

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4464

Konkoly Observatory
Budapest
9 April 1997

HU ISSN 0374 - 0676

DETECTION OF FAST FLARES OF EV Lac IN 1994-96

Spiky type very short flares of a duration less than 1 sec of some flare stars have been detected (Zalinian, Tovmassian, 1987; Tovmassian, Zalinian, 1988) by observations made with the two-channel (U and B) fast photometer of the Byurakan Astrophysical Observatory (Zalinian, Tovmassian 1989). Fast flares of a total duration of a few seconds or less have been found also by Tsvetkov et al. (1986) and Shvartsman et al. (1988).

In the present contribution we report on the results of the monitoring of EV Lac, that was carried out with the 40 cm telescope of the Byurakan Observatory in 1994-96 with somewhat modified mode of observations. In the present observations the monitoring was done as before with 0.1 sec integration time, but counts in U and B were recorded with an integration time of 10 sec, until the current count in U jumped above the mean value of the preceding hundred counts by 5σ . Then the signal in both channels was recorded with 0.1 sec integration time. Hence the fast, spiky type flares were recorded with 0.1 sec integration time, whilst the relatively slowly rising usual flares were recorded with 10 sec integration time. After each 15-20 min the star was moved out from the diaphragm, and the sky background was recorded for 20-30 sec. In these observations both components of the double fell in the diaphragm of the photometer. As usually in the case of observations of flare stars the ΔU and ΔB magnitudes were determined by the ratio I/I_0 , where I_0 is the intensity of the star in its quiescent state. Since observations were done simultaneously in U and B, we measured also $U-B$ values for the star during the flare.

Observations were done during 25 hours. Twelve flares were detected. The total duration 4 of half of them is less than 1 sec. In consecutive columns of the Table the following data on the detected flares are presented: date of observation, UT at the maximum of the flare, designation of separate maximums "s" for relatively slow flares), ΔU and ΔB magnitudes of the flare, $U-B$ color of the star at the flare maximum, rising time t_r of the flare in seconds, and total duration of the flare. In deducing the parameters of the detected flares we accepted the following photometric data for EV Lac AB: $V=10.05$, $B-V=1.37$, $U-B=0.75$ (Moffet 1974). The ΔU amplitudes and $U-B$ colors of flares were estimated by using the light curves of flares smoothed by medians.

Light curves of some flares are shown in Figures 1-3. In Figure 3a the light curve integrated in 10 sec is shown. The record of the short flare that occurred after the main one is shown in Figure 3b with an integration time of 0.1 sec.

We would like to draw attention that very short spiky flares of a total duration less than 1 sec seem mainly to occur shortly after the longer lasting flares.

