

## Chromospherically active stars in the ROTSE-1 database: Paper 3. Another 25 new variables.

KLAUS BERNHARD<sup>1,3</sup>, CHRISTOPHER LLOYD<sup>2</sup>

1) A-4030 Linz, Austria; e-mail: klaus.bernhard@liwest.at

2) Department of Physics and Astronomy, Open University, Milton Keynes MK7 6AA, UK;  
e-mail: C.Lloyd@open.ac.uk

3) Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V. (BAV), Munsterdamm 90, D-12169 Berlin, Germany

BAV Mitteilungen Nr. 197

**Abstract:** Another 25 new chromospherically active stars are presented, which were found in the ROTSE-1 database:

GSC 05090-00118, GSC 01433-01056, GSC 01442-01289, GSC 03239-00610, GSC 00604-00254  
GSC 02121-00729, GSC 02991-00890, GSC 02747-01337, GSC 01094-00792, GSC 02769-00149  
GSC 03139-01710, GSC 01104-00245, GSC 04723-00878, GSC 02482-00745, GSC 00132-01109  
GSC 01191-01566, GSC 02107-00188, GSC 02744-01935, GSC 00359-00677, GSC 02479-00944  
GSC 00114-00296, GSC 05050-00802, GSC 05215-00136, GSC 01331-01211, GSC 02788-00248

During a programme of optical identification of X-ray sources from the ROSAT All-Sky Faint Source Catalogue (1RXS) (Voges et al. 2000) in the ROTSE1 database (<http://skydot.lanl.gov>, Wozniak et al., 2004) 25 new chromospherically active stars have been found.

For further details of the programme see Bernhard & Lloyd (2008).

The criteria for including a star in this list of chromospherically active stars were, i) the X-ray identification, ii) a suitable period after an analysis of the NSVS data with Period 04 (Lenz and Breger 2005) and iii) an appropriate B-V colour index (Høg et al. 2000) if available. Chromospherically active stars exhibit spectral types of F-K (these are mostly RS CVn systems, and a smaller number of FK Comae stars) and K-M (BY Dra variables). Partial information about high proper motions (Ivanov 2007) supports the classification as chromospherically active stars. Because of the high absolute magnitudes of pulsating variables with similar light curves (especially Cepheids) their large distances should result in small proper motions.

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

No.	GSC	RA (2000)	Dec	1RXS	Range	Epoch (Min)	Per. (d)
51	05090-00118	17 48 44.69	-05 07 14.7	J174844.1-050658	12.0-12.2	2451629.5(1)	6.576(4)
52	01433-01056	11 10 13.04	+18 28 11.5	J111012.5+182800	11.7-11.9	2451629.8(1)	5.811(2)
53	01442-01289	12 03 15.65	+16 06 37.8	J120316.6+160634	11.8-12.0	2454559.68(7)	3.5295(3)
54	03239-00610	23 39 06.38	+42 05 54.3	J233906.5+420609	10.2-10.3	2451524.6(3)	18.61(2)
55	00604-00254	00 40 58.87	+09 58 02.8	J004057.9+095756	12.4-12.6	2451576.6(4)	20.06(6)
56	02121-00729	18 55 43.92	+28 13 07.3	J185542.9+281301	10.3-10.5	2453189.7(9)	74.0(5)
57	02991-00890	09 31 12.66	+38 02 31.1	J093111.5+380226	10.8-12.1	2451582.6(1)	5.501(2)
58	02747-01337	22 31 53.29	+36 35 06.0	J223154.4+363505	10.5-10.7	2451324.9(4)	24.04(5)
59	01094-00792	20 55 50.85	+10 23 40.9	J205551.0+102325	11.3-11.4	2451507.6(2)	10.15(1)
60	02769-00149	23 32 04.60	+32 27 56.0	J233203.8+322807	12.0-12.1	2451444.7(1)	7.839(8)
61	03139-01710	19 39 09.98	+40 52 15.4	J193911.1+405204	10.3-10.4	2451496.7(6)	31.2(1)
62	01104-00245	21 10 54.15	+08 58 16.6	J211053.1+085810	11.5-11.8	2453649.5(3)	14.060(5)
63	04723-00878	03 48 36.26	-05 20 30.4	J034835.3-052037	11.7-11.8	2451577.70(3)	1.4527(3)
64	02482-00745	08 17 44.55	+36 26 06.0	J081743.8+362555	11.8-12.0	2451325.7(1)	8.235(5)
65	00132-01109	06 16 42.47	+01 15 17.0	J061643.6+011521	11.6-11.7	2451498.91(6)	3.363(2)
66	01191-01566	00 43 48.87	+18 46 52.8	J004347.8+184700	10.9-11.1	2453674.7(2)	13.74(1)
67	02107-00188	18 33 44.70	+22 55 21.8	J183343.6+225522	12.1-12.3	2452888.6(1)	7.282(1)
68	02744-01935	22 46 31.88	+35 11 34.9	J224630.8+351147	11.5-11.6	2451535.72(8)	4.139(2)
69	00359-00677	15 44 35.22	+04 23 08.3	J154436.3+042317	12.2-12.4	2451442.63(1)	0.73874(2)
70	02479-00944	07 51 18.87	+36 29 57.0	J075119.9+363009	12.3-12.4	2451556.70(6)	3.3769(2)
71	00114-00296	05 31 04.63	+00 17 23.6	J053104.7+001705	11.8-11.9	2451550.7(2)	13.32(4)
72	05050-00802	16 51 22.19	-00 50 00.7	J165122.8-004945	11.4-11.6	2454348.51(6)	3.3593(2)
73	05215-00136	21 53 56.67	-02 34 30.4	J215355.7-023430	11.8-11.9	2451453.7(1)	7.71(1)
74	01331-01211	06 48 38.71	+16 24 46.9	J064840.2+162445	11.9-12.0	2451558.90(7)	3.889(3)
75	02788-00248	00 30 19.95	+41 10 40.7	J003018.4+411046	10.5-10.9	2451497.6(7)	36.50(9)

