

New RS CVn Variables in the NSV Catalogue

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Received: 7.09.2010; accepted: 3.11.2010

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1	NSV 15584	GSC 07018-00507	02 48 07.93, -36 58 53.7	RS	7.83	7.88	V	17.698	2452710.52	min	G1V	Comm. 1	NSV_15584.jpg		NSV_15584
2	NSV 16633	GSC 07056-01342	05 40 49.00, -31 24 06.9	RS	8.62	8.80	V	9.16	2451868.70	min	G7III	Comm. 2	NSV_16633.jpg		NSV_16633
3	NSV 16803	GSC 07084-01098	06 12 43.58, -36 37 55.2	RS	8.15	8.22	V	10.305	2454890.60	min	K0III	Comm. 3	NSV_16803.jpg		NSV_16803
4	NSV 3374	GSC 01345-00063	07 05 47.61, +15 01 21.4	RS	9.37	9.46	V	35.53	2454524.55	min	G5V	Comm. 4	NSV_3374.jpg		NSV_3374
5	NSV 18506	GSC 08210-00226	10 44 47.89, -50 53 06.2	RS	7.76	8.03	V	65.53	2453109.71	min	G6III	Comm. 5	NSV_18506.jpg		NSV_18506
6	NSV 6937	GSC 05580-00503	15 06 44.49, -08 38 48.1	RS	10.93	11.14	V	18.73	2453062.80	min	G8	Comm. 6	NSV_6937.jpg		NSV_6937
7	NSV 20419	GSC 08697-01466	15 52 38.45, -53 26 15.0	RS	7.90	8.24	V	99.1	2452667.86	min	G8III	Comm. 7	NSV_20419.jpg		NSV_20419
8	NSV 20781	GSC 07371-00236	16 49 44.55, -36 24 22.2	RS	8.06	8.41	V	31.22	2454521.84	min	G7III	Comm. 8	NSV_20781.jpg		NSV_20781
9	NSV 14697	GSC 07521-00936	23 46 03.13, -35 35 20.6	RS	10.58	10.74	V	20.98	2455144.65	min	G7IV	Comm. 9	NSV_14697.jpg		NSV_14697

Comments:

1. Johnson B-V = 0.609 (derived from Tycho-2); J-K = 0.507 (2MASS).
Proper motion: pmRA = 21.71 mas/yr, pmDE = 33.05 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J024807.9-365857; HR1 = -0.10, HR2 = 0.39.
Spectral type: G1V, EW(Li) = 0 (Torres et al. 2006).
Known visual binary star (Olsen 1980).

2. Johnson B-V = 1.089 (derived from Tycho-2); J-K = 0.741 (2MASS).
Proper motion: pmRA = 12.52 mas/yr, pmDE = -25.88 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J054048.7-312402; HR1 = 0.19, HR2 = 0.33.
Spectral type: G7III, EW(Li) = 0 (Torres et al. 2006).

3. Johnson B-V = 0.952 (derived from Tycho-2); J-K = 0.634 (2MASS).
Proper motion: pmRA = -7.25 mas/yr, pmDE = -2.85 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J061243.3-363755, HR1 = 0.28, HR2 = 0.22.
Spectral type: K0III spec bin, EW(Li) = 90 (Torres et al. 2006).
Type RS: (Olsen 1993).

4. Johnson B-V = 1.109 (derived from Tycho-2); J-K = 0.689 (2MASS).
Proper motion: pmRA = 2.06 mas/yr, pmDE = -3.49 mas/yr (Röser et al. 2008).
ROSAT: 2RXP J070547.1+150130, HR1 = 0.44, HR2 = 0.04.
Spectral type: G5V (Nassau & MacRae 1955).

5. Johnson B-V = 0.836 (derived from Tycho-2); J-K = 0.611 (2MASS).
Proper motion: pmRA = -44.94 mas/yr, pmDE = 5.27 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J104447.7-505310, HR1 = 0.45, HR2 = 0.35.
Spectral type: G6III, SB2, EW(Li) = 30 (Torres et al. 2006).

