

## Chromospherically active stars in the ASAS-3 database: Paper 4. 25 new variables

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BAV Mitteilungen Nr. 223

**Abstract:** Another 25 new chromospherically active stars are presented, which were found in the ASAS-3 database:

GSC 07037-01333, GSC 06584-00040, GSC 08188-01052, GSC 07195-01866, GSC 07713-01595  
GSC 07710-02231, GSC 08641-01961, GSC 08633-00825, GSC 08244-00494, GSC 08650-01272  
GSC 07783-02098, GSC 08259-00401, GSC 08252-01015, GSC 07796-02110, GSC 07274-00609  
GSC 07804-01633, GSC 08678-01367, GSC 08679-00484, GSC 07825-00956, GSC 08696-01232  
GSC 07838-00556, GSC 08319-01323, GSC 06267-02271, GSC 07432-01663, GSC 06302-02521

During a programme of optical identification of X-ray sources from the ROSAT All-Sky Bright Source Catalogue (IRXS) (Voges et al. 1999) in the ASAS-3 database (Pojmanski, 2002) (<http://www.astrouw.edu.pl/asas/?page=main>) another 25 new chromospherically active stars have been found. This research continues the search for new chromospherically active stars in the ASAS-3 database (Bernhard & Bernhard, 2011).

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

i) the X-ray identification: Only those variable ASAS-3 objects were chosen, which were within the error ellipse of the ROSAT All-Sky Bright Source Catalogue. Therefore it is very likely that the X-ray identifications of the variable stars given in this paper are correct and types of variables like Cepheids or semiregular variables can be ruled out because of their low X-ray emission (see the more detailed discussion in Bernhard and Lloyd, 2008).

ii) period, amplitude and shape of the light curve are consistent with the definition of RS CVn, BY Dra and young stellar objects (IN) stars in the GCVS (<http://www.sai.msu.su/groups/cluster/gcvs/gcvs/iii/vartype.txt>), for a detailed description and sample light curves of the various types of chromospherically active stars see Berdyugina, 2005. Due to the shapes of the light curves other types of chromospherically active and X-ray emitting objects like W UMa variables and Algol stars can be ruled out.

iii) appropriate 2MASS J-K (Skrutskie et al. 2006, Table 8 in Gonzalez-Solares et al. 2008) and B-V (Høg et al. 2000) colour indices if available.

iv) Further information like

- spectral types including the lithium content as indicator of young stellar objects,
- the ratios of X-ray to optical flux  $f_X / f_{opt}$  (Voges et al., 1999),
- proper motions,
- the relation of the maximum amplitude vs. periods of main sequence stars given in Messina et al., 2003 and

-an investigation of the respectively star fields using ALADIN

(<http://aladin.u-strasbg.fr/aladin.gml>) to check, if there are nearby open star clusters or known young stellar objects

was also used for the classification of the objects.

The resulting list of variables (Table 1) contains with a very high likelihood chromospherically active stars of the types RS CVn (spectral types F-K), BY Dra (spectral types F-K) or young stellar objects (spectral types F-M).

The light variability of these objects is caused by axial rotation of a star with a variable degree of nonuniformity of the surface brightness (spots). Some of these variables are also eclipsing systems. Secular variations of the light curves, which are typical for many RS CVn, BY Dra variables and young stellar objects (see the detailed light curves below) can be explained by the existence of a long-period stellar activity cycle similar to the 11-year solar activity cycle, during which the number and total area of spots on the star's surface vary.

The ASAS-3 telescopes are situated at Las Campanas Observatory in Chile, V and I filters are used in combination with 200/2.8 lenses and AP-10 CCD cameras. The aperture suggested by the ASAS-3 system (first row of the ASAS-3 V data) was taken for the calculations of the ephemeris and the figures. The ranges given in Table 1 are derived from the time span of the ASAS-3 V observations, due to secular variations (activity cycles) the full ranges could be somewhat larger.

The values of the column "var" denote the extent of secular variations: "0" for no secular variation, "1" for weak secular variation, "2" for strong secular variation of amplitude and/or mean magnitude. The epochs are given for the minima as HJD-2450000, figures in brackets denote errors (sigma) in units of the last decimal.

Table 1: Positions, identifications and photometric data for the new chromospherically active stars

No.	GSC	RA (2000)	Dec	IRXS	Range (ASAS3-V)	Epoch (Min)	Per. (d)	var
76	07037-01333	04 13 59.00	-31 32 40.0	J0413358.8-313229	10.60-10.95	3458.51(8)	8.360(2)	2
77	06584-00040	08 50 19.52	-28 56 38.8	J085019.4-285644	9.90-10.25	3068.7(3)	31.83(7)	2
78	08188-01052	10 18 55.91	-48 25 14.2	J101856.1-482514	9.90-10.10	4175.76(9)	9.200(2)	1
79	07195-01866	10 20 21.76	-36 12 13.4	J102021.3-361213	8.35-8.65	4479.7(3)	29.6(1)	2
80	07713-01595	10 22 30.43	-39 50 14.0	J102231.6-395011	8.60-8.85	4435.8(5)	51.0(2)	2
81	07710-02231	10 32 10.19	-39 05 46.5	J103211.4-390553	9.20-9.55	3087.6(6)	62.2(2)	2
82	08641-01961	12 17 04.65	-57 43 55.8	J121704.2-574356	10.75-11.30	3449.64(7)	7.549(2)	1
83	08633-00825	12 26 02.24	-54 21 15.5	J122603.0-542113	10.25-10.55	2054.5(2)	21.3(1)	2
84	08244-00494	12 36 17.67	-50 42 42.0	J123620.3-504238	11.45-11.70	4282.59(3)	3.091(1)	1
85	08650-01272	12 39 11.03	-54 29 24.9	J123912.6-542920	8.90-9.45	4507.7(4)	37.6(1)	2
86	07783-02098	12 47 55.65	-44 57 34.7	J124757.9-445735	10.40-10.60	1918.77(9)	8.6709(1)	1
87	08259-00401	13 15 16.66	-50 58 07.3	J131516.1-505803	9.05-9.20	4501.83(8)	8.242(2)	1
88	08252-01015	13 29 18.52	-47 22 50.6	J132917.6-472316	11.90-12.50	4149.80(4)	4.406(1)	2
89	07796-02110	13 34 31.89	-42 09 30.7	J133432.2-420929	10.40-10.75	1889(1)	104.6(5)	2
90	07274-00609	13 43 31.11	-35 20 25.0	J134331.9-352027	8.95-9.4	4848.8(3)	27.1(1)	2
91	07804-01633	14 12 46.91	-38 31 22.0	J141245.7-383114	11.45-11.70	5018.65(4)	4.074(1)	1
92	08678-01367	14 22 07.35	-54 17 05.1	J142206.2-541706	11.05-11.40	3621.539(8)	0.7773(3)	2
93	08679-00484	14 35 36.64	-53 47 37.7	J143536.1-534729	9.95-10.25	4575.7(8)	78.2(2)	2
94	07825-00956	15 04 28.64	-39 24 26.0	J150428.9-392423	10.75-11.10	3402.83(2)	18.2(1)	1
95	08696-01232	15 45 17.87	-53 18 10.2	J154519.5-531751	11.30-11.85	4314.49(5)	5.272(1)	2
96	07838-00556	15 52 04.54	-37 47 44.0	J155204.3-374751	8.65-8.80	2766.7(4)	37.4(1)	1
97	08319-01323	16 10 03.20	-50 26 12.1	J161003.3-502605	9.90-10.10	4952.71(2)	1.6823(5)	1
98	06267-02271	18 36 36.41	-15 06 42.6	J183635.9-150642	10.55-10.75	2702.9(1)	10.665(4)	2
99	07432-01663	19 28 31.99	-35 07 59.0	J192832.0-350801	9.60-9.80	4546.88(3)	3.244(1)	1
100	06302-02521	19 35 03.80	-18 33 56.8	J193504.4-183357	9.10-9.25	3634.6(2)	22.7(1)	2

