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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV LAC

Continuous photoelectric monitoring of the flare star EV Lac has been carried out at the Stephanion Astronomical Station ($\lambda = -22^{\circ}49'44''$, $\phi = +37^{\circ}45'15''$) during the following periods: 1.) the period August 14-31, 1972, 2.) the period of cooperative optical observations of this star proposed by the IAU Working Group on Flare Stars i.e. September 1-15, 1972 (Chugainov, IBVS, No. 605, 1971) and 3.) the period September 16-19, 1972, 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 color of the international UBV system. The telescope and photometer will be described elsewhere. Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$\begin{aligned}V &= v_o + 0.018(b-v)_o + 1.788, \\(B-V) &= 0.814 + 0.930(b-v)_o, \\(U-B) &= -0.951 + 0.864(u-b)_o.\end{aligned}$$

The monitoring intervals in UT as well as the total monitoring time for each night are given in Table 1. Any interruption of more than one minute has been noted.

During the 44.2 hours of monitoring time 6 flares were observed the characteristics of which are given in Table 2. For each flare following characteristics (Andrews et al. IBVS No. 326, 1969) are given: a) the date and universal time of flare maximum, 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 our instrumental system, f) the standard deviation of random noise fluctuation $\sigma(\text{mag}) = 2.5 \{ \log(I_o + \sigma)/I_o \}$ and g) the air mass. The light curves of the observed flares in the b color are shown in Figs. 1-6.

TABLE 1

Date 1972 Aug.	Monitoring intervals	Total Monitoring Time
14-15	19 ^h 36 ^m -19 ^h 49 ^m , 1954-2013, 2017-2031, 2032-2037, 2137-2159, 2202-2214, 2217-2224, 2227-2244, 2302-2321, 2325-2332, 2338-2347, 2350-2358, 2359-0009, 0020-0032, 0041-0100, 0109-0134, 0137-0150.	3 ^h 51 ^m
15-16	1936-1951, 1955-2015, 2018-2036, 2040-2100, 2111-2131, 2134-2152, 2156-2214, 2307-2316, 2318-2333, 2337-2358, 0001-0021, 0024-0041, 0051-0110, 0114-0131, 0134-0201.	4 ^h 34 ^m
16-17	1949-2006, 2009-2025, 2028-2042, 2051-2109, 2112-2130, 2133-2148, 2258-2323, 2337-2353, 2356-0015, 0018-0037, 0044-0100, 0102-0121, 0123-0141, 0143-0200.	4 ^h 07 ^m
17-18	2343-2354, 0002-0029, 0031-0056, 0110-0131, 0133-0204.	1 ^h 55 ^m
19-20	2135-2155, 2156-2202, 2204-2227, 2338-2357, 0000-0028, 0037-0100, 0103-0128, 0136-0200.	2 ^h 48 ^m
20-21	2026-2055, 2059-2120, 2154-2158, 2309-2335, 2338-2351, 0002-0032, 0035-0104, 0115-0138, 0141-0200.	3 ^h 14 ^m
21	2045-2111, 2115-2142, 2150-2157.	1 ^h
30-31	2257-2321, 0025-0053, 0057-0114.	1 ^h 09 ^m
31	2019-2036, 2038-2048, 2051-2123, 2129-2156, 2200-2229, 2329-0000.	2 ^h 26 ^m
Sept.		
1	0004-0033, 0042-0110, 0113-0142, 0149-0238.	2 ^h 15 ^m
6-7	1952-2026, 2034-2042, 2049-2115, 2118-2158, 2219-2226, 2336-0003.	2 ^h 22 ^m
8-9	2114-2139, 2141-2154, 2157-2227, 2231-2256, 2320-2333, 2345-0012.	2 ^h 13 ^m
9-10	2206-2231, 2233-2309, 2312-2346, 2349-0001, 0012-0112.	2 ^h 47 ^m
11-12	2221-2246, 2248-2326, 2327-2339, 2343-0008, 0010-0144, 0147-0157.	3 ^h 24 ^m
12-13	2229-2250, 2254-2347, 2352-0027, 0028-0105, 0109-0120, 0123-0135, 0138-0152, 0155-0208.	3 ^h 16 ^m
16	2210-2317.	1 ^h 07 ^m
18-19	2350-0023, 0025-0043, 0054-0113, 0115-0151.	1 ^h 46 ^m
	Total	44 ^h 14 ^m

TABLE 2
 Characteristics of the flares observed

Flare No.	Date	U.T. maximum	t_b min.	t_a min.	Duration min.	$(I_f - I_o)/I_o$ maximum	P min.	Δm mag	σ mag.	Air mass	
	1972 Aug.										
1	14	22 ^h 33 ^m 8	1.3	4.5	5.8	0.21	0.35	0.21	0.01	1.03	
2	16	20 ^h 31 ^m 5	0.6	0.4	1.0	0.15	0.06	0.16	0.02	1.21	
3	16	23 ^h 15 ^m 8	0.4	4.3	4.7	0.79	0.57	0.63	0.01	1.02	
4	19	23 ^h 46 ^m 8	0.3	0.5	0.8	0.11	0.05	0.11	0.01	1.01	
	Sept.										
5	11	23 ^h 57 ^m 4	0.4	8.7	9.1	0.90	2.14	0.70	0.01	1.10	
6	19	01 ^h 04 ^m 4	0.2	2.8	3.0	0.29	0.21	0.28	0.01	1.34	

