COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2630

Konkoly Observatory
Budapest
23 November 1984
HU ISSN 0374 - 0676

UV CETI: SYNCHRONOUS UBV FLARE OBSERVATIONS

The results of the flare observations on UV Ceti carried out at the Maidanak station of Tashkent Astronomical Institute are presented. During the 94.25 hours of effective time of observations (1-14 August 1978, 20-29 September 1979, 24-27 September 1982) 14 flares were detected on UV Ceti (Melikian et al. 1979, Kiljachkov et al. 1979a, Kiljachkov et al.1979b, Melikian et al. 1981, Melikian et al. 1983). Some of them have been observed simultaneously in three colours U, B and V with the 60-cm and 48-cm telescopes. The description of the method and some characteristics of these observations can be found in Melikian's et al. (1979, 1981) papers.

The present paper includes the data of all observed flares (see Table I). In the columns of Table I the following data on flares are presented, respectively:

1. The serial number of the flare up in the given year;
2. The date of flare in UT;
3. Time of maximum in UT;
4. The rise time - t_1 in seconds;
5. The decay time t_2 in seconds;
6.-8. Amplitudes ΔU, ΔB and ΔV
9.-10. The $(U-B)_+$ and $(B-V)_+$ colours of the flare at the maximum, respectively.

The data presented in Table I show, that the average frequency of flares is about 1.1 flares $hour^{-1}$ during these observations and that the $(U-B)_+$ and $(B-V)_+$ colours of the flares are very blue. Such blue colours were detected for the flares in stellar aggregates, associations and young stellar clusters (Mirzoyan et al. 1981, 1983).

Using the two component flare model, Kunkel (1967) showed, that after the maximum the flares have a slope

$$\frac{\Delta(U-B)}{\Delta(B-V)} \approx 0.3$$

Table I

The data of observed flares on UV Ceti

No	date of flare	time of max. (UT)	rise time t_1 s	decay time t_2 s	ΔU m	ΔB m	ΔV m	$(U-B)_+$ m	$(B-V)_+$ m
1	02.08.1978	$22^h12^m42^s$	12	8	1.53	0.39	0.10	-0.75	+0.30
2	"	13 00	4	12	1.42	0.36	0.06	-0.70	-
3	04.08.1978	21 39 26	6	14	2.63	0.95	0.39	-0.77	+0.57
4	"	43 37	22	88	2.70	-	0.20	-	-
5	"	46 58	8	16	1.80	-	-	-	-
6	"	22 41 12	4	22	1.90	-	-	-	-
7	"	43 18	8	42	2.14	0.58	0.17	-0.96	+0.30
8	05.08.1978	23 13 46	6	14	3.50	-	0.40	-	-
9	07.08.1978	21 22 30	8	52	-	1.50	0.25	-	+0.80
10	"	22 26 08	18	160	-	1.40	-	-	-
11	"	29 10	20	30	-	1.10	-	-	-
12	09.08.1978	20 55 10	40	>70	3.72	1.93	0.56	-0.56	-0.31
13	"	58 32	102	3700	6.50	>4.30	3.20	-	-
14	10.08.1978	22 14 54	78	440	-	2.60	0.70	-	-0.75
15	12.08.1978	23 14 00	10	280	3.55	2.02	0.44	-0.28	-0.73
16	13.08.1978	21 29 15	30	150	2.92	1.63	0.37	-0.10	-0.40
1	20.09.1979	21 01 15	9	345	>3.49	2.20	0.94	-	+0.16
2	23.09.1979	19 00 32	14	105	1.51	0.37	0.24	-0.78	+1.31
3	"	23 53	14	793	4.03	1.94	0.88	-0.87	+0.35
4a	"	20 05 32	7	16	2.17	0.18	-	-	-
4b	"	05 58	9	9	2.11	0.20	-	-	-
4c	"	07 15	7	17	2.86	0.57	-	-1.79	-
4d	"	08 53	2	9	2.33	0.37	-	-1.77	-
4e	"	09 49	28	28	1.73	0.48	0.22	-0.72	+0.80
5	"	13 32	7	150	2.44	0.72	0.36	-1.00	+0.92
6	"	19 05	9	32	1.63	0.23	0.29	-1.52	+2.13
7	"	32 48	16	44	2.72	-	-	-	-
8	"	37 00	5	37	2.00	-	-	-	-
9	"	41 30	16	67	1.79	0.26	0.16	-1.59	+1.28
10	"	21 08 28	5	21	1.69	0.21	0.13	-1.74	+1.33
11	"	57 45	7	182	2.36	0.55	0.29	-1.29	+1.03
12	"	22 09 30	14	69	2.57	0.58	0.24	-1.40	+0.72
13	24.09.1979	19 11 40	2	12	2.27	-	-	-	-
14	"	15 47	2	12	1.49	-	-	-	-
15a	"	20 48 37	2	9	1.97	-	-	-	-
15b	"	49 32	2	9	2.60	-	-	-	-
16	25.09.1979	18 35 57	14	663	4.12	1.15	-	-2.2	-
17a	"	51 12	18	39	1.84	-	-	-	-
17b	"	52 49	7	23	2.34	-	-	-	-
18	"	19 25 37	14	21	1.53	0.16	0.06	-	-
19	"	51 14	2	44	-	0.32	0.18	-	+1.15
20	"	21 03 21	7	55	2.02	0.28	0.15	-1.79	+1.13
21	"	58 58	5	9	2.62	-	-	-	-
22	"	22 08 53	7	208	3.06	0.77	0.24	-1.57	+0.31
23	"	20 18	2	12	2.66	-	0.27	-	-
24	"	23 04 37	23	160	1.60	0.22	0.16	-	-
25	"	36 39	7	60	>0.97	0.36	0.19	-	+1.04
26	26.09.1979	20 11 15	9	81	1.97	0.32	0.22	-1.56	+1.38
27	"	21 13 00	5	65	3.27	0.93	0.33	-1.49	+0.58
28	"	22 55 21	14	30	1.41	0.20	0.13	-1.42	+1.38
29	27.09.1979	18 45 10	16	225	>1.30	0.79	-	-	-
30	"	19 05 46	12	60	1.48	0.25	0.07	-1.23	+0.43

