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THE FLARE ACTIVITY OF UV CETI 1982–1984

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Photoelectric monitoring observations of the flare star UV Cet have been carried out in 1982–1984, using the 60–cm telescope of the Rozhen National Astronomical Observatory and the UBV photon–counting, one channel, computer controlled photometer. The 1982 observations have been published in Panov et al. (1983) and Panov (1984). Here we list the flares observed in 1983–84 (Table 1). All observing runs were obtained with 1^s integration in the U band, because of superior flare detection. During the total of 10^h45^m35^s monitoring, 20 flares were observed. The flare characteristics in Table 1 have been described elsewhere (cf. Panov et al., 2000). The flare energy E_f is obtained as:

$$\log E_f = \log ED + \log E_q \quad (1)$$

where:

$$E_q(U) = 2.77 \times 10^{27} \text{ergs.s}^{-1} \quad (2)$$

and

$$E_q(B) = 1.73 \times 10^{28} \text{ergs.s}^{-1} \quad (3)$$

are the quiescent stellar luminosities in the U and B band, respectively. These values are obtained with the respective stellar magnitudes and distance, taken from Gershberg et al. (1999).

We used the flares from Table 1 to study the flare activity of UV Cet and added also flares from other studies in 1982–1984, as follows:

4 U–band flares from Panov (1984), 8 U–flares from Panov et al. (1983), 2 B–band flares from Panov et al. (1983), 3 B–flares from Tsvetkov et al. (1983), 5 B–flares from Ilyin (1984), 1 B–flare from Orchiston et al. (1985), and 1 B–flare from Mavridis et al. (1990). Unfortunately, not all of the flares published are useful for our study, because of insufficient data.

Altogether, 30 U–band flares and 12 B–band flares were used. The B–band flare energies were converted to U–band energies, using (Lacy et al., 1976):

$$E_U = 1.20 \times E_B \quad (4)$$

For the total sample of 42 flares (total duration=45^h12^m27^s) we calculated the cumulative flare energy distribution:

$$\log \nu = (14.3 \pm 2.5) - (0.49 \pm 0.09) \log E_f(U) \quad (5)$$

where $\nu = \frac{N}{T}$ is the cumulative flare frequency and a and b are constants (cf. Gershberg and Shakhovskaya, 1983). Note that flares No. 9 and No. 12 are not included in the sample, as we registered only a part of the descending light curve. Moreover, in the fit (5) we consider only the linear part of the cumulative distribution, corresponding to energies greater than $\log E_f(U) = 29.4$. In our case, this is the threshold of full flare detection. In Fig 1, we plotted the total flare sample, together with the linear fit from (5). Also shown are the solutions from Gershberg and Shakhovskaya (1983) and Lacy et al. (1976). Our solution for the parameters a and b shows significant difference from the two previous solutions in the sense that during 1982–1984 UV Cet possibly was in a state of increased flare activity.

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Table 1. Characteristics of the U–band flares for UV Cet.

No.	Date [UT]	Flare max [UT]	t_{rise} [sec]	Duration [m:s]	Noise $\frac{\sigma}{I_0}$	Amplitude $\frac{I_{0+f}-I_0}{I_0}$	Δm [mag]	$\log E_f$ [ergs]
1.	02.10.1983	23:44:12	11	6 ^m 07 ^s	0.41	7.83	2.36	29.69
2.	02.10.1983	23:55:53	88	8 ^m 52 ^s	0.23	3.93	1.73	30.23
3.	03.10.1983	00:05:21	62	2 ^m 28 ^s	0.58	4.35	1.82	29.67
4.	05.10.1983	22:58:45	5	2 ^m 02 ^s	0.73	5.86	2.09	29.52
5.	05.10.1983	–	–	2 ^m 42 ^s	0.49	> 1.45	> 1.00	–
6.	06.10.1983	00:15:10	38	2 ^m 56 ^s	0.52	3.78	1.70	29.49
7.	06.10.1983	23:31:48	32	2 ^m 22 ^s	0.43	2.63	1.40	29.01
8.	09.11.1983	–	–	> 15 ^m 34 ^s	0.15	> 3.7	> 1.7	–
9.	10.11.1983	21:50:59	30	7 ^m 16 ^s	0.38	4.84	1.90	29.54
10.	10.11.1983	22:02:24	61	2 ^m 23 ^s	0.38	1.89	1.14	29.03
11.	04.01.1984	17:21:25	16	1 ^m 40 ^s	0.45	4.00	1.75	29.32
12.	04.01.1984	17:53:42	23	1 ^m 59 ^s	0.46	3.52	1.62	29.52
13.	04.01.1984	18:08:35	5	24 ^s	0.24	2.38	1.35	28.34
14.	04.01.1984	18:16:02	35	3 ^m 07 ^s	0.34	2.63	1.40	29.19
15.	04.01.1984	18:43:41	29	2 ^m 06 ^s	0.55	5.73	2.07	29.64
16.	23.11.1984	21:04:55	39	9 ^m 04 ^s	0.39	2.29	1.28	29.65
17.	23.11.1984	20:20:56	31	6 ^m 49 ^s	0.45	15.84	3.07	30.14
18.	23.11.1984	20:47:36	40	1 ^m 01 ^s	0.37	3.03	1.51	29.10
19.	24.11.1984	20:43:27	7	3 ^m 36 ^s	0.63	7.67	2.34	29.67
20.	25.11.1984	20:49:56	44	4 ^m 14 ^s	0.65	3.98	1.74	29.58

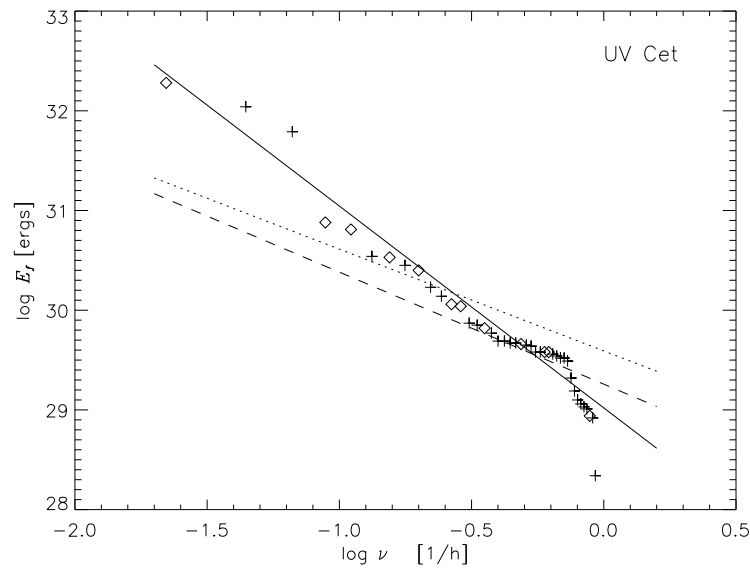


Figure 1. Cumulative flare energy distribution of our sample (full line), Gershberg and Shakhovskaya (1983) (dashed line), and Lacy et al. (1976) (dotted line). Crosses are U band flares and diamonds are B band flares.

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