudes from 0.25 to 0.55 mag. This is close to the record high amplitude ever observed among this type of variable stars, namely 0.6m for XX Tri (Nolthenius, 1991). NSVS 9070589 is definitely showing amplitude changes on a timescale of several years similar to those in IM Peg (Strassmeier et al., 1997). Moreover, this star has shown a shorter period, about 18 days, during our observations in January 2008 (the data will be published elsewhere), probably due to different rotational periods of the two components.

It should be also noted that the X-ray hardness ratio HR1 from ROSAT catalogue is systematically higher for all five stars in this paper as compared to other known RS CVn stars. HR1 is defined as $(B-A)/(B+A)$, where A and B are countrates in two ROSAT energy ranges $\sim 0.1-0.4$ and $\sim 0.5-2.0$ keV, respectively (Voges et al., 1999). For example, the already mentioned star IM Peg (P=24.73d) has HR1=0.21 +/- 0.06, while the lowest value among the five new variables is 0.61 +/- 0.20 for TYC 0759 307 1 = 1RXS J064715.8+143435. It is also curious that there is a direct correlation between the period P and the X-ray hardness ratio HR1 for the five stars (the longer the period, the harder the spectrum). Though the X-ray to optical flux ratio for the newly discovered objects is similar to that for most previously known RS CVn stars, there is still a possibility that these stars belong to a different subtype of X-ray variables.

References:

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