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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac IN 1975

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Observatory ($\lambda = -22^{\circ}49'44''$ $\phi = +37^{\circ}45'15''$) during the year 1975 using the 30 inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki. Observations have been made with a Johnson dual channel photoelectric photometer in the B colour of the international UBV System. The telescope and photometer will be described elsewhere. Here we mention only that the transformation of our instrumental uvb system to the international UBV system is given by the following equations:

for the time interval from 25-6-1975 to 30-7-1975

$$\begin{aligned}V &= v_0 + 0.119(b-v)_0 + 2.163, \\(B-V) &= 0.819 + 1.047(b-v)_0, \\(U-B) &= -1.509 + 1.006(u-b)_0,\end{aligned}$$

for the time interval from 31-7-1975 to 16-9-1975

$$\begin{aligned}V &= v_0 + 0.046(b-v)_0 + 2.440, \\(B-V) &= 0.782 + 1.062(b-v)_0, \\(U-B) &= -1.612 + 1.063(u-b)_0,\end{aligned}$$

and for the time interval from 17-9-1975 to 20-2-1976

$$\begin{aligned}V &= v_0 + 0.059(b-v)_0 + 2.368, \\(B-V) &= 0.737 + 1.035(b-v)_0, \\(U-B) &= -1.675 + 1.122(u-b)_0.\end{aligned}$$

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.

Flare Star EV Lac, 1975

Table I

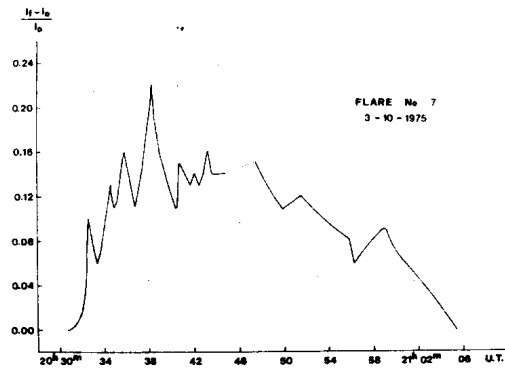
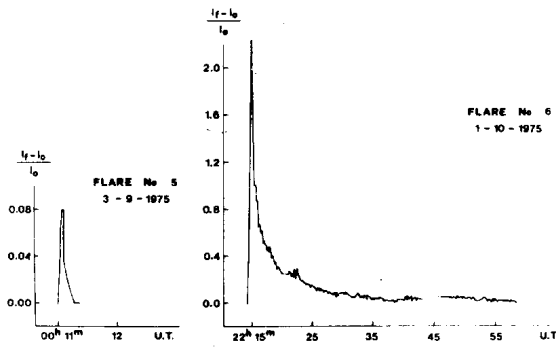
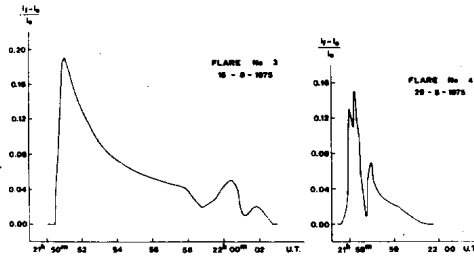
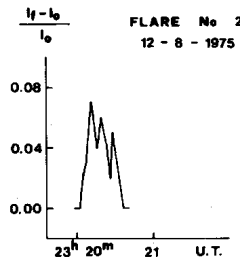
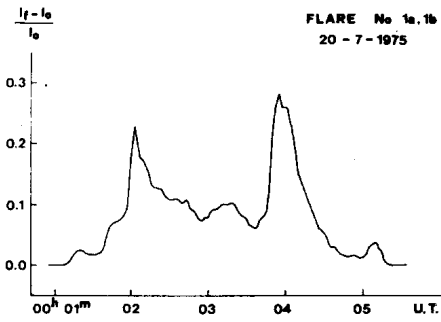
Date	Monitoring Intervals (U.T.)	Total Monitoring Time	σ (U.T.)
July			
19-20	20 ^h 48 ^m -21 ^h 15 ^m , 21 ^h 18 ^m -21 ^h 55 ^m , 21 ^h 58 ^m -22 ^h 27 ^m , 22 42-23 11, 23 16-23 46, 23 52-23 56, 00 00-00 09, 00 12-00 26, 00 44-01 13, 01 18-01 53.	4 ^h 03 ^m	0.03(21 ^h 05 ^m),0.02(21 ^h 40 ^m), 0.01(22 21),0.02(22 55), 0.01(23 32),0.02(23 53), 0.01(00 57),0.01(01 37).
August			
10-11	22 00-22 31, 22 39-23 03, 23 10-23 36, 23 56-00 20, 00 34-00 54, 01 01-01 16.	2 20	0.02(22 16),0.02(22 50), 0.02(23 20),0.02(00 11), 0.02(00 46),0.02(01 09).
11-12	21 51-22 17, 22 19-22 50, 22 54-23 27, 23 42-00 09, 00 12-00 45, 00 48-01 34.	3 16	0.02(22 12),0.02(22 35), 0.02(23 15),0.03(23 59), 0.02(00 33),0.02(01 19).
12-13	21 55-22 24, 22 28-22 57, 23 02-23 31, 00 29-01 03, 01 05-01 44.	2 40	0.03(22 15),0.02(22 46), 0.02(23 18),0.03(00 46), 0.03(01 20).
15-16	21 15-21 41, 21 44-22 12, 22 14-22 46, 23 00-23 36, 00 26-00 56, 00 58-01 34.	3 08	0.02(21 30),0.02(21 57), 0.02(22 32),0.02(23 18), 0.02(00 46),0.02(01 16).
18	00 15-01 00, 01 03-01 48.	1 30	0.03(00 45),0.02(01 19).
19-20	19 26-19 59, 20 02-20 31, 20 32-21 06, 21 20-21 55, 21 58-22 27, 22 32-23 22, 00 13-00 58, 01 01-01 44.	4 58	0.06(19 44),0.10(20 16), 0.07(20 55),0.04(21 35), 0.06(22 12),0.07(22 50), 0.05(00 34),0.04(01 16).
27-28	19 03-19 34, 19 38-20 06, 20 09-20 38, 20 51-21 24, 21 30-21 53, 21 57-22 32, 23 21-00 19, 00 21-01 14, 01 16-01 27.	5 01	0.02(19 25),0.02(19 53), 0.02(20 21),0.03(21 06), 0.03(21 42),0.03(22 15), 0.03(23 49),0.04(00 50), 0.03(01 20).

