

New Variable Stars in the Open Cluster NGC 7129

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1		2MASS 21442961+6548438	21 44 29.62, +65 48 43.9	EA:	14.73	15.11	R			other		Comm. 1	v68.jpg	im_v68.png	v68.txt
2		2MASS 21433767+6550489	21 43 37.67, +65 50 48.9	INT:	17.84	18.34	V			other		Comm. 2	v233.jpg	im_v233.png	v233.txt
3		2MASS 21435283+6554277	21 43 52.84, +65 54 27.7	SR:	14.17	14.30	V	23.05:		other		Comm. 3	v526.jpg	im_v526.png	v526.txt
4		2MASS 21412361+6555377	21 41 23.62, +65 55 37.7	SR:	14.65	14.97	V			other		Comm. 4	v579.jpg	im_v579.png	v579.txt
5		2MASS 21422105+6555405	21 42 21.06, +65 55 40.5	SR:	16.05	16.24	V			other		Comm. 5	v596.jpg	im_v596.png	v596.txt
6		2MASS 21430782+6557095	21 43 07.82, +65 57 09.5	I:	13.26	13.50	I			other		Comm. 6	v703.jpg	im_v703.png	v703.txt
7		2MASS 21421203+6600254	21 42 12.03, +66 00 25.5	INT:	16.51	17.38	V			other		Comm. 7	v884.jpg	im_v884.png	v884.txt
8		2MASS 21405762+6602255	21 40 57.62, +66 02 25.6	SR:	13.78	14.11	V			other		Comm. 8	v990.jpg	im_v990.png	v990.txt
9		2MASS 21405096+6603475	21 40 50.97, +66 03 47.5	SR:	12.30	12.45	V			other		Comm. 9	v1054.jpg	im_v1054.png	v1054.txt
10		2MASS 21395519+6604069	21 39 55.20, +66 04 07.0	EW	15.05	15.15	V	0.88696	2455232.35	min		Comm. 10	v1070.jpg	im_v1070.png	v1070.txt
11		2MASS 21425961+6604338	21 42 59.61, +66 04 33.8	INT	15.17	15.94	I	4.4:		other	K2	Comm. 11	v1108.jpg	im_v1108.png	v1108.txt
12		2MASS 21440634+6604231	21 44 06.35, +66 04 23.1	INT:	16.90	18.73	V			other		Comm. 12	v1111.jpg	im_v1111.png	v1111.txt
13		2MASS 21424705+6604578	21 42 47.05, +66 04 57.8	BY:	15.16	15.46	V	1.1267	2455235.46	min		Comm. 13	v1133.jpg	im_v1133.png	v1133.txt
14		2MASS 21431683+6605486	21 43 16.83, +66 05 48.7	INT:	15.79	16.01	I			other		Comm. 14	v1196.jpg	im_v1196.png	v1196.txt
15		2MASS 21430188+6606447	21 43 01.88, +66 06 44.8	INT:	14.89	15.11	I			other		Comm. 15	v1245.jpg	im_v1245.png	v1245.txt
16		2MASS 21425261+6606572	21 42 52.62, +66 06 57.3	INT	15.66	16.10	I			other		Comm. 16	v1258.jpg	im_v1258.png	v1258.txt
17		2MASS 21425349+6608053	21 42 53.50, +66 08 05.4	INT:	16.17	16.41	R			other		Comm. 17	v1309.jpg	im_v1309.png	v1309.txt
18		2MASS 21433182+6608506	21 43 31.82, +66 08 50.7	INT	17.59	18.65	V			other		Comm. 18	v1350.jpg	im_v1350.png	v1350.txt
19		2MASS 21431161+6609114	21 43 11.61, +66 09 11.5	INT	16.28	16.53	V	1.70:		other		Comm. 19	v1361.jpg	im_v1361.png	v1361.txt
20		2MASS 21432695+6609365	21 43 26.95, +66 09 36.5	IN:	14.89	14.99	I			other		Comm. 20	v1388.jpg	im_v1388.png	v1388.txt
21		2MASS 21432290+6610000	21 43 22.91, +66 10 00.0	LB:	15.57	16.11	I			other			v1412.jpg	im_v1412.png	v1412.txt

22		2MASS 21433625+6611329	21 43 36.25, +66 11 32.9	BY:	13.43	13.57	V	3.7701	2455127.67	min		Comm. 22	v1477.jpg	im_v1477.png	v1477.txt
23		2MASS 21424283+6612282	21 42 42.84, +66 12 28.2	EB	14.49	14.74	V	1.2641	2455237.12	min		Comm. 23	v1514.jpg	im_v1514.png	v1514.txt
24		2MASS 21424023+6613287	21 42 40.24, +66 13 28.8	INT:	15.54	16.80	I			other			v1572.jpg	im_v1572.png	v1572.txt
25		2MASS 21413315+6622204	21 41 33.16, +66 22 20.4	INT	15.18	15.93	V			other	K4	Comm. 25	v1895.jpg	im_v1895.png	v1895.txt
26		2MASS 21403066+6626034	21 40 30.67, +66 26 03.5	LB:	14.85	14.97	V			other		Comm. 26	v2042.jpg	im_v2042.png	v2042.txt
27		2MASS 21402965+6626442	21 40 29.65, +66 26 44.2	INT:	16.44	16.79	R			other		Comm. 27	v2068.jpg	im_v2068.png	v2068.txt
28		2MASS 21444647+6627018	21 44 46.47, +66 27 01.9	SR:	13.32	13.44	V			other		Comm. 28	v2105.jpg	im_v2105.png	v2105.txt