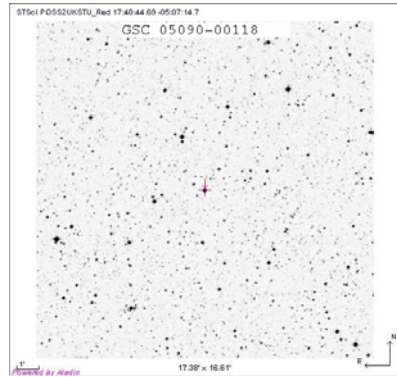
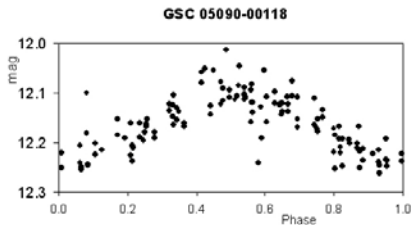
The ROTSE-I telescope was operated without any filters so the quantum efficiency of the used CCD camera AP-10 camera makes the effective band most comparable to the Johnson R band (Range in Table 1). The epochs are given for the minima as HJD, ASAS-3 data (<http://www.astrouw.edu.pl/asas/?page=main>) are included in the period analysis when available. Figures in brackets denote errors (sigma) in units of the last decimal.

### Folded light curves (with the period given above), finding charts and comments:

#### No. 51: GSC 05090-00118

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=13778147&mask=32004>

Proper motion 12 mas yr<sup>-1</sup> (Zacharias et al. 2005)



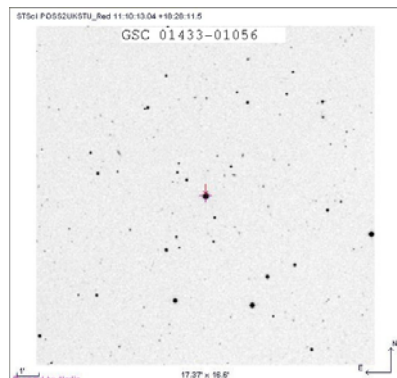
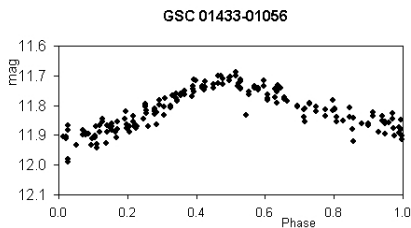
#### No. 52: GSC 01433-01056

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=10331362&mask=32004>

Tycho-2: 01433-01056-1; Johnson B-V=0.946 (derived from Tycho-2)

Proper motion 29 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star



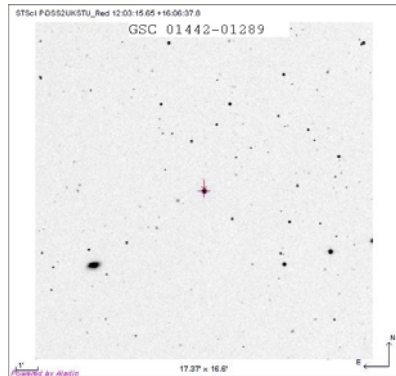
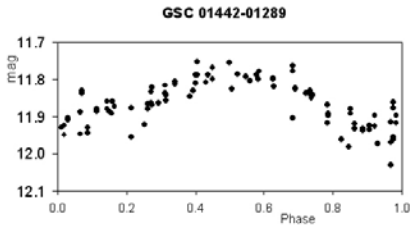
**No. 53: GSC 01442-01289**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=10386957&mask=32004>