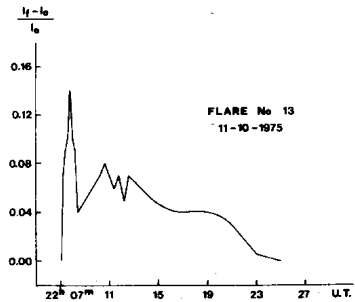
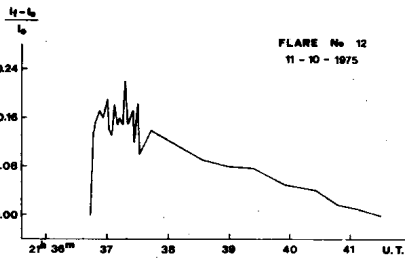
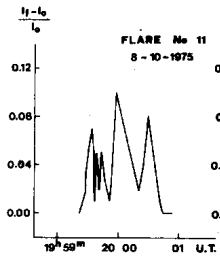
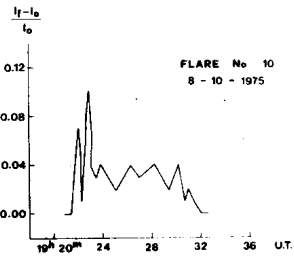
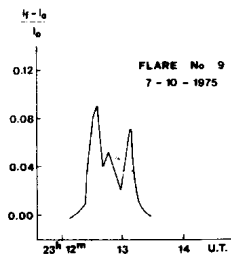
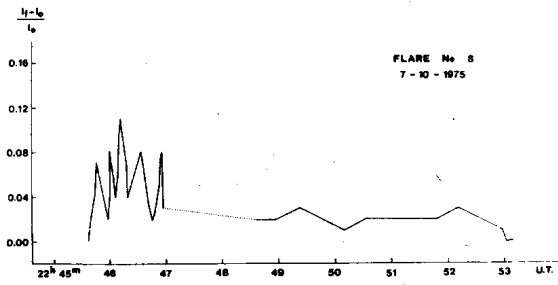
Table I (Continued)