**Light curves, folded light curves (with the period given above) and comments:**

All of the following stars showed a clear variation of the shape of their light curves, which is typical of chromospherically active stars .

The folded light curves are given for a distinct time period with only small changes in amplitudes and mean magnitudes, therefore a special detrending was not necessary (described in figure as HJD 245 ....-.....). The time periods used for the folded light curves are marked as open circles in the original light curves.

**No. 76: GSC 7037-01333**

Period: 8.360(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/041359-3132.7.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/041359-3132.7.asas3.0.0.500.0.0)

2MASS J-K: 0.653

Johnson B-V = 0.670 (derived from Tycho-2)

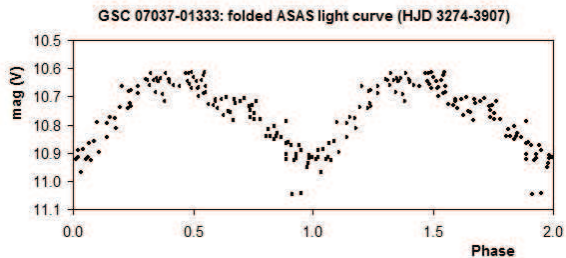
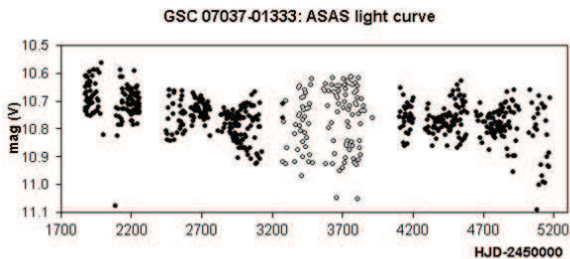
ROSAT: HR1 = 0.41, HR2 = 0.39, fxfopt = -2.14

Proper motion: pmRA: 3.17 mas/yr, pmDE: -1.41 mas/yr (Roeser et al., 2008)

Spectral type: G8IIIe, Li: 0 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC)

Likely an RS CVn variable

**No. 77: GSC 06584-00040**

Period: 31.83(7) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/085020-2856.6.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/085020-2856.6.asas3.0.0.500.0.0)

2MASS J-K: 0.680

Johnson B-V = 1.016 (derived from Tycho-2)

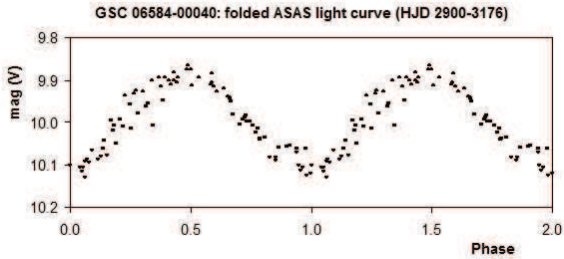
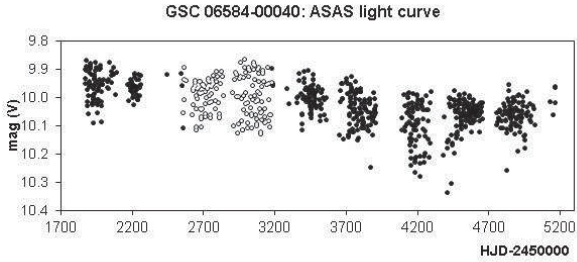
ROSAT: HR1 = 0.81, HR2 = -0.06, fxfopt = -2.50

Proper motion: pmRA: -7.67 mas/yr, pmDE: 8.73 mas/yr (Roeser et al., 2008)

Spectral type: G7III, Li: 0 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC)

Likely an RS CVn variable

**No. 78: GSC 8188-01052**

Period: 9.200(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/101856-4825.2,asas3,0,0,500,0,0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/101856-4825.2,asas3,0,0,500,0,0)

2MASS J-K: 0.737

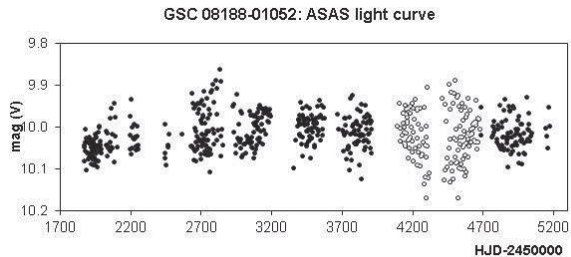
Johnson B-V = 0.934 (derived from Tycho-2)