Table I (cont.)

No	date of flare	time of max. (UT)	rise time t_1	decay time t_2	ΔU	ΔB	ΔV	$(U-B)_+$	$(B-V)_+$
			^{s}	^{s}	^{m}	^{m}	^{m}	^{m}	^{m}
31a	27.09.1979	$19^h26^m46^s$	9	83	4.35	1.86	0.72	-1.29	+0.14
31b	"	28 42	39	463	2.46	0.50	0.18	-1.50	+0.58
32	"	20 48 42	2	23	2.43	0.51	0.17	-1.47	+0.48
33	"	21 22 56	2	16	1.98	0.20	0.22	-2.14	+1.95
34	"	22 00 55	14	23	1.16	0.20	0.16	-1.06	+1.61
35	"	22 00	9	37	1.40	0.20	-	-1.40	-
36	"	23 30 32	2	14	1.85	0.23	-	-1.79	-
37	"	33 16	7	18	1.63	0.32	-	-1.13	-
38	28.09.1979	18 10 00	-	400	-	0.45	-	-	-
39	"	23 15	2	73	-	0.35	-	-	-
40	"	59 56	7	37	2.54	0.66	0.23	-1.23	+0.62
41	"	19 06 42	2	14	1.79	-	0.22	-	-
42	"	15 56	18	26	2.03	0.52	0.18	-1.00	+0.53
43	"	20 13 30	7	44	2.88	0.83	0.28	-1.22	+0.35
44	"	21 28 32	7	60	1.70	0.16	0.13	-2.04	+1.63
45a	"	47 33	5	5	2.32	-	-	-	-
45b	"	47 40	2	20	3.05	-	-	-	-
46	"	56 32	7	60	2.06	0.23	-	-2.04	-
47	"	59 42	5	91	3.33	0.96	0.37	-1.51	+0.50
48	"	22 02 39	7	192	4.81	1.96	0.83	-1.64	+0.24
49a	"	27 05	16	>30	1.89	0.44	0.39	-1.00	+1.70
49b	"	29 10	108	800	2.23	0.58	0.54	-1.10	+1.70
50	"	23 34 35	16	127	-	0.60	-	-	-
51	29.09.1979	20 05 00	7	25	-	0.26	-	-	-
1	24.09.1982	21 54 23	7	23	1.82	-	-	-	-
2	"	22 38 02	5	72	2.54	-	0.28	-	-
3	"	43 18	5	23	1.82	-	-	-	-
4	"	55 11	2	30	2.02	-	-	-	-
5	"	23 34 30	30	120	2.10	0.58	0.32	-0.90	+1.05
6	"	38 18	2	23	1.45	-	-	-	-
7	25.09.1982	21 20 52	2	23	4.47	-	-	-	-
8a	"	39 11	7	46	2.56	0.64	0.24	-1.30	+0.60
8b	"	40 07	2	60	2.63	0.60	0.19	-1.50	+0.40
9	"	22 09 11	5	23	1.53	0.24	0.15	-1.40	+1.30
10	"	33 11	14	30	1.67	-	-	-	-
11	"	23 11 16	9	30	1.72	0.49	0	-0.70	-
12	26.09.1982	21 02 11	2	30	2.05	-	-	-	-
13	"	06 07	5	120	1.10	-	-	-	-
14	"	43 11	5	55	2.22	0.64	0.24	-0.90	+0.60
15	"	22 34 11	5	23	2.08	-	-	-	-
16	"	40 18	32	72	1.96	0.32	-	-1.50	-
17	"	23 07 16	5	23	-	0.20	-	-	-
18	27.09.1982	20 15 16	14	120	1.70	0.33	0.05	-1.20	-
19	"	21 49	5	200	1.51	0.36	0.26	-0.80	+1.40
20	"	55 41	2	23	1.66	-	-	-	-
21	"	21 05 44	2	28	1.45	0.13	0.08	-2.10	-
22	"	22 11 26	2	23	1.89	-	-	-	-
23	"	16 44	2	67	2.29	-	-	-	-
24	"	59 11	7	46	2.90	1.16	-	-0.70	-
25	"	23 04 00	5	120	2.93	1.15	0.46	-0.08	+0.50
26	"	10 16	5	46	4.36	-	-	-	-
27	"	21 16	2	23	2.10	0.66	0.34	-0.70	+1.00

