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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1980

Photoelectric monitoring of the flare star EV Lac has been carried out in September and October 1980 using the 60 cm Cassegrain reflector of the National Astronomical Observatory of the Bulgarian Academy of Sciences.

Observations have been made with a one channel photoelectric photometer (Tomov, 1977) using an EMI 9789QB photomultiplier and a photoncounting system. The observations have been made in the "b" colour with an integration time of 1 sec.

The transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$\begin{aligned}\Delta V &= \Delta v - 0.12\Delta(b-v), \\ \Delta(B-V) &= 1.14\Delta(b-v), \\ \Delta(U-B) &= 1.08\Delta(u-b),\end{aligned}$$

The monitoring intervals in UT as well as the total monitoring time for each night are given in Table I. Any interruption of more than one minute has been noted. In the fourth column of Table I the standard deviation of random noise fluctuation  $\sigma(\text{mag}) = 2.5 \log(I_0 + \sigma)/I_0$  for different times (UT) of the corresponding monitoring intervals is given.

During the 15.4 hours of monitoring time 5 flares were observed, the characteristics of which are given in Table II. For each flare the following characteristics (Andrews et al., 1969) are given: a) the date and universal time of flare maximum, b) the duration before and after maximum ( $t_b$  and  $t_a$ , respectively) as well as the total duration of the flare, c) the value of the ratio  $(I_f - I_0)/I_0$  corresponding to flare maximum, where  $I_0$  is the

intensity deflection less sky background of the quiet star and  $I_f$  is the total intensity deflection less sky background of the star plus flare, d) the integrated intensity of the flare over its total duration, including pre-flares, if present,  $p = \int (I_f - I_0) / I_0 dt$ , e) the increase of the apparent magnitude of the star at flare maximum  $\Delta m(b) = 2.5 \log(I_f / I_0)$ , where b is the blue magnitude of the star in the instrumental system, f) the standard deviation of random noise fluctuation  $\sigma(\text{mag}) = 2.5 \log(I_0 + \sigma) / I_0$  during the quiet-state phase immediately preceding the beginning of the flare and g) the air mass at flare maximum. The light curves of the observed flares in the b colour are shown in Figs 1-5.

Table I  
Monitoring intervals in 1980

Date	Monitoring intervals (U.T.)	Total Monitoring Time	$\sigma$ (U.T.)
1980			
Sept.			
21	19 <sup>h</sup> 02 <sup>m</sup> -19 <sup>h</sup> 31 <sup>m</sup> , 19 <sup>h</sup> 33 <sup>m</sup> -20 <sup>h</sup> 00 <sup>m</sup> , 20 <sup>h</sup> 16 <sup>m</sup> -20 <sup>h</sup> 46 <sup>m</sup> , 20 48 -21 17 , 21 36 -21 55, 21 59 -22 40 , 22 48 -23 38.	3 <sup>h</sup> 45 <sup>m</sup>	0.03(19 <sup>h</sup> 04 <sup>m</sup> ), 0.04(19 <sup>h</sup> 35 <sup>m</sup> ), 0.04(20 19 ), 0.04(20 50 ), 0.04(21 38 ), 0.04(22 11 ), 0.03(22 50 ), 0.03(23 21 ), 0.04(18 45 ), 0.06(19 20 ), 0.05(20 03 ), 0.04(20 31 ), 0.06(21 04 ), 0.03(21 36 ), 0.03(22 19 ), 0.05(22 50 ), 0.06(23 31 ), 0.04(00 11 ), 0.04(19 14 ).
22-23	18 44 -19 37 , 20 02 -20 35, 20 37 -21 21, 21 27 -21 51 , 21 53 -22 36, 22 42 -23 29, 23 30 -00 13 , 00 15 -00 19.	4 51	0.02(20 41 ), 0.03(21 13 ), 0.03(21 47 ), 0.03(22 16 ), 0.03(22 37 ), 0.03(23 07 ), 0.04(23 37 ).
28	19 12 -19 36.	24	0.03(20 58 ), 0.03(21 28 ), 0.02(21 53 ), 0.02(22 24 ), 0.02(23 07 ), 0.02(23 32 ),
29-30	20 40 -20 53 , 20 54 -21 40, 21 46 -22 03, 22 06 -00 12 , 00 15 -00 20.	3 27	
30	20 57 -21 47 , 21 52 -22 33, 22 44 -23 05, 23 06 -24 00.	2 46	
Oct.			
1	00 00 -00 11.	11	0.02(00 01 ).