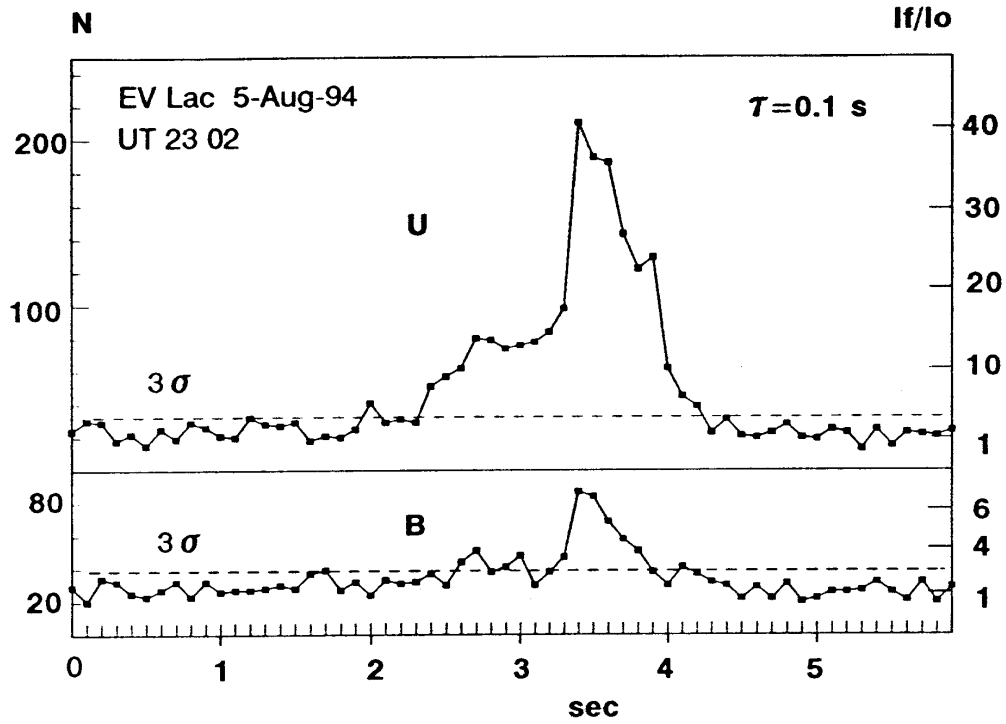


Figure 1

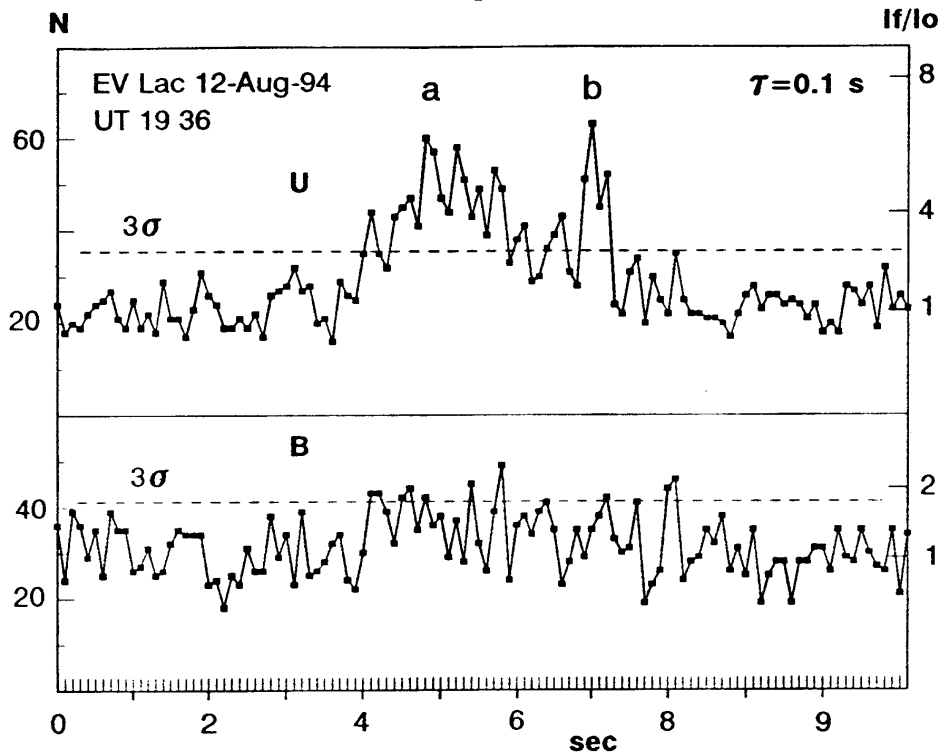


Figure 2

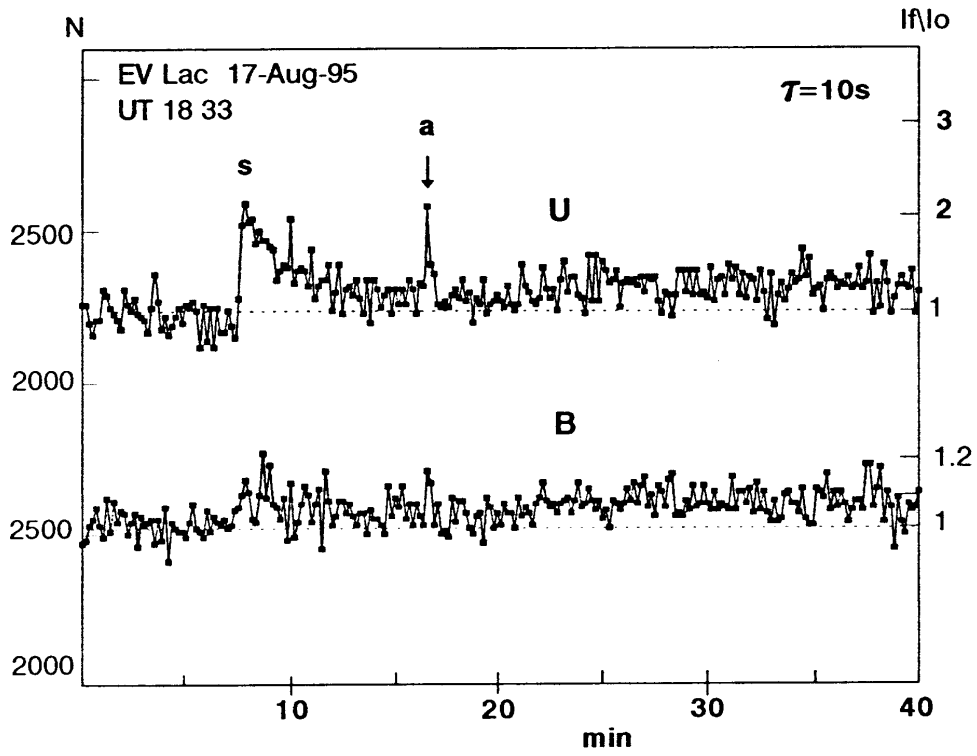


Figure 3a

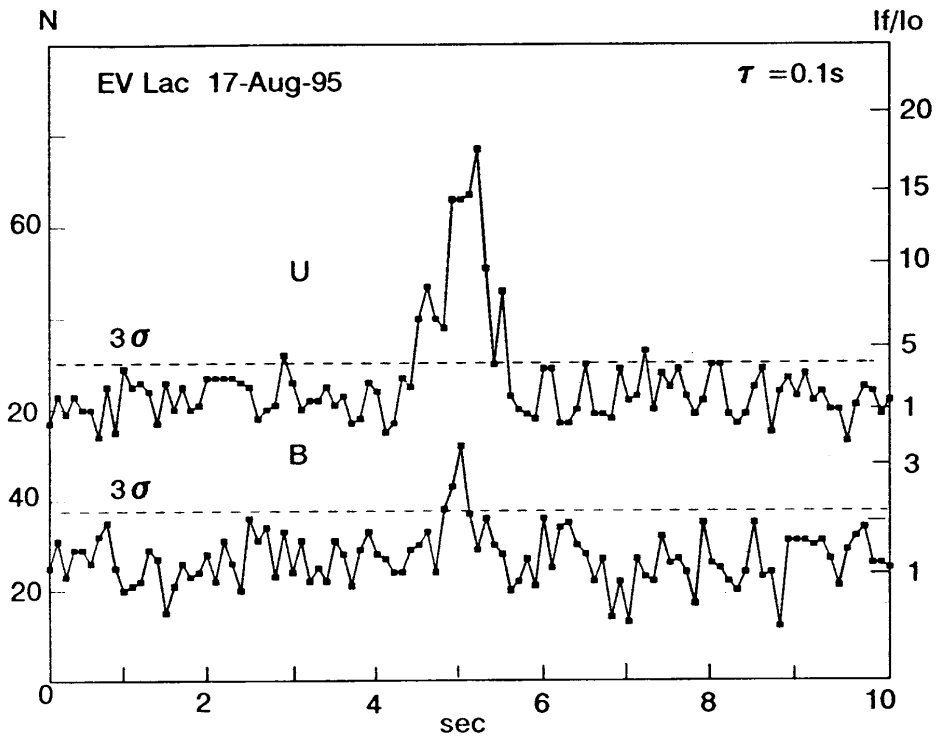


Figure 3b

Table 1. Data on flares of EV Lac

Date	UT max h m	Peaks	ΔU	ΔB	U-B	t_r sec	Duration
4 Aug 94	22 13	s	0.7	0.2	0.2	20	3.5 m
		a	2.2	1.1	-0.3	0.1	0.4 s
5 Aug 94	23 02		4.0	1.9	-1.3	0.2*	2.0* s
7 Aug 94	23 43		2.2	1.2	-0.2	0.2	0.3 s
7 Aug 94	23 59		2.7	1.2	-0.7	0.2	0.3 s
8 Aug 94	00 17	s	1.3	0.4	-0.1	30	6.5 m
12 Aug 94	19 36	a	1.8	0.5	-0.5	0.8	2.4 s
		b	2.0	0.5	-0.7	0.2	0.5 s
17 Aug 95	18 33	s	0.8	0.3	0.3	20	10.0 m
		a	2.9	1.2	-1.0	0.8	1.2 s
17 Sep 96	00 34	a	1.7	0.7	-0.2	0.1	0.8 s
		b	1.2	0.4	-0.1	0.2	0.2 s

* Not certain

VPZ is grateful to CONACYT for financial support by the Project 211290-5-000PE during the reduction of observational data.

V.P. ZALINIAN
Byurakan Astrophysical
Observatory of the Armenian
National Academy of Sciences

H.M. TOVMASSIAN
Instituto Nacional Astrofisica
Optica y Electronica
Puebla
Mexico

References:

- Moffet, T.J., 1974, *ApJ Suppl.*, **29**, 1
 Shvartsman, V.F., Beskin, G.M., Gershberg, P.E., Neizvestni, S.I., Plakhotenkova, V.L.,
 Pustilnik, L.A., 1988, *Izv. Crimean AO*, **79**, 71
 Tovmassian, H.M., Zalinian, V.P., 1988, *Astrofizika*, **28**, 131
 Tsvetkov, M.K., Antov, A.P., Tsvetkova, A.G., 1986, *Comm. Konkoly Obs., Hung. Acad. Sci.*, No. 86, 435
 Zalinian, V.P., Tovmassian, H.M., 1987, *IBVS*, No. 2992
 Zalinian, V.P., Tovmassian, H.M., 1989, *Contr. Byurakan Obs.*, **61**, 142