Tycho-2 01442-01289-1: Johnson B-V=1.054 (derived from Tycho-2)

ASAS variable (type MISC/CW):

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&source=II/264/%2a%5bv3%5d%2a&ASAS=120316%2b1606.6>Proper motion 28 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star

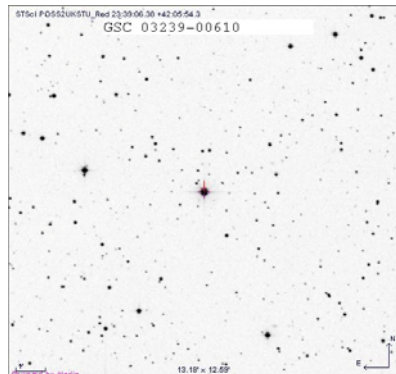
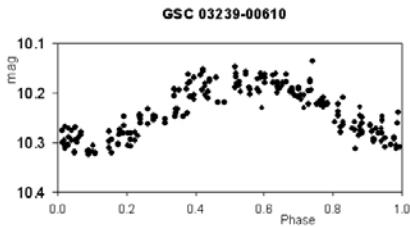
**No. 54: GSC 03239-00610**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=3615926&mask=32004>

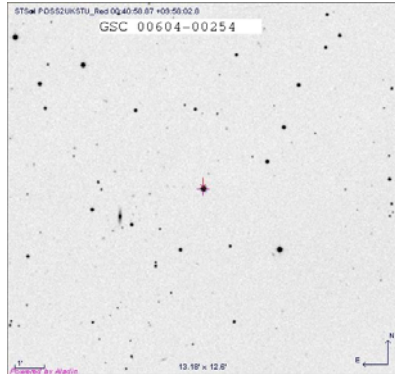
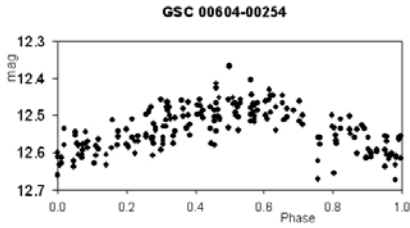
Tycho-2 03239-00610-1: Johnson B-V=1.117 (derived from Tycho-2)

Star with high-proper motion (Ivanov, 2007)

Proper motion 50 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star



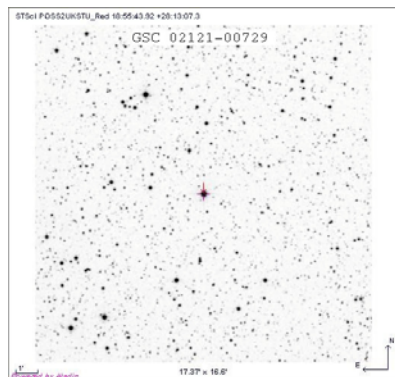
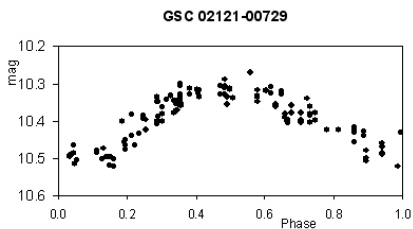
**No. 55: GSC 00604-00254**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=9146119&mask=32004>Proper motion 62 mas yr<sup>-1</sup> (Zacharias et al. 2005)**No. 56: GSC 02121-00729**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=8198761&mask=32004>

Tycho-2: 02121-00729-1: Johnson B-V=1.172 (derived from Tycho-2)

ASAS variable (type MISC):

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&-source=II/264/%2a%5bv3%5d%2a&ASAS=185544%2b2813.0>Proper motion 9 mas yr<sup>-1</sup> (Zacharias et al. 2005)

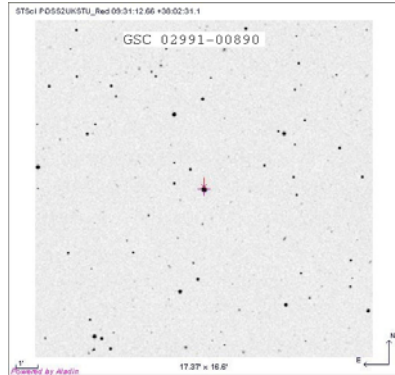
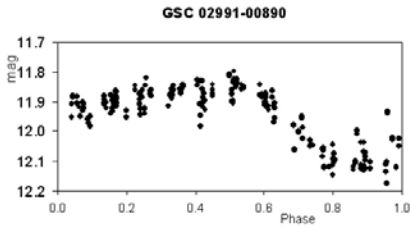
Probably a BY Dra star



