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PHOTOELECTRIC MONITOR OF THE FLARE STARS AD Leo AND EV Lac

Five flares were detected during a photoelectric monitor of the star AD Leo over a total of $22^{\text{h}}19^{\text{m}}$ spread over eight nights during the period 12 March - 4 May 1973. No flare on EV Lac could be detected over a coverage of nearly 2^{h} between 4 - 6 December 1972. The details of observations are contained in Tables Ia and Ib. Table II records the flare characteristics of AD Leo which were computed using the same techniques and procedures as those employed earlier (Kapoor and Sinvhall, 1972). For all the energy calculations the quiescent state luminosity of the star was taken to be 1.25×10^{29} erg sec $^{-1}$ 100 A $^{-1}$ in the U filter and 8.2×10^{29} erg sec $^{-1}$ 100 A $^{-1}$ in the B filter with reference to Oke and Schild's (1970) calibration of α Lyr.

The light curves of the flares, shown in Figs. 1, 3 and 4 imply that we have to do with Type II flares of Oskanyan (1969) although once again the classification is not too exact (see e.g., Kapoor and Sinvhall, 1972; Kapoor, 1973). The other flares (Figs. 2 and 5) seem to be Type I flares.

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Uttar Pradesh State Observatory
Manora Peak, Naini Tal, India.

R.C. KAPOOR
B.B. SANWAL
S.D. SINVHAL

References:

- Kapoor, R.C., and Sinvhall, S.D., 1972, I.B.V.S. No.750.
Kapoor, R.C., 1973, I.B.V.S. No. 758.
Oke, J.B., and Schild, R.E. 1970, *Astrophys.J.*, 161, 1015.
Oskanyan, V.S., 1969, *Non-periodic Phenomena in Variable Stars* Ed. L.Detre, Academic Press, Budapest, p.131.

TABLE Ia
 COVERAGE OF AD Leo

Date, 1973	Telescope	Filter	(Times rounded to the nearest minute of UT)	Effective Coverage
12 Mar.	56 - cm	U	<u>15^h27^m - 32^m;</u> 15 58 - 16 ^h 37 ^m ; 17 01 - 50 18 33 - 19 08; 19 40 - 20 23.	15 ^h 34 ^m - 56 ^m ; 16 38 - 49 ; 18 27 - 31 ; 19 09 - 39 ;
14 Mar.	56 - cm	B	18 13 - 42; 20 08 - 24.	18 43 - 19 43;
23 Mar.	56 - cm	B	16 38 - 17 08; 17 31 - 39; 17 52 - 55; 18 17 - 21; 18 52 - 19 01; 19 30 - 33.	17 09 - 14 ; 17 44 - 48 ; 17 59 - 18 12; 18 42 - 50 ; 19 06 - 18 ;
25 Mar.	56 - cm	B	15 22 - 29; 15 48 - 16 10; 16 37 - 59; 17 20 - 36; 17 50 - 53; 18 04 - 20; <u>18 48 - 19 09;</u> <u>19 14 - 17;</u> <u>19 23 - 40;</u>	15 33 - 46 ; 16 11 - 28 ; 17 00 - 15 ; 17 37 - 47 ; 17 54 - 18 03; 18 21 - 47 ; 19 11 - 13 ; 19 18 - 22 ; 19 41 - 46.
27 Mar.	56 - cm	B	<u>15 05 - 24;</u> 15 41 - 54; 16 10 - 14; 16 34 - 17 15; 17 21 - 32; 17 55 - 18 24; 18 56 - 19 20; 19 49 - 20 12; 20 20 - 33.	15 28 - 40 ; 15 55 - 16 09; 16 18 - 33 ; 17 16 - 20 ; 17 33 - 54 ; 18 25 - 55 ; 19 21 - 48 ; 20 13 - 18 ;
8 Apr.	104 - cm	U	15 37 - 47; <u>16 01 - 17 33;</u>	15 50 - 59 ; 17 35 - 18 25.
28 Apr.	104 - cm	U	<u>16 13 - 55;</u> <u>17 01 - 25;</u>	16 57 - 59 ; 17 30 - 19 17.
4 May	56 - cm	B	<u>15 57 - 16 00;</u> <u>16 28 - 59;</u> <u>17 34 - 18 02;</u> 18 33 - 19 00; 19 27 - 36; 19 43 - 51.	16 01 - 27 ; 17 00 - 33 ; 18 03 - 31 ; 19 03 - 25 ; 19 38 - 42 ;

- Notes:
1. The flare intervals have been underlined.
 2. TOTAL COVERAGE: 22^h19^m spread over eight nights.
 3. Photomultiplier: 1P21, unrefrigerated.