28-29	19 ^h 14 ^m -19 ^h 43 ^m , 19 ^h 46 ^m -20 ^h 22 ^m , 20 ^h 25 ^m -21 ^h 03 ^m , 21 15-21 45, 21 48-22 21, 22 24-23 04, 23 52-00 31, 00 33-01 04, 01 14-01 45.	5 ^h 07 ^m	0.02(19 ^h 29 ^m), 0.02(20 ^h 01 ^m), 0.02(20 46), 0.03(21 30), 0.03(22 02), 0.02(22 41), 0.03(00 14), 0.03(00 48), 0.03(01 29).
29-30	19 13-19 45, 19 46-20 17, 20 20-20 54, 21 04-21 36, 21 38-22 07, 22 09-22 51, 23 47-00 28, 00 32-01 21, 01 24-01 50.	5 16	0.02(19 27), 0.02(20 01), 0.02(20 35), 0.02(21 20), 0.02(21 51), 0.03(22 32), 0.03(00 04), 0.03(00 59), 0.03(01 39).
30	19 03-19 31, 19 36-20 08, 20 11-20 56, 21 15-21 41, 21 46-22 19.	2 44	0.02(19 16), 0.03(19 49), 0.02(20 33), 0.02(21 30), 0.02(21 58).
31- 1	19 21-20 02, 20 05-20 41, 20 48-21 18, 21 34-22 05, 22 09-22 35, 22 37-23 11, 01 31-02 00, 02 04-02 34, 02 39-03 02.	4 40	0.02(19 43), 0.02(20 29), 0.02(20 59), 0.02(21 46), 0.01(22 12), 0.02(22 53), 0.02(01 49), 0.02(02 19), 0.03(02 47).
September			
2 - 3	21 44-22 14, 22 17-22 48, 22 51-23 21, 23 33-00 16, 00 17-00 59, 01 03-01 51.	3 44	0.02(21 58), 0.02(22 29), 0.02(23 08), 0.02(23 57), 0.03(00 37), 0.03(01 32).
11-12	21 48-21 55, 21 59-22 18, 23 04-23 15, 23 19-23 33, 23 36-23 48, 23 50-00 03.	1 16	0.02(22 08), 0.02(23 32), 0.02(00 01).
14-15	23 06-23 24, 23 26-23 31, 23 35-23 55, 23 59-00 03, 00 06-00 14, 00 17-00 26, 00 28-00 31, 00 41-01 09, 01 14-01 20, 01 21-01 46.	2 06	0.02(23 30), 0.02(24 00), 0.02(00 29), 0.03(00 55), 0.02(01 34).
17	19 54-20 18, 20 21-20 42, 20 43-20 55, 20 58-21 27.	1 26	0.02(20 02), 0.02(20 39), 0.03(21 09).
25-26	22 49-23 16, 23 19-23 46, 23 49-00 15, 00 55-01 12, 01 21-01 25, 01 28-01 44.	1 57	0.03(22 59), 0.03(23 29), 0.04(23 59), 0.06(01 23).

Table I (Continued)

October			
1	20 ^h 55-21 ^h 19 ^m , 21 ^h 22-21 ^h 50 ^m , 21 ^h 53-22 ^h 44 ^m , 22 47-23 04, 23 17-23 28, 23 31-23 44, 23 50-23 55,	2 ^h 29 ^m	0.02(21 ^h 10 ^m),0.01(21 ^h 41 ^m), 0.01(22 58).
2-3	20 32-20 59, 21 02-21 34, 21 36-22 05, 22 19-22 48, 22 50-23 32, 23 35-00 08.	3 12	0.02(20 44),0.02(21 17), 0.02(21 49),0.02(22 31), 0.02(23 09),0.02(23 46).
3	19 34-20 02, 20 04-20 44, 20 46-21 18, 21 29-21 59, 22 10-22 40, 22 43-23 15, 23 17-23 47.	3 42	0.02(19 50),0.02(20 21), 0.02(20 52),0.02(21 45), 0.02(22 25),0.02(22 57), 0.02(23 30).
4	18 56-19 31, 19 33-19 58, 20 00-20 36, 20 48-21 10.	1 58	0.03(19 15),0.03(19 44), 0.02(20 16),0.03(20 59).
7	20 15-20 44, 20 48-21 09, 21 21-21 50, 22 03-22 35, 22 37-23 05, 23 09-23 39.	2 49	0.02(20 30),0.02(20 58), 0.02(21 34),0.02(22 18), 0.02(22 48),0.02(23 19).
8	19 16-19 46, 19 48-20 18, 20 20-20 51, 21 03-21 36, 21 51-22 16, 22 19-22 51, 23 02-23 43.	3 42	0.02(19 31),0.02(19 58), 0.02(20 31),0.02(21 18), 0.02(22 05),0.02(22 35), 0.02(23 21).
10	18 41-18 59, 19 18-19 35.	0 35	0.03(18 51),0.03(19 28).
11	18 33-19 01, 19 03-19 34, 19 38-20 10, 20 24-20 57, 21 01-21 48, 21 52-22 25, 22 49-23 20, 23 22-23 54.	4 27	0.03(18 46),0.02(19 17), 0.03(19 52),0.03(20 41), 0.03(21 20),0.02(22 13), 0.02(23 02),0.03(23 35).
12	18 26-19 00, 19 03-19 34,19 36-20 11, 20 23-20 59, 21 02-21 39, 21 42-21 54,	3 05	0.03(18 43),0.03(19 18), 0.03(19 52),0.03(20 41), 0.03(21 17),0.03(21 47).
21	19 03-19 50, 19 53-20 25, 20 29-20 34, 20 37-20 46.	1 33	0.06(19 28),0.05(20 12), 0.06(20 41).
TOTAL		82 ^h 44 ^m	





During the 82.73 hours of monitoring time 13 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 flare maximum, b) the duration before and after the 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 Figures 1-13.

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Reference:

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