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FLARE OBSERVATIONS OF EV Lac

This communication presents the results of the observations of the flare star EV Lac carried out at the National Astronomical Observatory of the Bulgarian Academy of Sciences. The observations cover the period from 11 to 14 August, 1986, when, together with the reported photoelectric observations on the 60 cm telescope and the FF-1 single-channel photoelectric photometer, more than 40 spectrograms in the blue and red spectral regions of EV Lac were obtained for a period of two nights. More detailed data with reference to the character of the spectrum during the photoelectric monitoring in the U light will be published later.

The total effective observational time is about 13 hours. The light curves of the observed flares, as well as some data on the behaviour of the star's brightness in the light minimum are shown. Table I lists the respective data on the observed flares: number of flare, date of flare in U.T., maximum moment in U.T., the duration of the increase ( $t_1$ ), that of the decrease ( $t_2$ ), amplitude in U light ( $\Delta m_U$ ) and errors in observations ( $\delta_U$ ).

It is worth noting that the EV Lac monitoring was carried out excluding the optical companion of the star.

Figure 1 shows the light curves of the observed flares. Universal time (U.T.) is indicated along the abscissa, while the value  $(I_f - I_0)/I_0$  are plotted along the ordinate where  $I_0$  is the stellar intensity in normal state and  $I_f$  is the stellar intensity with additional emission during the flare.

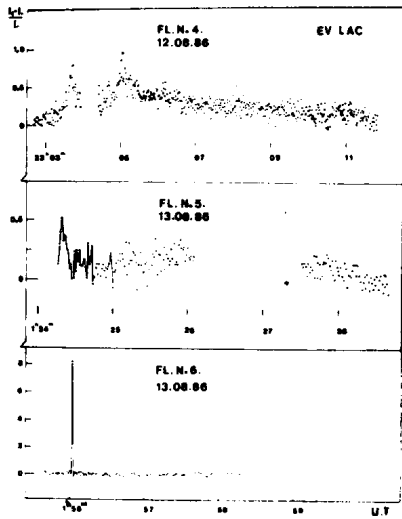


Figure 1: Light curves of observed flares of EV Lac

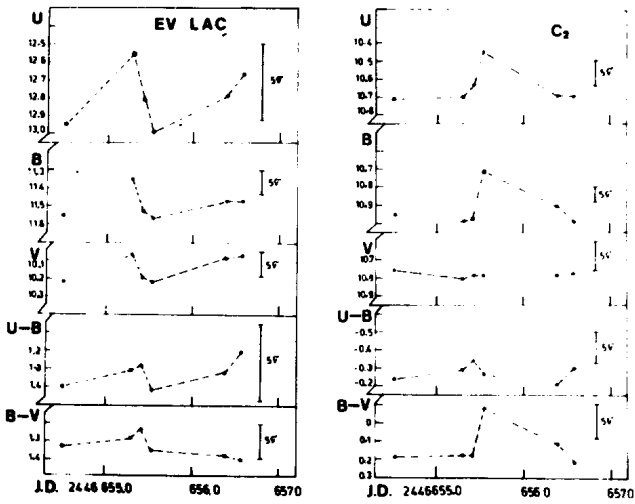


Figure 2 Light curves of EV Lac in undisturbed state and of the standard star C<sub>2</sub> during the observational period 12 August - 14 August, 1986.

Table I  
Data for observed flares of EV Lac

N	Date of flare (UT)	Time of maximum(UT)	Time of increase	Time of decrease	$m_U$	U
1a	11.08.86	23 <sup>h</sup> 38 <sup>m</sup> 33 <sup>s</sup>	43 <sup>s</sup>	- <sup>s</sup>	0. <sup>m</sup> 52	0. <sup>m</sup> 07
1b	11.08.86	22 39 38	8	40	0.54	0.07
2	12.08.86	01 11 10	15	145	0.52	0.13
3	12.08.86	21 07 10	70	180	0.85	0.06
4a	12.08.86	23 03 40	20	-	0.55	0.06
4b	12.08.86	23 05 00	30	200	0.66	0.06
5	13.08.86	01 24 23	8	240	0.46	0.07
6	13.08.86	01 56 02	1 total duration		2.44	0.08

Table II  
Results of UB<sub>V</sub> measurements of EV Lac and the standard star C2

Date	EV Lac			C <sub>2</sub>			
	U. T.	V	B-V	U-B	V	B-V	U-B
12.08.1986							
	00 <sup>h</sup> 15 <sup>m</sup>	10. <sup>m</sup> 22	1. <sup>m</sup> 33	1. <sup>m</sup> 40	10. <sup>m</sup> 76	0. <sup>m</sup> 19	-0. <sup>m</sup> 24
	20 <sup>h</sup> 25 <sup>m</sup>	10.07	1.28	1.31	10.81	0.18	-0.29
	22 <sup>h</sup> 32 <sup>m</sup>	10.20	1.23	1.28	10.79	0.19	-0.34
13.08.1986							
	00 <sup>h</sup> 56 <sup>m</sup>	10.22	1.35	1.42	10.79	-0.08	-0.26
	22 <sup>h</sup> 43 <sup>m</sup>	10.09	1.38	1.32	10.79	0.12	-0.21
14.08.1986							
	02 <sup>h</sup> 00 <sup>m</sup>	10.07	1.40	1.20	10.78	0.22	-0.30

We should like to attract particular attention to the case of flare No.6 where a spike-shaped increase of the light of EV Lac was again recorded as during the 1984 observations (Tsvetkov et al., 1985). The nature of this sort of flares is still controversial and it is therefore necessary simultaneous observations in the ultraviolet spectral region to be carried out in order to prove and understand the physical conditions of its appearance.

We can further say that flare No. 6 is also comparable in character and amplitude to the phenomenon observed by Gershberg and Petrov (1985) during simultaneous observations with ASTRON.

The UBV photometry of EV Lac in the light minimum was carried out by employing the photometric standards  $C_1$  and  $C_2$  (Pettersen and Jin-Chung Hsu, 1981, Pettersen, 1980). It should be noted here that the star  $C_2$  is of spectral class A3V. During the processing of the observational data it was found out that this star exhibits light variations in the U and B colour with an amplitude of about  $0^m.3$ , while in the V light it was constant (Fig. 2). This result brings to question the use of  $C_2$  as a standard star in investigations of the light variations of EV Lac. On the other hand, using the standard star  $C_1$ , relatively short-time light and colour variations of EV Lac were recorded by Pettersen (1980). Table II is a summary of the results of the measurements for EV Lac and the standard star  $C_2$ .

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References:

- Gershberg, R.F., Petrov, P.P., 1986, Proc. Symp. "Flare Stars and Related Objects", Byurakan, ed. by L.V. Mirzoyan  
 Pettersen, B.R., 1980, Astron. J. 85.7.871  
 Pettersen, B.R., Jin-Chung Hsu, 1981, Astrophys. J. 247.3.1.1013  
 Tsvetkov, M.K., Antov, A.P., Tsvetkova, A.G., 1986, Comm. Konkoly Obs. Hungarian Acad. Sci., Budapest, 86.423