

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2133

Konkoly Observatory
Budapest
1982 April 28
HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1981

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Observatory during the autumn 1981 in the framework of the Program for Scientific and Technical Co-operation between the Department of Geodetic Astronomy, University of Thessaloniki-Greece and the Department of Astronomy with National Astronomical Observatory, Bulgarian Academy of Sciences - Bulgaria.

Observations have been made with the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy installed at the Stephanion Observatory, and a Johnson dual channel photoelectric photometer, in the B colour of the international UBV system. The telescope and the photometer have been described elsewhere (Mavridis et al., 1982). The transformation of our instrumental ubv system to the international UBV system for the period September-October 1981 is given by the following equations:

$$\begin{aligned} V &= v_0 - 0.023(b-v)_0 + 3.202, \\ (B-V) &= 0.582 + 1.004(b-v)_0, \\ (U-B) &= -1.869 + 1.021(u-b)_0. \end{aligned}$$

The monitoring intervals in U.T. 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 - σ (mag) = $2.5 \log (I_0 + \sigma)/I_0$, for different times (U.T.) of the corresponding monitoring intervals is given.

During the 14.5 hours of monitoring time 3 flares were observed the characteristics of which are given in Table II. For each flare following characteristics (Andrews et al., 1969) are given:

- a. the date and universal time of maximum;

Table I
Monitoring intervals in 1981

Date	Monitoring intervals (U.T.)	Total Monitoring Time	σ (U.T.)
1981			
Sept. 28-29	21 ^h 23 ^m -21 ^h 55 ^m , 21 ^h 57 ^m -22 ^h 33 ^m , 22 35 -23 00 , 23 02 -23 40 , 23 42 -00 49 , 00 55 -01 15 , 01 17 -01 37 , 01 45 -01 50 .	4 ^h 03 ^m	0.02/21 ^h 43 ^m / , 0.02/22 ^h 20 ^m / , 0.03/22 50 / , 0.03/23 20 / , 0.03/00 35 / , 0.03/01 04 / , 0.03/01 08 / , 0.02/01 24 / , 0.02/01 46 / .
29-30	20 50 -21 41 , 21 43 -22 24 , 22 26 -00 05 , 00 07 -00 47 .	3 51	0.02/21 34 / , 0.02/22 00 / , 0.02/22 55 / , 0.04/00 34 / .
30	19 19 -19 55 , 19 56 -20 07 , 20 12 -20 42 , 20 45 -21 25 , 20 28 -20 30 , 21 33 -21 48 , 21 55 -22 16 .	2 35	0.02/19 32 / , 0.02/20 00 / , 0.02/20 30 / , 0.02/21 05 / , 0.02/21 29 / , 0.02/21 40 / , 0.02/22 13 / .
Oct. 1	19 08 -19 55 , 19 58 -20 05 , 20 17 -20 23 .	1 00	0.02/19 38 / , 0.03/20 03 / , 0.02/20 18 / .
3	19 16 -19 20 , 19 23 -19 45 , 19 55 -20 33 , 20 35 -21 25 , 21 28 -21 48 , 21 50 -22 35 .	2 59	0.05/19 18 / , 0.02/19 34 / , 0.03/20 23 / , 0.02/20 51 / , 0.03/21 40 / , 0.02/22 23 / .

Total = 14^h28^m

Table II
Characteristics of the Flares Observed

Flare No	Date 1981	U.T. max	t_b min	t_a min	Duration min	$\frac{I_f - I_o}{I_o}$ max	P min	Δm mag	σ mag	Air mass
1.	Sept. 29	1 ^h 31 ^m .6	2.60	5.24	7.84	1.024	3.90	0.77	0.02	1.66
2.	29	22 30.5	0.14	5.50	6.64	0.486	0.213	0.43	0.02	1.08
3.	Oct. 3	22 27.4	0.52	6.00	6.52	0.177	0.214	0.18	0.02	1.09

