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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1981

Photoelectric observations of flare stars have been continued at the National Astronomical Observatory of the Bulgarian Academy of Sciences and the Stephanion Observatory, Greece. In this paper we report about our joint observations of the flare star EV Lac during the summer of 1981.

The equipment used at the National Astronomical Observatory consists of a 60cm Cassegrain reflector and a new one-channel UB_v photometer, built at the Bulgarian Academy of Sciences. A photoncounting system with an integration time of 1 sec was used. Details of this equipment will be published elsewhere. Here we give only the transformation of the instrumental ub_v system to the international UB_v system for the period under consideration:

$$\begin{aligned}\Delta V &= \Delta v + 0.10 \Delta(b-v), \\ \Delta(B-V) &= 1.11 \Delta(b-v), \\ \Delta(U-B) &= 0.80 \Delta(u-b).\end{aligned}$$

At the Stephanion Observatory the observations were carried out with the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki and a Johnson dual channel photoelectric photometer. The transformation of the Stephanion ub_v system to the international UB_v system for the period under consideration is given by the equations:

$$\begin{aligned}V &= v_0 + 0.011(b-v)_0 + 3.191, \\ B-V &= 0.569 + 1.022(b-v)_0, \\ U-B &= -1.858 + 0.962(u-b)_0.\end{aligned}$$

Table I contains, for each night, the monitoring intervals in UT, the colour in which the observations were made, as well as the total monitoring

time. Designation NAO or Steph. O. stands for the National Astronomical Observatory or Stephanion Observatory, respectively.

Table I
Flare star EV Lac, 1981

Date	Monitoring intervals(U.T.)	Total monit. time	Colour	NAO/Steph.O.
1981				
June				
29/30	23 ^h 40 ^m 08 ^s -00 ^h 02 ^m 15 ^s , 000545-003630,004130-005500, 005615-012100.	1 ^h 31 ^m 07 ^s	B	Steph.O.
30/1	222845-230800,231045-002630, 002930-012445.	2 50 15	B	Steph.O.
July				
1/2	225935-232835,233005-013635.	2 35 30	B	Steph.O.
2/3	221320-232535,232700-014020.	3 25 35	B	Steph.O.
August				
8/9	225140-235317,000839-001511, 001803-011305,013241-015602.	2 26 32	U	NAO
9/10	215544-005649,011647-015757.	3 42 15	U	NAO
21/22	221420-015629.	3 42 09	U	NAO
23/24	223800-011239.	2 34 39	U	NAO
September				
3	202259-212415.	1 01 14	B	NAO
5/6	221329-005738.	2 44 09	B	NAO
28	192128-232824.	4 06 56	U	NAO

	Total	30 ^h 40 ^m 21 ^s		

Table II
Characteristics of the flares observed

Flare No	Date 1981	U.T	t _b min	t _a min	Duration min	I _f /I _o max	Δm mag	σ mag	P min	Air mass
	August									
1	8	23 ^h 19 ^m 54 ^s	0.57	1.1	1.7	1.63	0.53	0.03	0.55	1.008
2	8	23 27 48	0.18	9.2	9.4	12.71	2.76	0.03	7.7	1.006
3	9	00 09 59	0.48	2	2.5	1.41	0.37	0.03	0.4	1.002
4	9	00 22 36	1.43	4.4	5.8	3.16	1.25	0.03	2.4	1.004
5	9	23 28 22	3.03	6.6	9.6	2.11	0.81	0.03	3.1	1.004
6	24	00 56 20	0.25	10.7	11	7.45	2.18	0.03	10.2	1.078
	September									
7	28	19 25 10	0.25	0.8	1.1	1.38	0.35	0.03	0.2	1.025

During the total of 30^h40^m monitoring time 7 flares were observed (all of them in "u" colour), the characteristics of which are given in Table II. For each flare the following characteristics (Andrews et al., 1969) are given:

- the date and universal time of maximum,
- the duration before and after maximum (t_b and t_a respectively),

- c. the total duration of the flare,
 d. the value of the ratio I_f/I_0 corresponding to flare maximum, where
 I_f is the total intensity of the star plus flare less sky background
 and I_0 is the quiet state intensity less sky background,
 e. the increase of the star magnitude at flare maximum:

$$\Delta m(u) = 2.5 \log I_f/I_0,$$
 where "u" is the ultraviolet instrumental magnitude at NAO,
 f. the standard deviation of random noise fluctuations in mag.