**No. 57: GSC 02991-00890**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=4888208&mask=32004>

Proper motion 7 mas yr<sup>-1</sup> (Zacharias et al. 2005)



**No. 58: GSC 02747-01337**

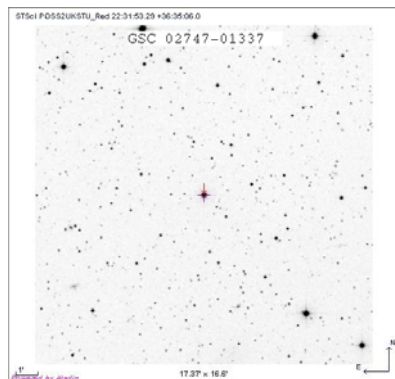
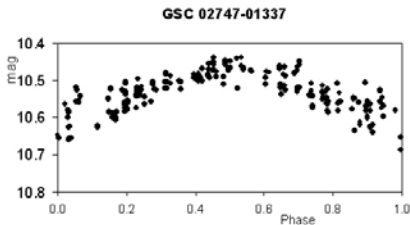
NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=8903481&mask=32004>

Tycho-2: 02747-01337-1: Johnson B-V= 0.972 (derived from Tycho-2)

Proper motion 12 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star

Variable amplitude



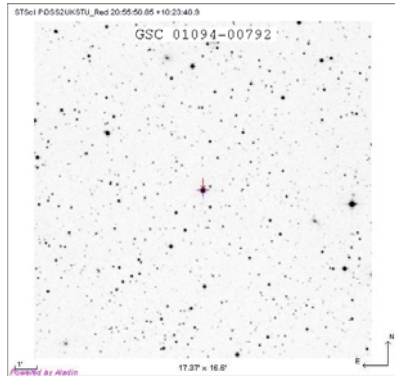
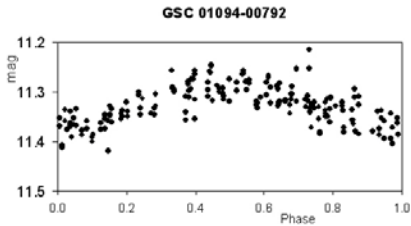
**No. 59: GSC 01094-00792**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=11545009&mask=32004>

Tycho-2: 01094-00792-1: Johnson B-V=0.677 (derived from Tycho-2)

Proper motion 9 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Likely RS CVn variable

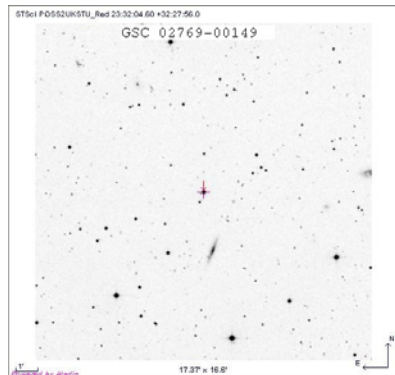
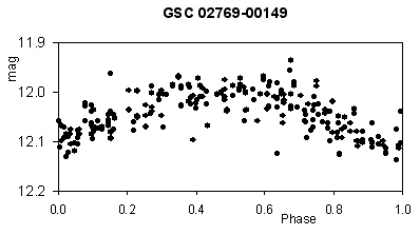


**No. 60: GSC 02769-00149**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=6230742&mask=32004>

Proper motion 12 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Misclassified as Cepheid (Maciejewski et. al, 2005)

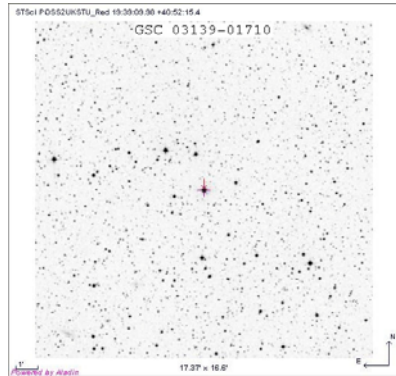
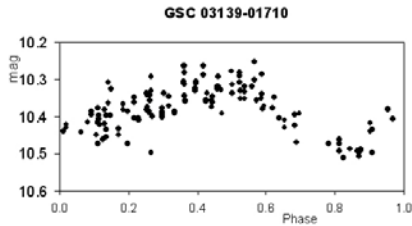


**No. 61: GSC 03139-01710**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=5679974&mask=32004>

Tycho-2: 03139-01710-1: Johnson B-V=0.963 (derived from Tycho-2)