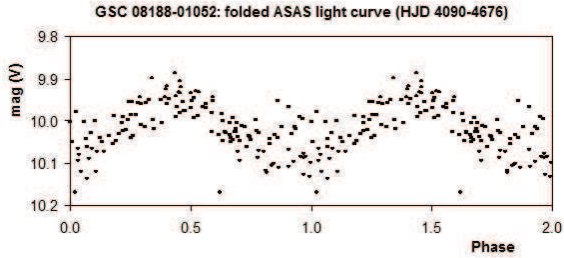
ROSAT: HR1 = 0.53, HR2 = 0.22, fxfopt = -1.65

Proper motion: pmRA: 9.02 mas/yr, pmDE: -1.69 mas/yr (Roeser et al., 2008)

Spectral type: K0III, Li: 30 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable



**No. 79: GSC 7195-01866**

Period: 29.6(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/102022-3612.2.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/102022-3612.2.asas3.0.0.500.0.0)  
2MASS J-K: 0.723

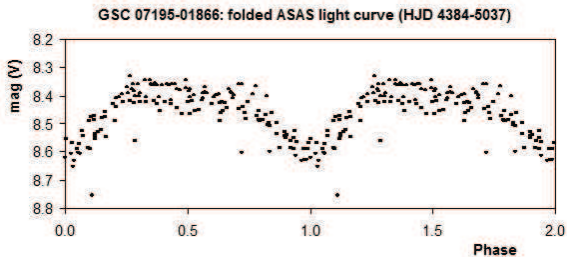
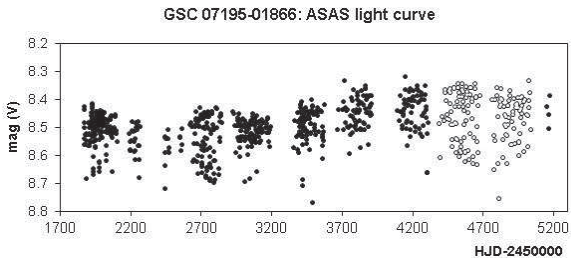
Johnson B-V = 0.967 (derived from Tycho-2)

ROSAT: HR1 = 0.35, HR2 = 0.31, fxfopt = -2.89

Proper motion: pmRA: -2.82 mas/yr, pmDE: -12.31 mas/yr (Roeser et al., 2008)

Spectral type: K1III, Li: 0 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable



**No. 80: GSC 7713-01595**

Period: 51.0(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/102230-3950.2,asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/102230-3950.2,asas3.0.0.500.0.0)

2MASS J-K: 0.815

Johnson B-V = 1.192 (derived from Tycho-2)

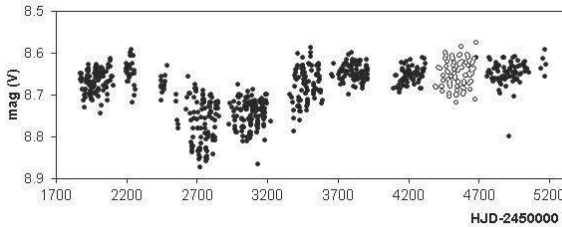
ROSAT: HR1 = 0.32, HR2 = 1.00, fxfopt = -2.98

Proper motion: pmRA: -28.91 mas/yr, pmDE: 8.64 mas/yr (Roeser et al., 2008)

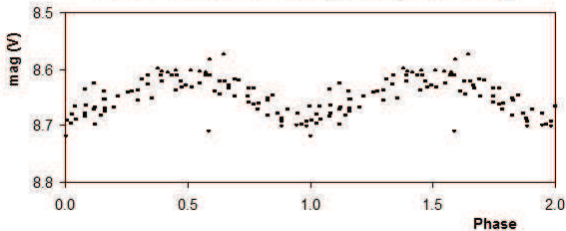
Spectral type: K2III, Li: 40 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable

GSC 07713-01595: ASAS light curve



GSC 07713-01595: folded ASAS light curve (HJD 4385-4672)

**No. 81: GSC 7710-02231**

Period: 62.2(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/103210-3905.8,asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/103210-3905.8,asas3.0.0.500.0.0)

2MASS J-K: 0.697

Johnson B-V = 1.067 (derived from Tycho-2)

ROSAT: HR1 = 0.73, HR2 = 0.20, fxfopt = -2.89

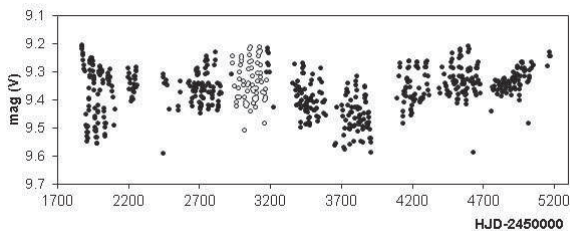
Proper motion: pmRA: -32.21 mas/yr, pmDE: -4.97 mas/yr (Roeser et al., 2008)

Spectral type: G9III, Li: 0 (0.1pm, Torres et al., 2006)

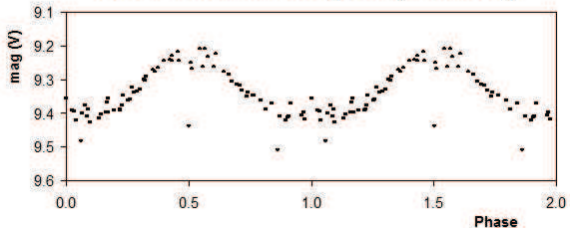
ASAS variable (type MISC)

Likely an RS CVn variable

GSC 07710-02231: ASAS light curve



GSC 07710-02231: folded ASAS light curve (HJD 2927-3168)

**No. 82: GSC 8641-01961**

Period: 7.549(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/121705-5743.9.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/121705-5743.9.asas3.0.0.500.0.0)

2MASS J-K: 0.832

Johnson B-V = 1.047 (derived from Tycho-2)

