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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac
DURING THE 1970 AUGUST 23 - SEPTEMBER 9
INTERNATIONAL PATROL

The preliminary results of the EV Lac observations carried out at Catania Astrophysical Observatory during the 1970 campaign arranged by the IAU Working Group on Flare Stars are here reported.

The observations were performed with a 91 cm cassegrain and a 61 cm quasi-cassegrain reflectors. The former fed a single channel photometer equipped with an EMI 6256 A (S13) photomultiplier and UG1/1 Schott filter (u light). The latter fed a simultaneous three colour photometer equipped with an EMI 6256 A (S13) photomultiplier and the Schott filter combinations UG1/1 (u'), BG12/1+GG13/2 (v). The u and u' colours are slightly different because the field lens of the three colour simultaneous photometer at the 61 cm telescope is made of quartz while that of the single channel photometer at the 91 cm telescope is made of glass.

In Table 1 the detailed coverage and in Table 2 the characteristics of the 28 flares observed in 42.2 hours of patrol are presented. The observed intensities have been corrected for the light contribution of the optical companion of EV Lac according to the linear relation $I_c = \alpha I$ (observed), the α coefficients being 0.51 for u and u' lights, 0.70 for b light and 0.83 for v light.

The peaks of a multiple flare are denoted by the order number of the flare followed by an alphabetic small letter. Only for the highest peak the complete set of flare characteristics is given in Table 2, while for lower peaks only the times of maxima are reported. Moreover the values of integrated intensity (P) and of the duration after primary maximum (d_a) are computed including whatever post-maximum activity.

The light curves of the observed flares are shown in the accompanying Figures Nos.1-5.

In addition to the parameter $3\sigma/I_0$, from which the magnitude difference between the quiet star and the smallest detectable flare can be computed, we give the new parameter, σ_{\max} , which represents in the I_0 unity the maximum deviation from the mean intensity deflection I_0 near the observed flare. The σ_{\max} values are not given in tabular

form, but for each flare they are represented graphically in the figures as "uncertainty" bars close at the corresponding flare light curves. Only flare features out of these "uncertainty" bars are to be considered reliable.

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Catania Astrophysical Observatory, Italy
February 12th 1971

Table 1

DATE Tel Light

COVERAGE (U.T.)

 $\frac{3 \delta / I_0}{}$

1970.					
Aug.					
23	91	u	2248m-23h02m; 2305-2322; 2325-2339; 2341-2359;		.02
24			0001-0029;		
25			2354-2400;		
26			0000-0030; 0032-0100; 0102-0119; 0148-0159; 0201-0228;		.03
			0230-0240; 0242-0306; 0308-0322.		.03
28			0142-0227; 0229-0257; 0259-0301; 0303-0326.		
28	61	u'/b/v	0138-0143; 0206-0218; 0221-0233; 0241-0243; 0246-0252;		.04/.01/.01
			0309-0314.		
29	91	u	2140-2151; 2154-2207; 2209-2223; 2226-2247; 2249-2302;		.03
			2305-2307.		.03/.02/.01
29	61	u'/b/v	2236-2249; 2250-2302.		
			b/v		
30	91	u	2329-2335.		
30	61	u'/b/v	2119-2130.		.03
			2116-2119; 2121-2125		.05/.01/.01
			b/v		
31	61	u'/b/v	2052-2135; 2137-2141; 2143-2150; 2152-2220;		
			2038-2048; 2233-2304; 2317-2331; 2352-2354; 2356-2400;		
			2222-2228;		
Sep.					
1			0000-0004; 0008-0042; 0048-0059; 0104-0115; 0122-0139.		.03/.01/.01
			b/v		
1	91	u	0115-0122.		.02
1			0057-0129; 0131-0138.		
			2045-2058; 2100-2116; 2119-2154; 2156-2232; 2235-2252;		
			2254-2315; 2318-2332; 2335-2352; 2354-2400;		
2			0000-0010; 0013-0059.		.03
4			2104-2116; 2118-2129; 2131-2149; 2152-2220; 2223-2228;		
			2231-2250; 2253-2327; 2330-2346; 2349-2400;		
5			0000-0012; 0014-0049; 0052-0117; 0120-0150; 0152-0209;		.03
			0212-0223; 0226-0249; 0252-0308.		

Table 1 (cont.)