Total = 15<sup>h</sup>24<sup>m</sup> = 15<sup>h</sup>.40

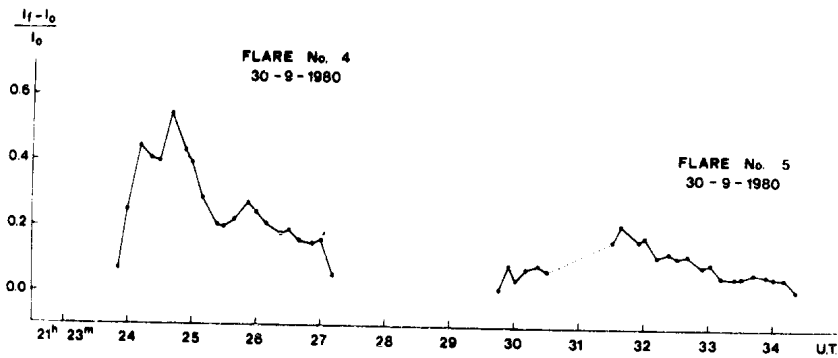
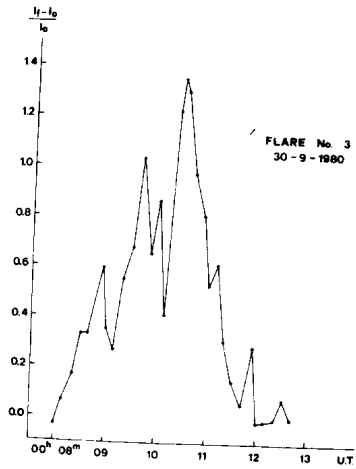
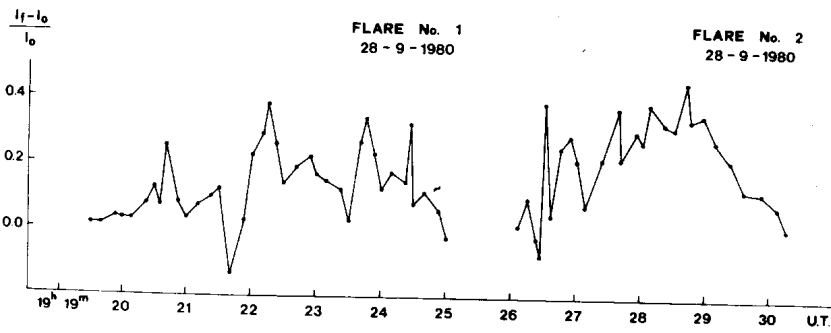


Table II  
Characteristics of the Flares Observed

Flare No.	Date	U.T.		$t_b$	$t_a$	Duration	$(I_f - I_o) / I_o$		P	$\Delta m$	$\sigma$	Air mass
		max	min				max	min				
1980												
Sept.												
		h	m									
1	28	19	22	33	2.50	2.67	5.17	0.382	0.850	0.351	0.04	1.044
2	28	19	28	67	2.55	1.60	4.15	0.452	0.962	0.405	0.04	1.038
3	30	00	10	43	2.40	2.10	4.50	1.346	2.326	0.926	0.06	1.286
4	30	21	24	70	1.00	2.35	3.35	0.543	0.906	0.471	0.03	1.020
5	30	21	31	65	1.90	2.67	4.57	0.206	0.387	0.203	0.03	1.024

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