ROSAT: HR1 = 0.85, HR2 = 0.49, fxfopt = -2.03

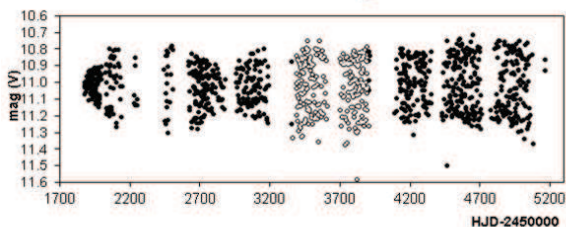
Proper motion: pmRA: -91.98 mas/yr, pmDE: -12.65 mas/yr (Roeser et al., 2008)

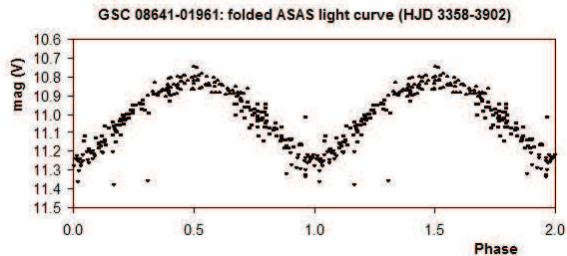
Spectral type: K0IIIe, Li: 160 (0.1pm, Torres et al., 2006)

ASAS variable (type DCEP-FU:)

Likely an RS CVn variable

GSC 08641-01961: ASAS light curve



**No. 83: GSC 8633-00825**

Period: 21.3(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/122602-5421.3.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/122602-5421.3.asas3.0.0.500.0.0)

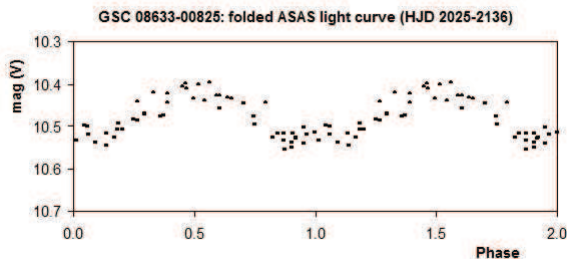
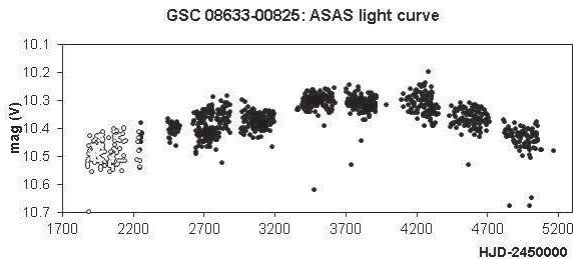
2MASS J-K: 0.788

Johnson B-V = 0.606 (derived from Tycho-2)

ROSAT: HR1 = 1.00, HR2 = 0.47,  $fx_{\text{opt}} = -2.30$ 

Proper motion: pmRA: -7.63 mas/yr, pmDE: 3.31 mas/yr (Roeser et al., 2008)

Likely an RS CVn variable





**No. 84: GSC 8244-00494**

Period: 3.091(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/123618-5042.7.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/123618-5042.7.asas3.0.0.500.0.0)

2MASS J-K: 0.746

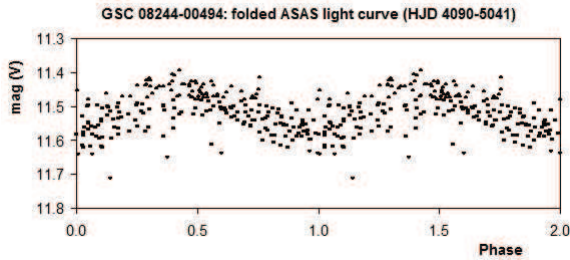
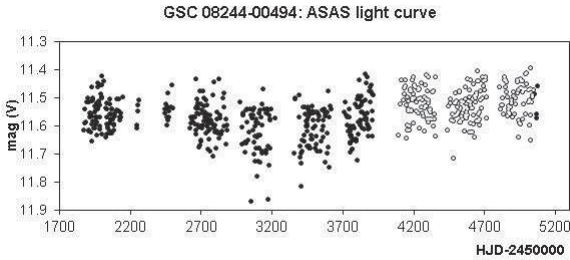
Johnson B-V = 0.652 (derived from Tycho-2)

ROSAT: HR1 = 0.25, HR2 = 0.68, fxfopt = -1.91

Proper motion: pmRA: -34.94 mas/yr, pmDE: -13.07 mas/yr (Roeser et al., 2008)

Spectral type: K4Ve, Li: 475, remark: Li strong (0.1pm, Torres et al., 2006)

Likely a BY Dra variable

**No. 85: GSC 8650-01272**

Period: 37.6(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/123911-5429.4.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/123911-5429.4.asas3.0.0.500.0.0)

2MASS J-K: 0.816

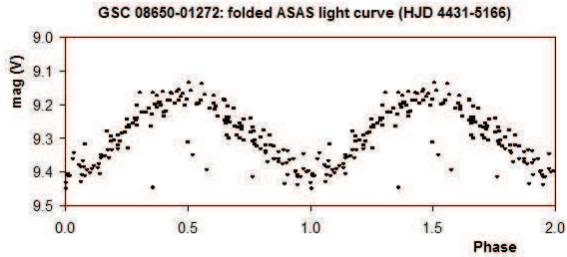
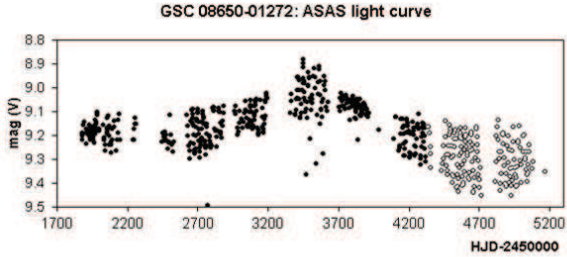
Johnson B-V = 1.093 (derived from Tycho-2)

ROSAT: HR1 = 0.81, HR2 = -0.25, fxfopt = -2.78

Proper motion: pmRA: -27.26 mas/yr, pmDE: -10.63 mas/yr (Roeser et al., 2008)

Spectral type: K3III, Li: 130 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable

**No. 86: GSC 7783-02098**

Period: 8.6709(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/124756-4457.6.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/124756-4457.6.asas3.0.0.500.0.0)

2MASS J-K: 0.797

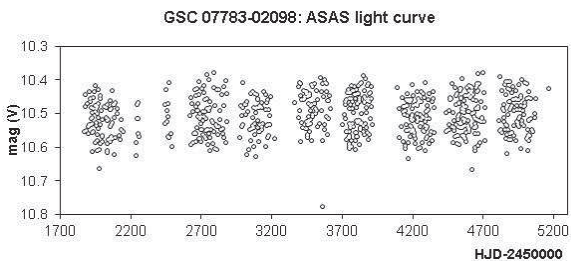
Johnson B-V = 1.141 (derived from Tycho-2)

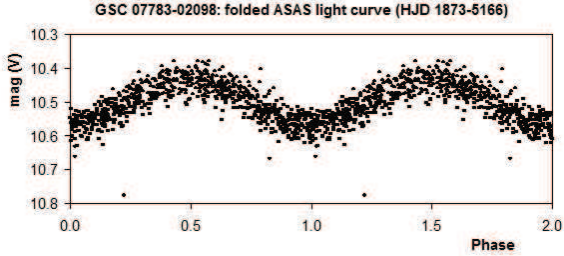
ROSAT: HR1 = 1.00, HR2 = 0.20, fxfopt = -2.19

Proper motion: pmRA: -12.66 mas/yr, pmDE: 5.94 mas/yr (Roeser et al., 2008)

Spectral type: K1IIIe, Li: 100 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable



**No. 87: GSC 8259-00401**

Period: 8.242(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/131517-5058.1.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/131517-5058.1.asas3.0.0.500.0.0)

2MASS J-K: 0.634

Johnson B-V = 0.890 (derived from Tycho-2)

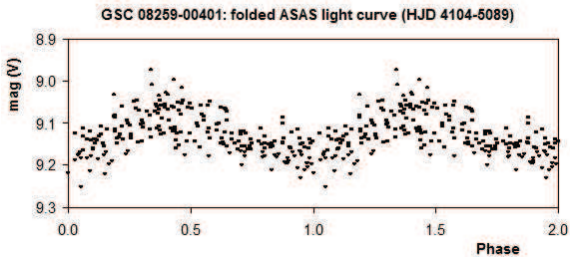
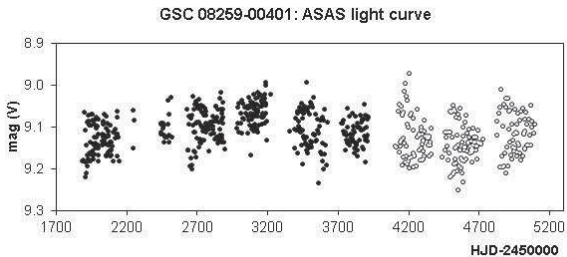
ROSAT: HR1 = 0.50, HR2 = 0.14, fxfopt = -2.08

Proper motion: pmRA: 1.64 mas/yr, pmDE: -20.44 mas/yr (Roeser et al., 2008)

Spectral type: G6III, Li: 10 (0.1pm, Torres et al., 2006)

NSV 19664 (9.16 - 9.33 Hp, no type / period determined)

Likely an RS CVn variable



**No. 88: GSC 8252-01015**

Period: 4.406(1) d

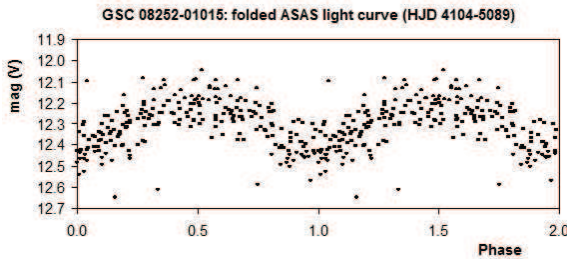
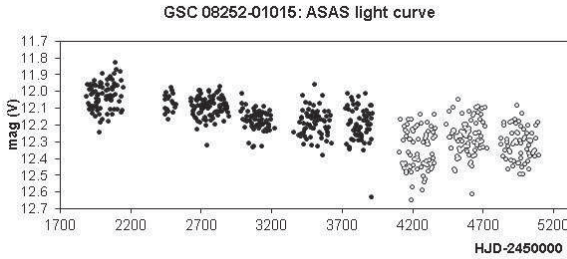
ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/132919-4722.9.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/132919-4722.9.asas3.0.0.500.0.0)

2MASS J-K: 0.741

ROSAT: HR1 = 0.84, HR2 = 0.21, fxfopt = -1.34

Proper motion: pmRA: 19.70 mas/yr, pmDE: -7.09 mas/yr (Roeser et al., 2008)

Likely an RS CVn variable

**No. 89: GSC 7796-02110**

Period: 104.6(5) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/133432-4209.5.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/133432-4209.5.asas3.0.0.500.0.0)

2MASS J-K: 0.690

Johnson B-V = 0.962 (derived from Tycho-2)

ROSAT: HR1 = 0.18, HR2 = 0.15, fxfopt = -1.93

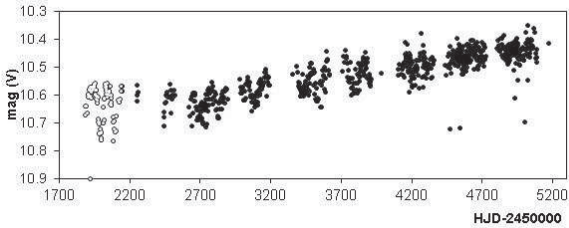
Proper motion: pmRA: -48.53 mas/yr, pmDE: -24.14 mas/yr (Roeser et al., 2008)

Spectral type: K2IVe, Li: 400, remark Li strong, SB2? (0.1pm, Torres et al., 2006)

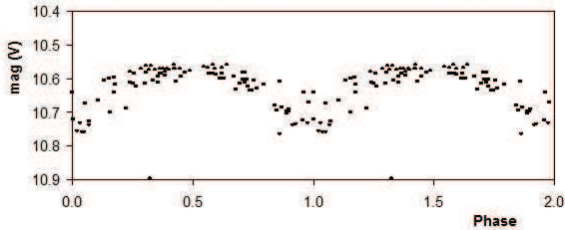
ASAS variable (type MISC)