Comments:

1. I = 14.38 – 14.72.
2. R = 16.92 – 17.67; I = 15.96 – 16.72.
3. R = 12.77 – 12.89; I = 11.20 – 11.24.
4. R = 13.05 – 13.41; I = 10.84 – 11.02.
5. R = 14.40 – 14.55; I = 12.27 – 12.33.
6. IRAS 21419+6543.
7. R = 15.62 – 16.48; I = 14.86 – 15.39.
8. R = 12.29 – 12.56; I = 10.27 – 10.41.
9. R = 10.85 – 10.97.
10. I = 14.09 – 14.22.
11. X-ray source SS2009 NGC7129-S3-X1. A T Tau variable according to Kun et al. (2009).
12. R = 16.06 – 17.38; I = 14.78 – 16.10.
13. X-ray source SS2009 NGC7129-S3-X2. R = 14.27 – 14.50; I = 13.36 – 13.50.
14. X-ray source SS2009 NGC7129-S3-X9.
15. X-ray source SS2009 NGC7129-S3-X20.
16. X-ray source SS2009 NGC7129-S3-X25. A T Tau variable according to Magakian et al. (2004).
17. X-ray source SS2009 NGC7129-S3-X29. I = 14.89 – 15.07.

18. X-ray source SS2009 NGC7129-S2-X1. A T Tau variable according to Magakian et al. (2004). R = 16.73 – 17.83; I = 15.70 – 16.38.
19. X-ray source SS2009 NGC7129-S3-X30. A T Tau variable according to Kun et al. (2009). R = 15.21 – 15.47; I = 14.10 – 14.26.
20. X-ray source SS2009 NGC7129-S2-X4.
22. X-ray source SS2009 NGC7129-S2-X9. R = 12.83 – 12.96; I = 12.41 – 12.51.
23. O'Connell effect is possible. R = 13.63 – 13.89; I = 12.82 – 13.04.
25. IRAS 21404+6608. A T Tau variable according to Kun et al. (2009). R = 14.37 – 14.94; I = 13.17 – 13.63.
26. R = 13.08 – 13.20; I = 10.93 – 10.99.
27. I = 15.45 – 15.64.
28. I = 10.32 – 10.39.

Remarks:

Photometric observations of the young open cluster NGC 7129 were performed between October 22, 2009 and November 20, 2010 in the Kourvka Astronomical Observatory of Ural State University. We used one of the MASTER robotic telescopes (Lipunov 2004), equipped with the Apogee AltaU16 4096 x 4096 Peltier-cooled CCD camera, its pixel size being 9 x 9 μm . The observations were carried out in the VRI filters of the Johnson–Cousins system. The initial reductions (dark subtraction and flat-fielding) and photometry were performed using the IRAF V2.14 software package. Photometry of 2300 stars was made in a small area (75' x 45') of the frame. The photometric uncertainty was from 0.007 to 0.06 mag for 700 stars with magnitudes from 11 to 16. We found 23 new variable stars and obtained new photometric data for 5 known variable stars, the results are presented in the Table. We also observed the previously known variables V373 Cep, V350 Cep, and CI NGC7129 SV1 (Semkov 2003), our results are in general agreement with data available for these stars. The suspected variable NSV 13871 showed no brightness variations in excess of photometry errors, i.e. it is found constant within 0.02 mag.

From our observations, we classify three stars as eclipsing binaries of EA, EB, EW types and two stars, as probable BY-type rotating variables by the shape of their light curves. To determine the periods, we used the period-search software developed by Dr. V.P. Goranskij for Windows environment. For classification of the other objects, we use their (J–H) and (H–K) color indices from the 2MASS survey. The stars v233, v884, v1108, v1111, v1196, v1245, v1258, v1309, v1350, v1361, v1388, v1572, v1895, v2068 exhibit a significant infrared excess. They are located in the area of classical T Tau stars in the (J–H) vs (H–K) diagram (Meyer et al. 1997). Five of these stars were previously classified as T Tau variables based on the presence of H α emission in their spectra (Stelzer & Scholz 2009; Kun et al. 2009; Magakian et al. 2004). We believe that the nine other stars with similar positions in the diagram are also Orion variables. The slowly pulsating stars v526, v579, v596, v990, v1054, v1412, v2042, v2105 are located in the area of giant stars in the (J–H) vs (H–K) diagram. We classified this stars as SR: or LB: variables. Our classification of IN and SR stars is only provisional. Long series of observations are needed to improve classification of these stars. The star coordinates were taken from the 2MASS catalog. The information on X-ray sources was taken from Stelzer and Scholz (2009). The spectral types are from Kun et al. (2009).

In our light curves, the V magnitudes are plotted as black squares; R magnitudes, as red triangles; and I magnitudes, as blue crosses. DV and DR in the panels are magnitude shifts applied respectively to the V- and R-band data.

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