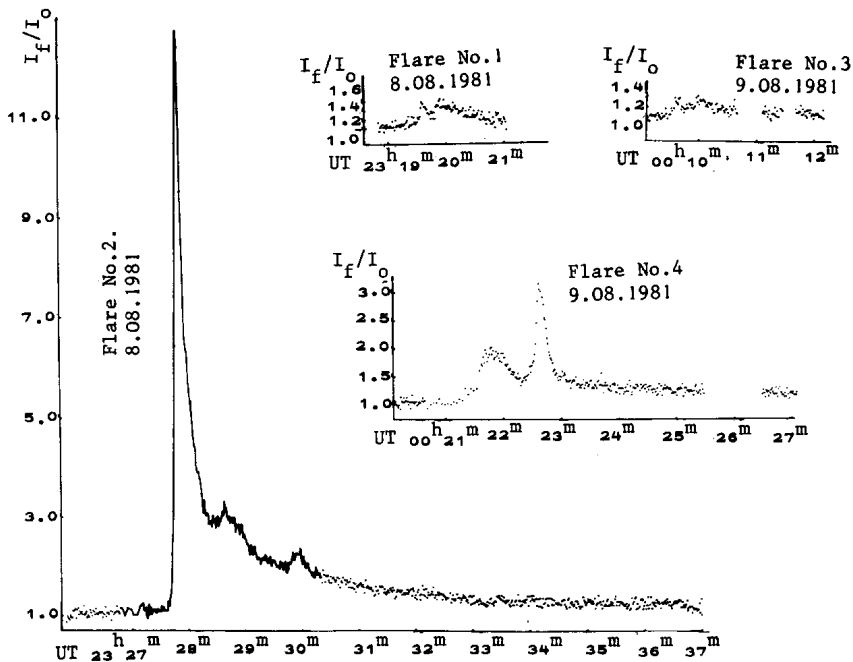
$$\sigma(\text{mag}) = 2.5 \log \frac{I_0 + \sigma}{I_0},$$

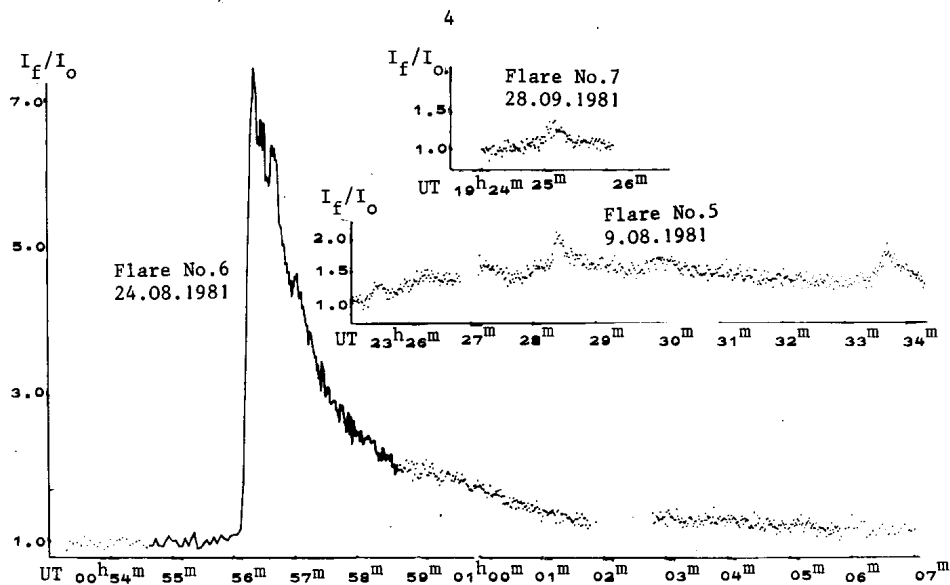
- g. the integrated intensity of the flare over its total duration:

$$P = \int (I_f - I_0) / I_0 dt,$$

- h. the air mass.

The light curves of the observed flares in colour "u" are shown in Figs. 1-7. We would like to draw attention to the remarkable activity of EV Lac during the night of 8/9 August 1981 with 4 flares observed within 1^h10^m.





Figures 1-7

Acknowledgements

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