Probably a binary T Tauri variable

GSC 07796-02110: ASAS light curve



GSC 07796-02110: folded ASAS light curve (HJD 1886-2142)

**No. 90: GSC 7274-00609**

Period: 27.1(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/134331-3520.4.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/134331-3520.4.asas3.0.0.500.0.0)

2MASS J-K: 0.677

Johnson B-V = 1.020 (derived from Tycho-2)

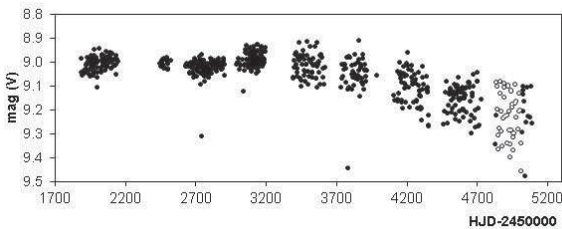
ROSAT: HR1 = 0.81, HR2 = 0.54, fxfopt = -2.56

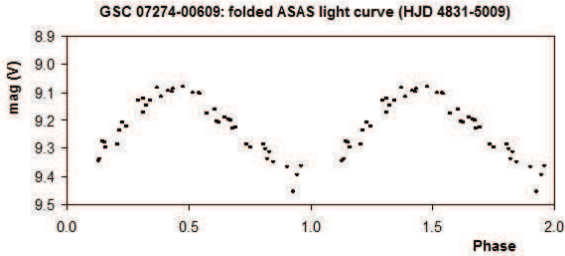
Proper motion: pmRA: -32.42 mas/yr, pmDE: -2.79 mas/yr (Roeser et al., 2008)

Spectral type: G8III, Li: 50 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable

GSC 07274-00609: ASAS light curve



**No. 91: GSC 7804-01633**

Period: 4.074(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/141247-3831.4.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/141247-3831.4.asas3.0.0.500.0.0)

2MASS J-K: 0.760

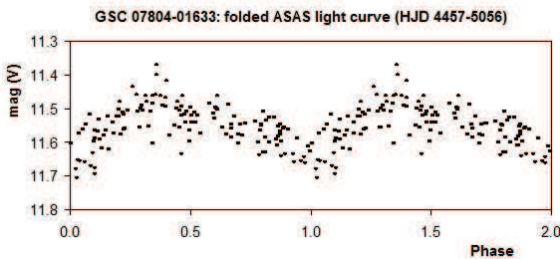
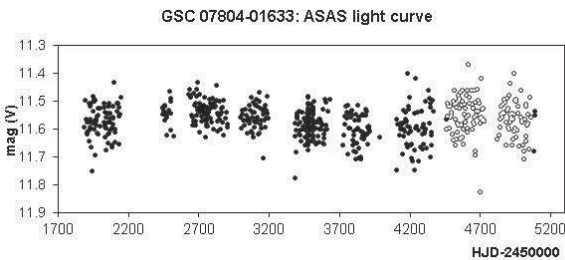
Johnson B-V = 1.241 (derived from Tycho-2)

ROSAT: HR1 = 0.27, HR2 = -0.09, fxfopt = -1.29

Proper motion: pmRA: -30.66 mas/yr, pmDE: -30.94 mas/yr (Roeser et al., 2008)

Spectral type: K3Ve, Li: 420, remark: Li strong (0.1pm, Torres et al., 2006)

Likely a BY Dra variable



**No. 92: GSC 8678-01367**

Period: 0.7773(3) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/142207-5417.1.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/142207-5417.1.asas3.0.0.500.0.0)

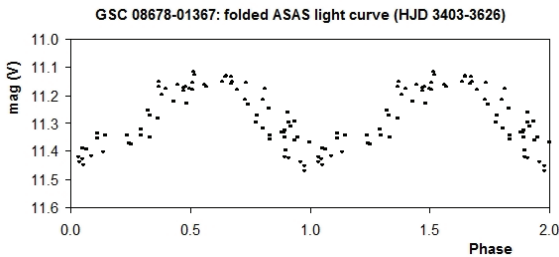
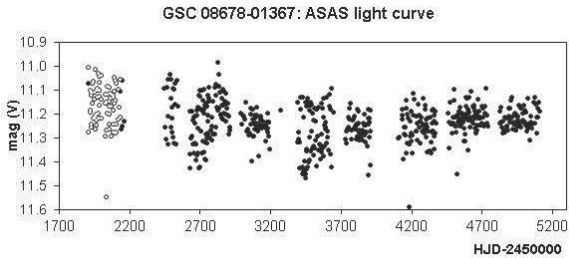
2MASS J-K: 0.667

ROSAT: HR1 = 0.33, HR2 = 0.30, fxfopt = -1.75

Proper motion: pmRA: -23.55 mas/yr, pmDE: -24.56 mas/yr (Roeser et al., 2008)

ASAS variable (type DCEP-FO|EC|ESD)

Likely an RS CVn variable



**No. 93: GSC 8679-00484**

Period: 78.2(2) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/143537-5347.6.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/143537-5347.6.asas3.0.0.500.0.0)

2MASS J-K: 0.828

Johnson B-V = 1.240 (derived from Tycho-2)

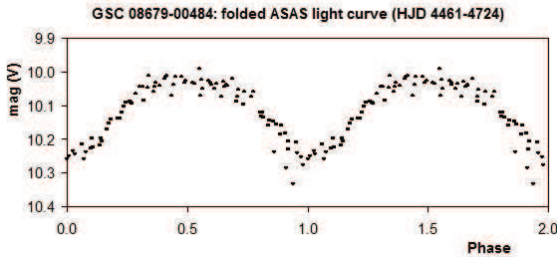
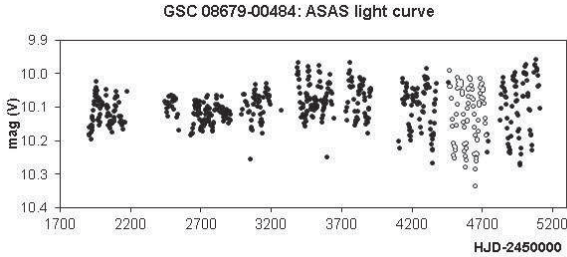
ROSAT: HR1 = 0.92, HR2 = 0.68, fxfopt = -2.36