FIG-1

25 MARCH, 1973 (B FILTER)

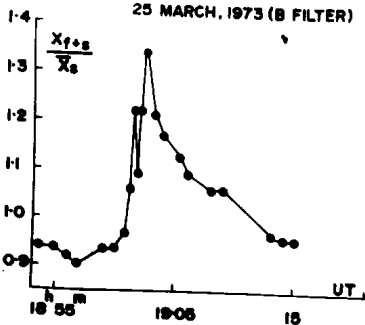


FIG-2

25 MARCH, 1973 (B FILTER)

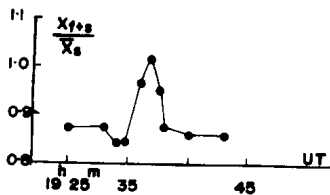


FIG-4

28 APR, 1973 (U FILTER)

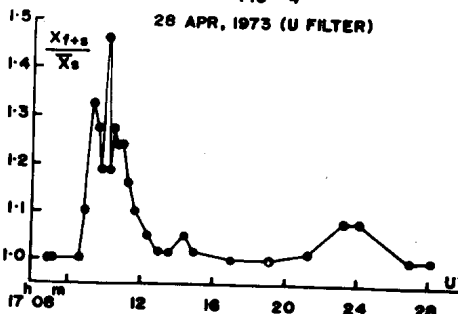


FIG-3

8 APR, 1973 (U FILTER)

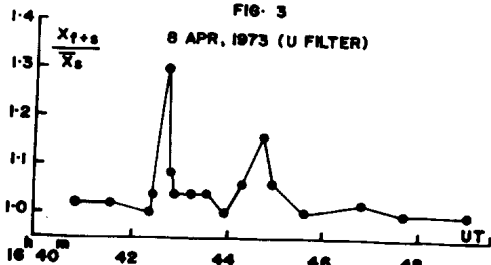


FIG-5

4 MAY, 1973 (B FILTER)

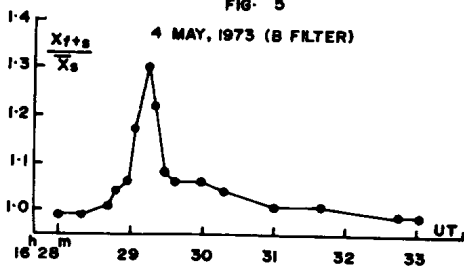


TABLE Ib
COVERAGE OF EV Lac

Date, 1972	Telescope	Filter	Effective Coverage	
			(Times rounded to the nearest minute of UT)	
4 Dec.	56 - cm	B	16 ^h 25 ^m - 29 ^m ; 17 00 - 12;	16 ^h 32 ^m - 59 ^m ; 17 14 - 25.
6 Dec.	56 - cm	B	15 26 - 33 ; 15 42 - 16 10; 16 51 - 59.	15 34 - 40 ; 16 28 - 48 ;

- Notes: 1. TOTAL COVERAGE: 2^h03^m spread over two nights.
2. Photomultiplier: 1P21, unrefrigerated.
3. No flare noticed.

TABLE II
CHARACTERISTICS OF THE FLARES ON AD LEONIS ($\Delta m_4e:v=9^m.43;U-v=2^m.61$)

Date 1973	UT _{max}	Flare duration		$\frac{X_{fm+s}}{\bar{X}_s}$	Δm	$\frac{\sigma}{\bar{X}_s}$	P (min)	F(z)	Energy	Total
		t _b	t _a						re- leased at flare max. (10 ²⁹ erg/s)	emission during the flare- up (10 ³⁰ erg/s)
25 Mar.	19 ^h 02 ^m 27 ^s	5 ^m .6	12 ^m .5	1.34	0.42	0.06	2.56	1.18	6.74	70.57
25 Mar.	19 36 48	2.0	6.0	1.02	0.02	0.06	0.43	1.29	4.66	11.85
8 Apr.	16 42 43	0.3	5.0	1.3	0.28	0.024	0.27	1.03	1.62	1.99
28 Apr.	17 10 06	1.38	18.05	1.46	0.41	0.038	1.99	1.24	1.82	14.93
4 May	16 29 14	0.9	3.5	1.3	0.28	0.021	0.24	1.19	5.95	6.53