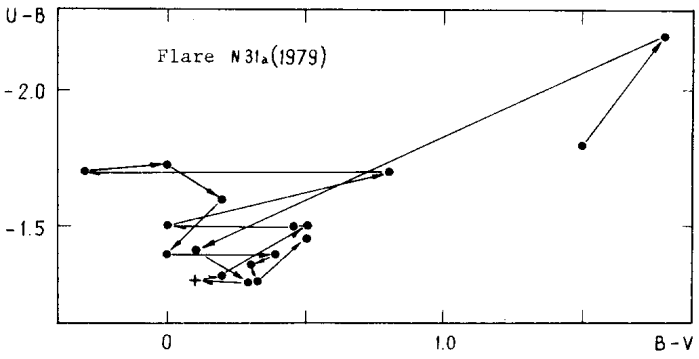

Figure 1

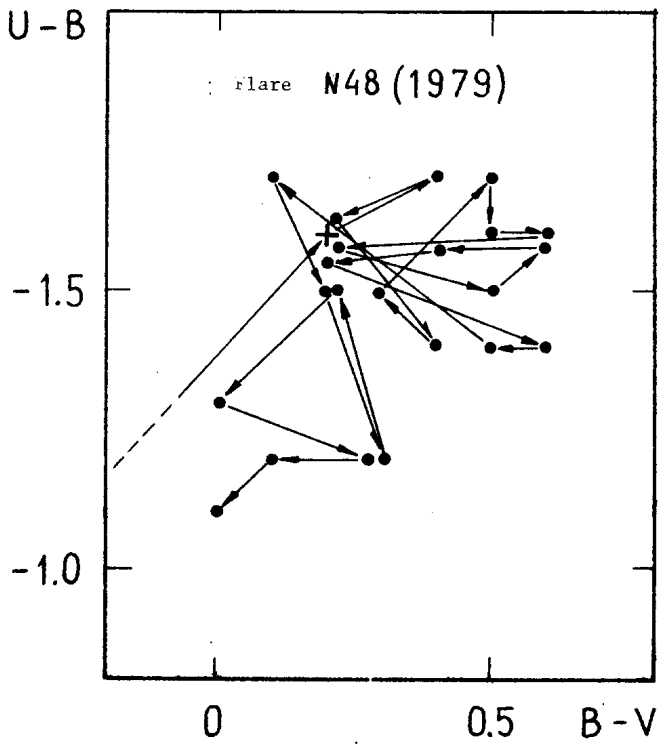

Figure 2

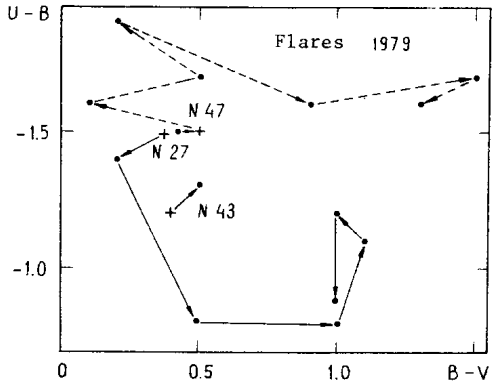

Figure 3

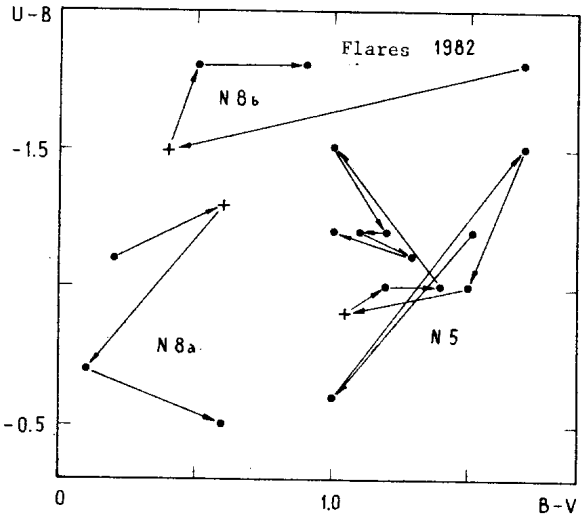

Figure 4

on the two-colour diagram (U-B, B-V).
From the other hand Cristaldi and Longhitano (1979) pointed out that during the flares the flare colours were constant.

On the basis of results of our first synchronous UBV flare observations on UV Ceti, it was shown that there was no certain direction for flare trajectories on the two-colour diagram (Kiljachkov et al. 1979b).
In the present paper in the Figures 1-4 the trajectories on the two-colour diagram for 8 flares on UV Ceti are presented. These figures show, that a) on the two colour diagram the flare trajectories have various directions, and b) the flare colours during the flare are not constant. The same results were obtained for flare stars in the stellar aggregates (Mirzoyan et al. 1981, 1983) on the basis of synchronous UBV flare observations.