Proper motion: pmRA: -4.98 mas/yr, pmDE: 0.38 mas/yr (Roeser et al., 2008)

Spectral type: K1III, Li: 100 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC|SR)

Likely an RS CVn variable



**No. 94: GSC 7825-00956**

Period: 18.2(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/150429-3924.4.asas3,0,0,500,0,0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/150429-3924.4.asas3,0,0,500,0,0)

2MASS J-K: 0.705

Johnson B-V = 0.855 (derived from Tycho-2)

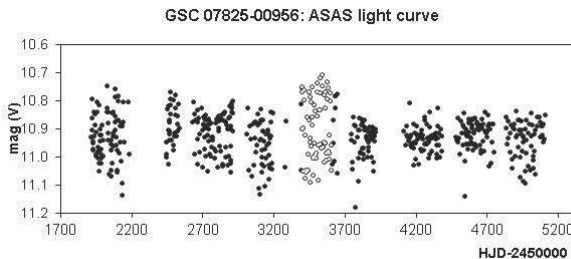
ROSAT: HR1 = 0.87, HR2 = 0.56, fxfopt = -2.36

Proper motion: pmRA: 0.04 mas/yr, pmDE: 2.48 mas/yr (Roeser et al., 2008)

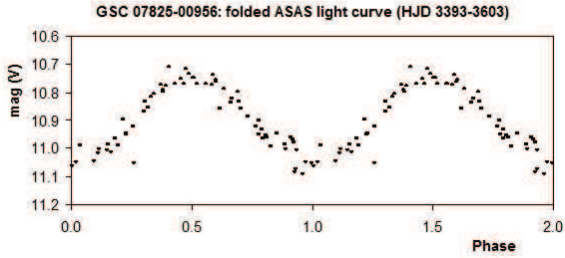
Spectral type: K0III(e), Li: 80 (0.1pm, Torres et al., 2006)

ASAS variable (type CW-FU|ESD)

Likely an RS CVn variable





**No. 95: GSC 8696-01232**

Period: 5.272(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/154518-5318.2.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/154518-5318.2.asas3.0.0.500.0.0)

2MASS J-K: 0.877

Johnson B-V = 1.483 (derived from Tycho-2)

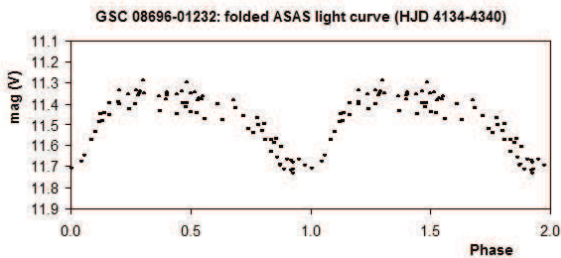
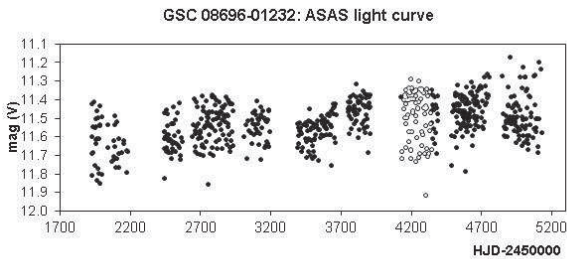
ROSAT: HR1 = 1.00, HR2 = 0.46, fxfopt = -2.04

Proper motion: pmRA: 19.26 mas/yr, pmDE: -16.16 mas/yr (Roesser et al., 2008)

Spectral type: G6IIIe, Li: 40 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC)

Likely an RS CVn variable



**No. 96: GSC 7838-00556**

Period: 37.4(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/155205-3747.7.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/155205-3747.7.asas3.0.0.500.0.0)

2MASS J-K: 0.766

Johnson B-V = 1.300 (derived from Tycho-2)

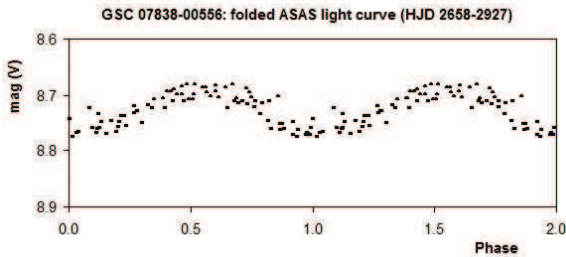
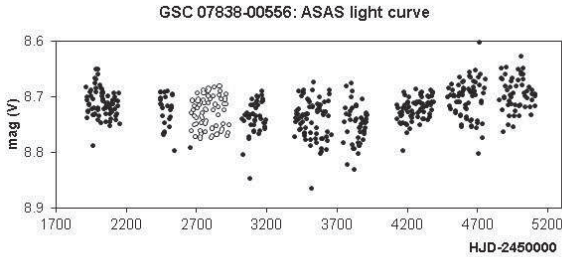
ROSAT: HR1 = 0.91, HR2 = 0.03, fxfopt = -2.67

Proper motion: pmRA: -2.97 mas/yr, pmDE: -19.71 mas/yr (Roeser et al., 2008)

Spectral type: K1III, Li: 50 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC)

Likely an RS CVn variable

**No. 97: GSC 8319-01323**

Period: 1.6823(5) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/161003-5026.2.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/161003-5026.2.asas3.0.0.500.0.0)

2MASS J-K: 0.713

Johnson B-V = 1.129 (derived from Tycho-2)