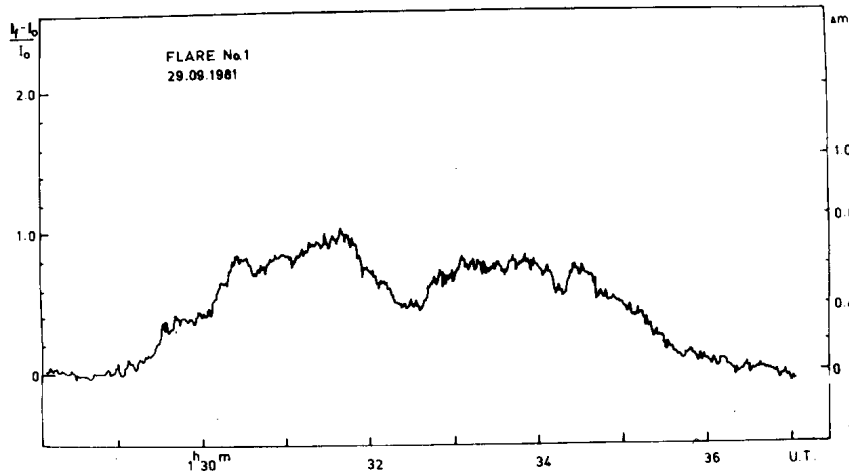


Figure 1

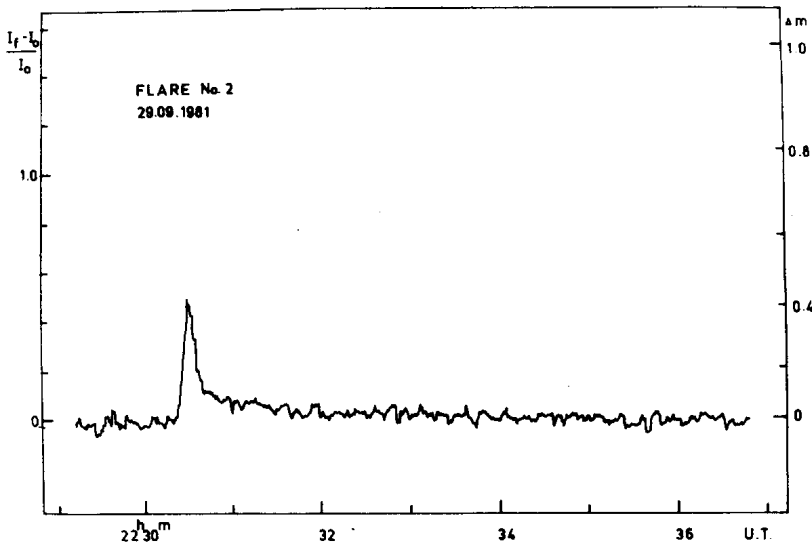


Figure 2

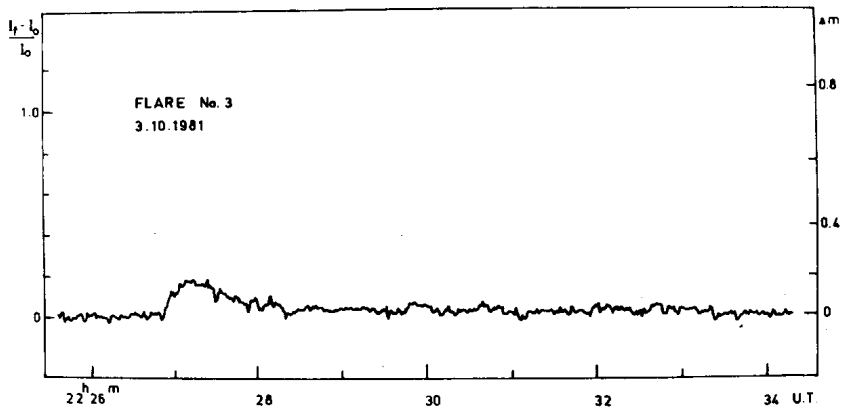


Figure 3

- 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 $(I_f - I_o)/I_o$ corresponding to flare maximum, where I_o 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: $P = \int (I_f - I_o)/I_o dt$;
- e. the increase of the apparent magnitude of the star at flare maximum $\Delta m(b) = 2.5 \log (I_f/I_o)$, where b is the blue magnitude of the star in the instrumental system;
- f. the standard deviation of random noise fluctuation - $\sigma(\text{mag}) = 2.5 \log (I_o + \sigma)/I_o$, during the quiet-state phase immediately preceding the beginning of the flare;
- g. the air mass at flare maximum.

The light curves of the observed flares in the b colour are shown in Figures 1-3.

Acknowledgements

The authors would like to express their gratitude to the relevant authorities of the respective countries for their support.

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