6. Johnson B-V = 0.879 (derived from Tycho-2); J-K = 0.737 (2MASS).
Proper motion: pmRA = 13.95 mas/yr, pmDE = -3.93 mas/yr (Röser et al. 2008).
Spectral type: G8 (GCVS, NSV).

7. Johnson B-V = 1.155 (derived from Tycho-2); J-K = 0.787 (2MASS).
Proper motion: pmRA = -6.46 mas/yr, pmDE = -4.53 mas/yr (Röser et al. 2008).
ROSAT: 1RXS-F J155238.4-532603, HR1 = 1.00, HR2 = 0.19.
Spectral type: G8III (Houk & Cowley 1975).

8. The star HIP 82360 (= NSV 20781) is mentioned by Koen & Eyer (2002) as a variable with variation frequency equivalent to the period of 31.53 days.
Johnson B-V = 1.013 (derived from Tycho-2); J-K = 0.714 (2MASS).
Proper motion: pmRA = 27.31 mas/yr, pmDE = -12.28 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J164944.7-362421, HR1 = 1.00, HR2 = 0.29.
Spectral type: G7III, EW(Li) = 0 (Torres et al. 2006).

9. Johnson B-V = 0.715 (derived from Tycho-2); J-K = 0.656 (2MASS).
Proper motion: pmRA = 71.66 mas/yr, pmDE = -22.29 mas/yr (Röser et al. 2008).
ROSAT: 1RXS J234604.8-353541, HR1 = 0.08, HR2 = 0.61.
Spectral type: G7IV, EW(Li) = 70 (Torres et al. 2006).

Remarks:

Nine new RS CVn variables were found by the investigation of ASAS-3 (<http://www.astro.uw.edu.pl/asas/?page=main>, Pojmanski 2002) light curves of objects listed in the New Catalogue of Suspected Variable Stars (NSV, <http://www.sai.msu.su/gcvs/gcvs/new.htm>).

Each object was checked against the Strasbourg CDS Vizier service and the International Variable Star Index (<http://www.aavso.org/vsx/>) for pre-existence as a chromospherically active star in variability catalogues.

The criteria for including a star in this list of RS CVn stars after an analysis of the available data with Period 04 (Lenz and Breger 2005) were:

- i) period, amplitude and shape of the light curve are consistent with the definition of RS CVn in the GCVS,
- ii) appropriate spectral types, 2MASS J-K (Skrutskie et al. 2006) and B-V (Høg et al. 2000) colour indices,
- iii) the X-ray identifications (Voges et al. 1999; Voges et al. 2000),

iiii) further information like the lithium content as indicator of young stellar objects and proper motions.

Some of these RS CVn stars showed a clear variation of the shape of the light curves. For these objects the ephemeris and the folded light curves are given for a distinct period of time (described in figure as HJD 245.....-.....). This is somewhat typical of chromospherically active stars which can show secular variation in mean magnitude and/or amplitude as a result of starspot cycles similar in nature to the Sun's sunspot cycle.

Besides the nine stars in the Table, we also analyzed the GCVS star HL Leo (the GCVS type BY, $P = 37.17$ days). We find a different period in the ASAS-3 data ($P = 31.89$ days). In our opinion, this is also an RS CVn variable, in agreement with its spectral type G2IV or G2III in several sources as well as with the Hipparcos parallax indicating a subgiant or giant luminosity.

Acknowledgements: This research has made use of the SIMBAD and VizieR databases operated at the Centre de Données Astronomiques (Strasbourg) in France, of the Smithsonian/NASA Astrophysics Data System, of the International Variable Star Index (AAVSO) and of the Two Micron All Sky Survey. It is a pleasure to thank John Greaves, UK for his suggestions and helpful comments. We would like to thank S.V. Antipin and N.N. Samus for helpful discussion and for improving the paper.

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