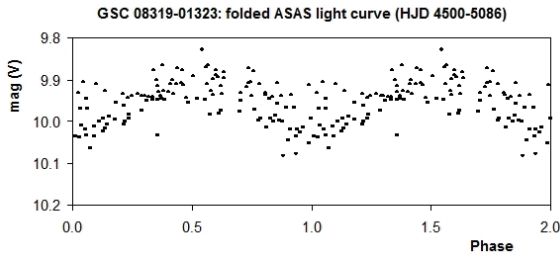
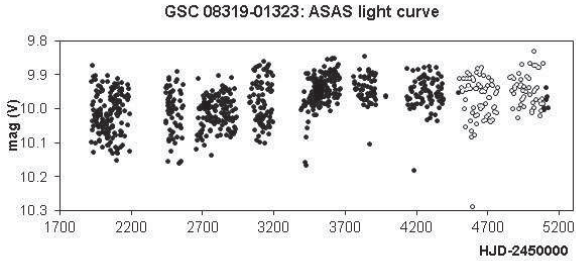
ROSAT: HR1 = 0.90, HR2 = 0.22, fxfopt = -2.79

Proper motion: pmRA: -15.45 mas/yr, pmDE: -14.33 mas/yr (Roeser et al., 2008)

Spectral type: K0III, Li: 200 (0.1pm, Torres et al., 2006)

ASAS variable (type ESD|EC)

Likely an RS CVn variable

**No. 98: GSC 6267-02271**

Period: 10.664 (4) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/183636-1506.7,asas3.0.0,500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/183636-1506.7,asas3.0.0,500.0.0)

2MASS J-K: 0.647

Johnson B-V = 0.915 (derived from Tycho-2)

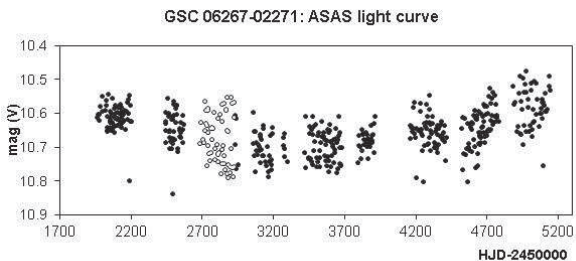
ROSAT: HR1 = 0.42, HR2 = 0.15, fxfopt = -2.33

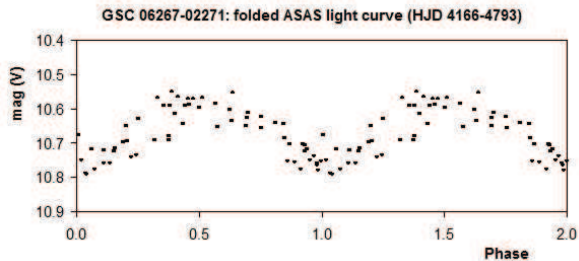
Proper motion: pmRA: 11.38 mas/yr, pmDE: -68.11 mas/yr (Roeser et al., 2008)

Spectral type: G7IIIe, Li: 0 (0.1pm, Torres et al., 2006)

ASAS variable (type MISC)

Likely an RS CVn variable



**No. 99: GSC 07432-01663**

Period: 3.244(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/192832-3508.0,asas3.0.0,500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/192832-3508.0,asas3.0.0,500.0.0)

2MASS J-K: 0.701

Johnson B-V = 0.692 (derived from Tycho-2)

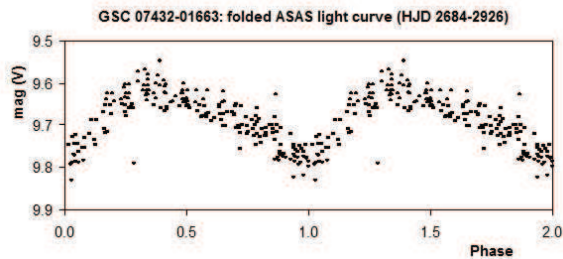
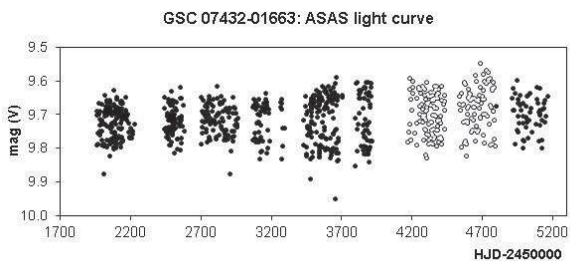
ROSAT: HR1 = 0.84, HR2 = 0.25, fxfopt = -2.00

Proper motion: pmRA: -15.73 mas/yr, pmDE: -13.91 mas/yr (Roeser et al., 2008)

Spectral type: G8IIIe, SB2 Li: 90 (0.1pm, Torres et al., 2006)

ASAS variable (type DCEP-FO|EC)

Likely an RS CVn variable



**No. 100: GSC 6302-02521**

Period: 22.7(1) d

ASAS data: [http://www.astrouw.edu.pl/cgi-asas/asas\\_variable/193504-1834.0.asas3.0.0.500.0.0](http://www.astrouw.edu.pl/cgi-asas/asas_variable/193504-1834.0.asas3.0.0.500.0.0)

2MASS J-K: 0.848

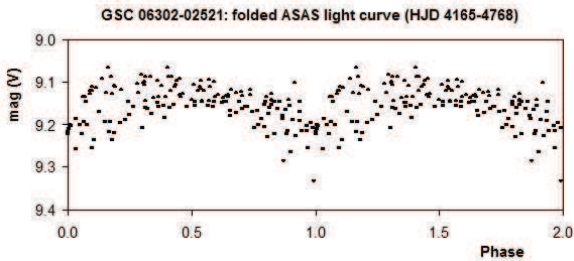
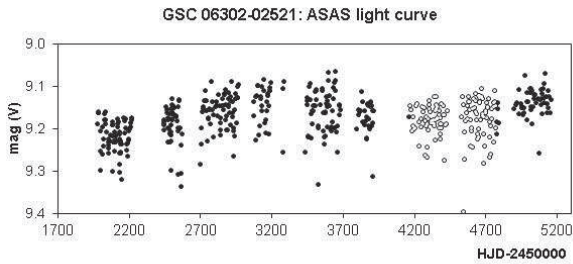
Johnson B-V = 1.172 (derived from Tycho-2)

ROSAT: HR1 = 0.93, HR2 = 0.26, fxfopt = -2.48

Proper motion: pmRA: 3.16 mas/yr, pmDE: 2.13 mas/yr (Roesser et al., 2008)

Spectral type: K2III, Li: 30 (0.1pm, Torres et al., 2006)

Likely an RS CVn variable



**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.

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