N.D. MELIKIAN
Armenian SSR, USSR,
Byurakan Astrophysical Observatory

References:

S. Cristaldi, M. Longhitano, 1979, Astron, Astrophys., Suppl. Ser., 38, 175.
N. N. Kiljachkov, N. D. Melikian, L. V. Mirzoyan, V. S. Shevchenko, 1979 a, Astrofizika, 15, 423.
N. N. Kiljachkov, N. D. Melikian, L. V. Mirzoyan, V. S. Shevchenko,1979 b, Astrofizika, 15, 605.
W. E. Kunkel, 1967, An Optical study of Stellar Flares. Austin.
N. D. Melikian, N. N. Kiljachkov, O. I. Stalbovsky, G. P. Sigal, V. E. Slutzky, A.I. Jeleznjakova, 1979, IBVS, No.1546.
N. D. Melikian, I. Jankovics, N. N. Kiljachkov, V. S. Shevchenko, O. I. Stalbovsky, 1981, IBVS , No. 2038.
N. D. Melikian, N. N. Kiljachkov, V. N. Igolkin, 1983, Astrofizika, 19, 835.
L.V. Mirzoyan, H. S. Chavushian, N. D. Melikian, R. Sh. Natsvlishvili, G.B. Ohanian, V. V. Hambarian, A. T. Garibjanian, 1981, Astrofizika 17, 197.
L. V. Mirzoyan, H. S. Chavushian, N. D. Melikian, R. Sh. Natsvlishvili, V.V. Hambarian, G. A. Brutian, 1983, Astrofizika, 19, 725.