Proper motion 6 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star

**No. 62: GSC 01104-00245**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=11565811&mask=32004>

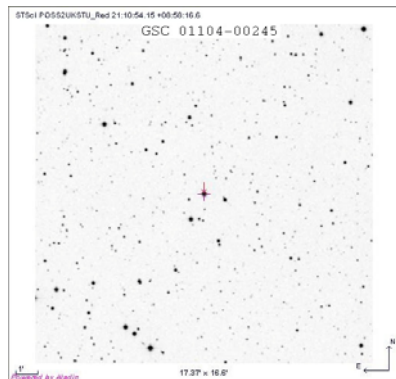
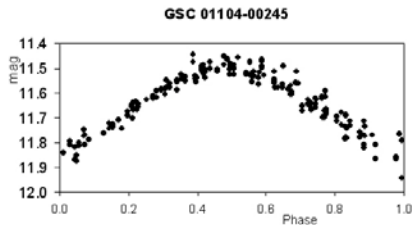
Tycho-2: 01104-00245-1: Johnson B-V=0.250 (derived from Tycho-2)

Proper motion 22 mas yr<sup>-1</sup> (Zacharias et al. 2005)

ASAS variable (type CW-FU):

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&-source=II/264/%2a%5bv3%5d%2a&ASAS=211055%2b0858.2>

Likely RS CVn variable



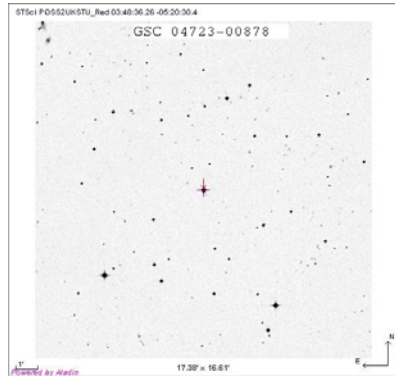
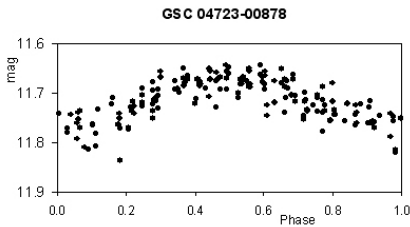
**No. 63: GSC 04723-00878**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=12166021&mask=32004>

Tycho-2: 04723-00878-1: Johnson B-V=0.971 (derived from Tycho-2)

Marginal proper motion (Zacharias et al. 2005)

Probably a BY Dra star



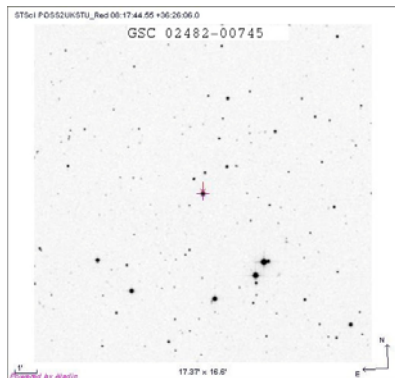
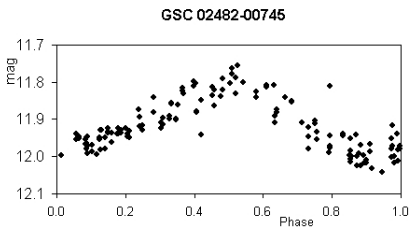
**No. 64: GSC 02482-00745**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=7364319&mask=32004>

Tycho-2: 02482-00745-1: Johnson B-V=0.990 (derived from Tycho-2)

Proper motion 15 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Probably a BY Dra star





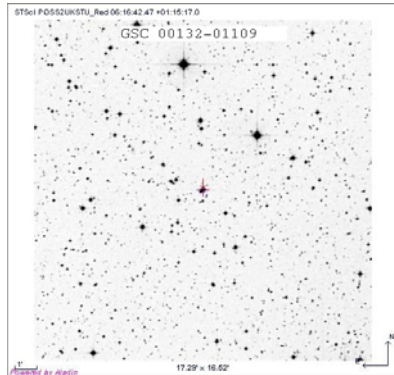
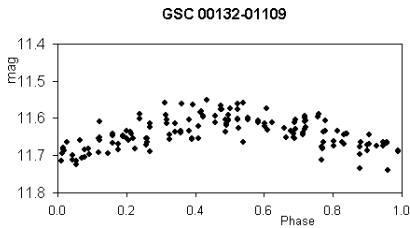
**No. 65: GSC 00132-01109**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=12472380&mask=32004>

Tycho-2: 00132-01109-1; Johnson B-V=0.919 (derived from Tycho-2)

Proper motion 18 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Likely RS CVn variable