DATE Tel Light	COVERAGE (U.T.)	$\frac{3S}{I_0}$
1970		
Sep.		
4	61 u' / b / v	
	19h49m-19h58m; 2001-2015; 2017-2041; 2044-2057; 2059-2142;	
	2144-2157; 2217-2303; 2305-2308; 2324-2336; 2338-2349;	
	2351-2400;	
	2203-2217.	
5	b / v	
	0000-0038; 0040-0105.	.04/.01/.01
8	91 u	
	2250-2343; 2345-2358;	
9		
	0000-0017; 0020-0027; 0035-0045; 0048-0140; 0142-0157.	
8	61 u' / b / v	
	2112-2143; 2145-2205; 2207-2233; 2235-2238; 2242-2252;	.03
	2255-2340; 2355-2400;	
9		
	0000-0014; 0018-0038; 0041-0119; 0121-0137; 0139-0153;	
	0155-0210; 0245-0259; 0301-0325.	
9	91 b	
	2104-2113; 2115-2131; 2135-2149; 2151-2209; 2237-2254;	.04/.01/.01
	2257-2312; 2314-2317; 2319-2328; 2331-2400.	
10		
	0000-0005; 0011-0014; 0016-0023; 0029-0052; 0055-0114;	
	0116-0119; 0122-0134; 0137-0146.	.03
9	61 u' / b / v	
	1912-1923; 1925-1955; 1957-2011; 2013-2036; 2038-2049;	
	2052-2117; 2120-2138; 2207-2233; 2235-2257; 2259-2306;	
	2324-2338; 2340-2354; 2356-2400.	.06/.02/.0

Date = year, month, day; Tel. = the telescope aperture in cm; Light = the wide band Schott filters utilized: UG1/1 (u), BG12/1 + GG13/2 (b), GG14/2 (v); coverage = the times of effective coverage in U.T. (interruptions longer than one minute are noted); $\frac{3S}{I_0}$ = the ratio between three times the standard deviation of the random noise fluctuation for a night, S, and the mean intensity, I_0 , of the quiet star during the same night.