**No. 66: GSC 01191-01566**

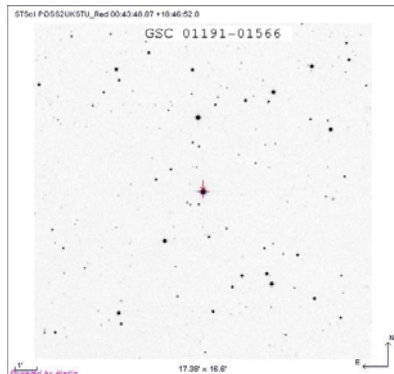
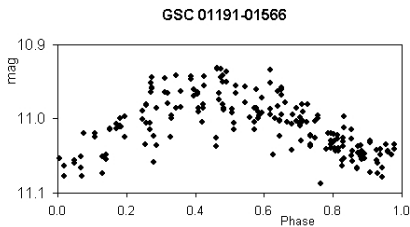
NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=9129637&mask=32004>

Proper motion 13 mas yr<sup>-1</sup> (Zacharias et al. 2005)

ASAS variable (type MISC)

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&-source=II/264/%2a%5b3%5d%2a&ASAS=004349%2b1846.9>

Variable amplitude



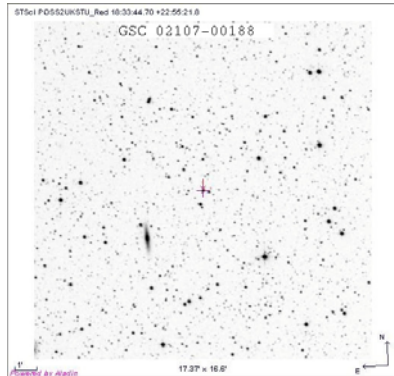
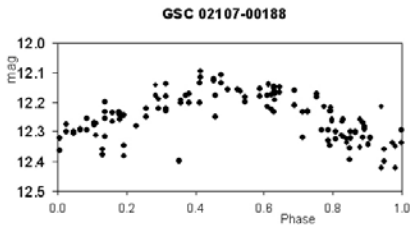
**No. 67: GSC 02107-00188**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=11028452&mask=32004>

Proper motion  $17 \text{ mas yr}^{-1}$  (Zacharias et al. 2005)

ASAS variable (type DCEP-FU/EC/ESD):

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&-source=II/264/%2a%5bv3%5d%2a&ASAS=183345%2b2255.2>



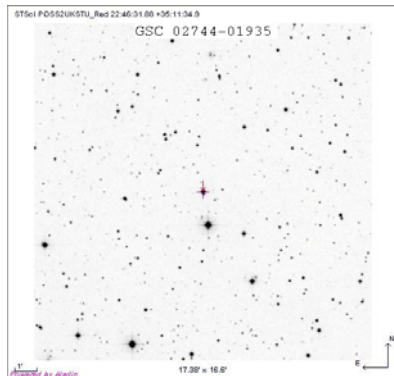
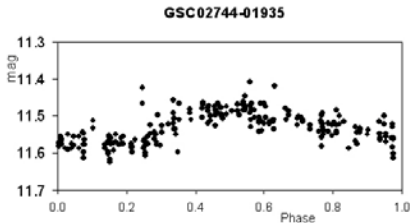
**No. 68: GSC 02744-01935**

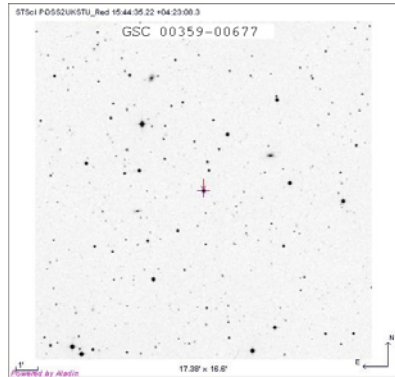
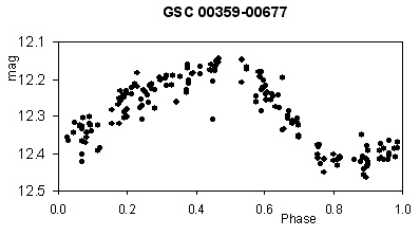
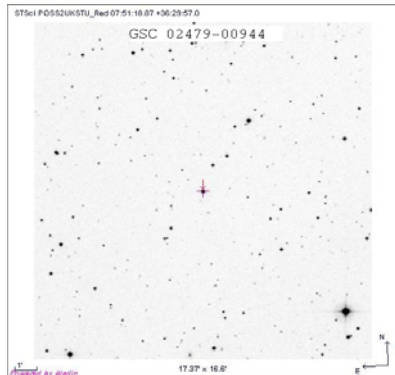
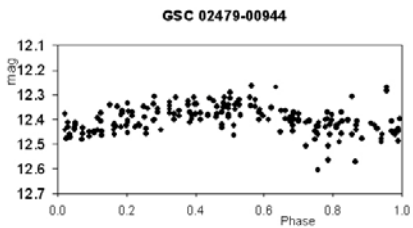
NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=8919537&mask=32004>