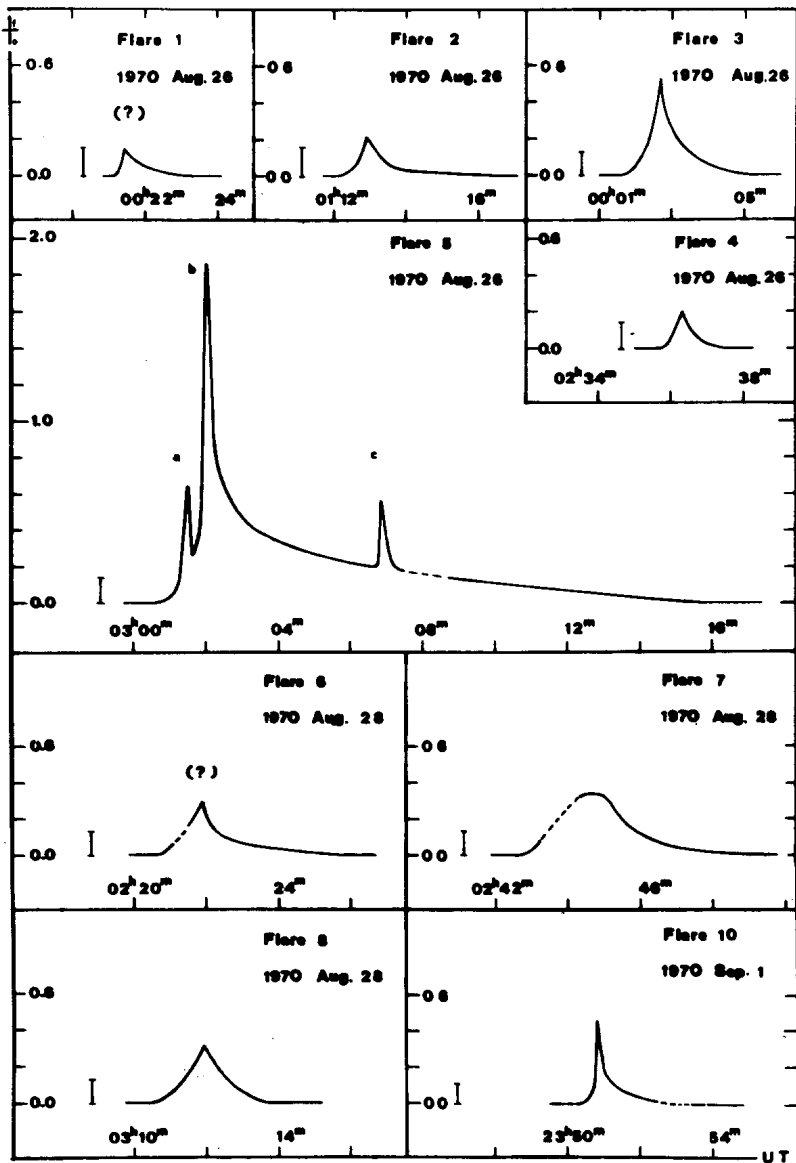
Table 2

no.	Tel. L	t_{\max} (U.T.)	d_b	d_a	$3\epsilon/I_0$	$(I_f/I_0)_{\max}$	P	a	b
1	91 u	1970 Aug. 26:00 ^b 21.4 ^m	0.1 ^m	1.8 ^m	.03	0.15	0.14	1	2
2		01 12.9	0.3	3.6	.03	0.22	0.18		2
3		02 02.7	0.5	2.2	.03	0.52	0.37		2
4		02 36.3	0.4	1.1	.03	0.21	0.14		2
5a		03 01.5	(s e c o n d a r y			m a x i m u m)			
5b		03 02.0	0.2	13.6	.03	1.86	3.11	3	2
5c		03 06.9	(s e c o n d a r y			m a x i m u m)			
6		28:02 21.9	0.9	3.8	.03	0.29	0.36	1	2
7		02 44.7	1.8	4.3	.03	0.34	0.74	2	2
8		03 11.9	0.9	1.7	.03	0.31	0.34	2	2
9a		Sep. 1:21 24.8	0.4	24.3	.03	2.66	5.68	4	1
9b		21 37.8	(s e c o n d a r y			m a x i m u m)			
10		23 50.8	0.1	2.0	.02	0.45	0.19	1	1
11a		2:00 47.0	(s e c o n d a r y			m a x i m u m)			
11b		00 48.2	1.2	4.0	.02	0.36	0.35	2	1
12		4:21 35.2	0.1	7.5	.03	0.33	0.54	1	2
13		22 39.7	0.1	0.7	.03	0.26	0.07	1	2
14		22 43.4	0.1	1.6	.03	0.21	0.08	1	2
15	61 u'	5:00 04.3	0.3	4.5	.04	2.08	1.15	2	2
	b	00 04.3	0.1	2.7	.01	0.26	0.11	2	2
	v	(n o t d e t e c t a b l e)							
91	u	00 04.3	0.3	6.6	.03	1.41	0.89	2	2
16		00 54.1	0.8	7.8	.03	0.16	0.34	1	2
17		01 55.0	1.2	13.2	.03	0.37	2.90	4	2
18		02 12.7	0.3	2.0	.03	0.25	0.25	2	2
19		03 05.5	0.1	0.6	.02	0.46	0.08	2	2
20	61 u'	8:23 21.9	0.3	6.2	.04	1.42	0.77	1	1
	b	23 21.8	0.1	1.3	.01	0.15	0.08	1	1
	v	(n o t d e t e c t a b l e)							
91	u	23 21.9	0.1	5.7	.03	0.43	0.41	1	1

Table 2 (cont.)

no.	Tel.	L	t_{\max} (U.T.)	d_b	d_a	$3\sigma/I_0$ (I_f/I_0) _{max}	P	a	b
1970 Sep.									
21	91	u	9:00 ^h 55.4 ^m	0.1	4.5	.03	0.30	0.28	4
22	61	u'	01 34.3	0.2	4.7	.04	0.61	0.63	1
		b	01 33.9	0.4	0.5	.01	0.15	0.14	1
		v	(n o t d e t e c t a b l e)						
23	91	u	01 34.3	0.1	7.8	.03	0.74	0.86	4
	61	u'	20 45.1	0.9	5.0	.04	1.78	2.98	1
		b	20 45.1	1.0	4.5	.01	0.25	0.33	1
24	91	v	20 45.1	0.2	0.4	.01	0.12	0.04	1
25	91	u	21 40.0	2.0	18.6	.03	0.56	3.26	1
26	61	u'	22 03.7	0.8	3.5	.02	0.16	0.31	1
		b	23 48.9	0.0	0.7	.03	0.70	0.15	1
		v	(n o t d e t e c t a b l e)						
27	91	u	23 49.0	0.2	1.3	.03	0.59	0.22	1
28	91	u	23 59.9	1.4	4.4	.03	0.30	0.74	1
		u	10:00 20.3	0.2	1.0	.03	0.22	0.10	1

no. = the order number; Tel. = the telescope aperture in cm; L = the wide band Schott filters utilized; UG1/1 (u), BG 12/1 + GG13/2 (b), GG14/2 (v); t_{\max} = the U.T. of the flare maximum; d_b = the duration of the flare before maximum, including post-maximum activity whatever; $3\sigma/I_0$ = the ratio between three times the standard deviation of the random noise fluctuation, σ , and the mean intensity, I_0 , of the quiet star near the observed flare; $(I_f/I_0)_{\max}$ = the relative intensity at the flare maximum; P = $\int (I_f/I_0) dt$, the integrated intensity per minute; the flare feature (1: uncertain, 2: double, 3: multiple, 4: complex structure); b = the sky condition (0: very clear, 1: clear, 2: some cirrus, 3: extended cirrus, 4: some clouds).



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