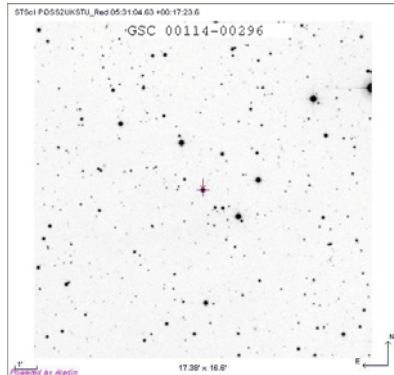
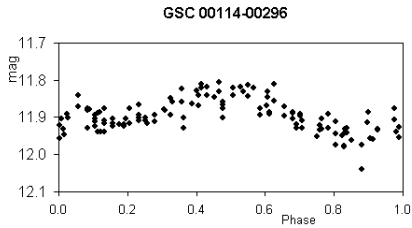
Tycho-2: 02744-01935-1: Johnson B-V=0.677 (derived from Tycho-2)

Proper motion  $14 \text{ mas yr}^{-1}$  (Zacharias et al. 2005)

Likely RS CVn variable



**No. 69: GSC 00359-00677**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=13448194&mask=32004>Proper motion 30 mas yr<sup>-1</sup> (Zacharias et al. 2005)**No. 70: GSC 02479-00944**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=7334515&mask=32004>Proper motion 20 mas yr<sup>-1</sup> (Zacharias et al. 2005)

**No. 71: GSC 00114-00296**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=12343618&mask=32004>Proper motion  $16 \text{ mas yr}^{-1}$  (Zacharias et al. 2005)**No. 72: GSC 05050-00802**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=13608829&mask=32004>

Tycho-2: 05050-00802-1: Johnson B-V=1.007 (derived from Tycho-2)

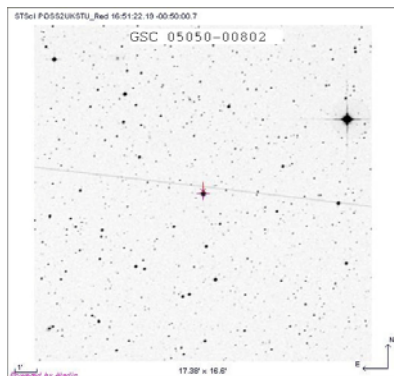
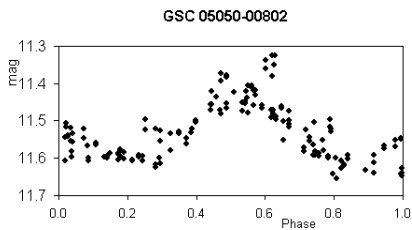
Proper motion  $35 \text{ mas yr}^{-1}$  (Zacharias et al. 2005)

ASAS variable (type DCEP-FO/EC):

<http://webviz.u-strasbg.fr/viz-bin/VizieR-5?-out.add=&-source=II/264/%2a%5b%3%5d%2a&ASAS=165122-0050.0>

Variable amplitude

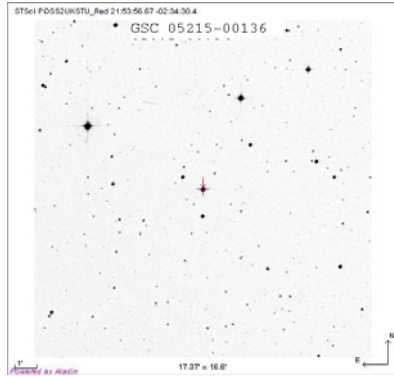
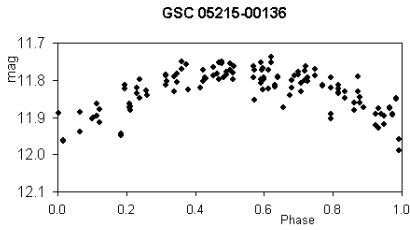
Probably a BY Dra star



**No. 73: GSC 05215-00136**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=14482002&mask=32004>

Proper motion  $24 \text{ mas yr}^{-1}$  (Zacharias et al. 2005)



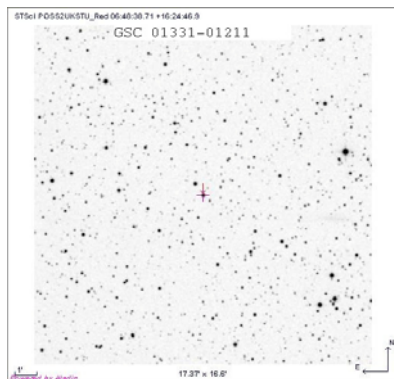
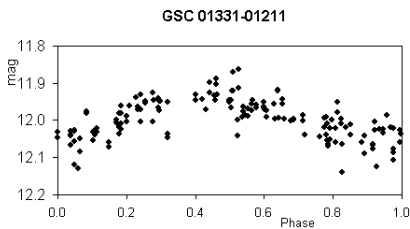
**No. 74: GSC 01331-01211**

NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=9804085&mask=32004>

Tycho-2: 01331-01211-1: Johnson B-V=0.391 (derived from Tycho-2)

Marginal proper motion (Zacharias et al. 2005)

Likely RS CVn variable



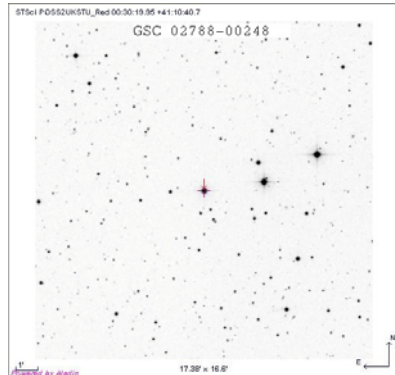
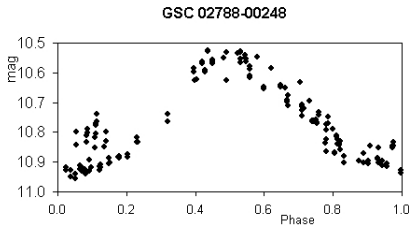
**No. 75: GSC 02788-00248**NSVS data: <http://skydot.lanl.gov/nsvs/star.php?num=3666194&mask=32004>

Tycho-2: 02788-00248-1: Johnson B-V=1.124 (derived from Tycho-2)

Proper motion 16 mas yr<sup>-1</sup> (Zacharias et al. 2005)

Variable amplitude

Probably a BY Dra star



**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 and of the International Variable Star Index (AAVSO).

**References:**

Bernhard K., Lloyd C., 2008, OEJV, 86

<http://var.astro.cz/oejv/issues/oejv0086.pdf>

Bernhard K., Lloyd C., 2008, OEJV, 89

<http://var.astro.cz/oejv/issues/oejv0089.pdf>Høg E., Fabricius C., Makarov V.V., Urban S., Corbin T., Wycoff G., Bastian U., Schwekendiek P., Wicenec A., 2000, *Astron. Astrophys.*, 355, L27 (2000A&A...355L..27H)<http://adsabs.harvard.edu/abs/2000A&A...355L..27H>Ivanov G.A., 2007, *Catalogue of stars with high-proper motions - version 1.*, Ivanov G.A., Main Astronomical Observatory (MAO), Kiev, Ukraine<http://cdsarc.u-strasbg.fr/viz-bin/Cat?I/306>Lenz P., Breger M., 2005, *Comm. in Asteroseismology*, 146, 53 (2005CoAst.146...53L)<http://adsabs.harvard.edu/abs/2005CoAst.146...53L>Maciejewski G., Czart, K., Niedzielski, A., 2005, *IBVS*, 5614<http://www.konkoly.hu/cgi-bin/IBVS?5614>

Voges W., Aschenbach B., Boller Th., Brauningner H., Briel U., Burkert W., Dennerl K., Englhauser J., Gruber R., Haberl F., Hartner G., Hasinger G., Pfeffermann E., Pietsch W., Predehl P., Schmitt J., Trumper J., Zimmermann U. 2000, IAU Circ. 7432, ROSAT all-sky survey faint source catalogue. (2000IAUC.7432R...1V)

<http://adsabs.harvard.edu/abs/2000IAUC.7432R...1V>

Wozniak P. R., Vestrand W. T., Akerlof C. W., Balsano R., Bloch J., Casperson D., Fletcher S., Gisler G., Kehoe R., Kinemuchi K., Lee B. C., Marshall S., McGowan K. E., McKay T. A., Rykoff E. S., Smith D. A., Szymanski J., Wren J., 2004, Astron. J., 127, 2436, Northern Sky Variability Survey: Public Data Release (2004AJ....127.2436W)

<http://adsabs.harvard.edu/abs/2004AJ....127.2436W>

Zacharias N., Monet D.G., Levine S.E., Urban S.E., Gaume R., Wycoff G.L., 2005, Naval Observatory Merged Astrometric Dataset (NOMAD) San Diego AAS Meeting, January (2005) (2004AAS...205.4815Z)

<http://adsabs.harvard.edu/abs/2004AAS...205.4815Z>

<http://cdsarc.u-strasbg.fr/viz-bin/Cat?I/297>

