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FURTHER OBSERVATIONS OF EV Lac IN 1974

High-speed photometric techniques developed for observations of optical pulses and ultra-rapid variability on time scales of 1 millisecond to 10 seconds were utilized for the patrol of the dMe flare star, EV Lac, in 1974. The 36-inch Yapp reflector at the Royal Greenwich Observatory was employed with the 2-star photometer, designed by Dr Bingham, to simultaneously monitor EV Lac and a comparison star, BD +43°4310 (Sp K0, 22^h46^m26^s, +44°25'6", 1950), separated 28'.2 from EV Lac. A multi-channel analyzer (Fabri-Tek Model 1072) was fed with the amplified dual pulses from the ultraviolet photoelectrons detected at two uncooled EMI 6256A photo-multipliers. Additional observations on three other nights were made using the Brookdeal 501 Photon-counting System and the data logger previously employed at the RGO (See Andrews 1973).

On 19 August 1974 four runs each lasting 4096 seconds were made with the Fabri-Tek System. The progress of the dual counting for the two stars in the standard U-band filter was displayed on an oscilloscope and recorded on punch tape. A dwell time of 8 seconds for each channel was used. During the third run, a stellar flare of amplitude 0.^m3 in the ultraviolet with duration 14 minutes was observed against the combined light of EV Lac and its faint companion (See Andrews and Chugainov 1969). The time of maximum was 23^h05^m45^s UT. However, due to a malfunction in the tape punch the individual data were irretrievable. The only record retained was on a tracing onto transparent paper from the oscilloscope display, and a detailed diary of events.

On 20-22 August 1974 observations were continued using the Brookdeal System. Continuous monitoring in the ultraviolet in the auto-repeat mode was performed with a 10-second integration. The counter was maintained at a fairly constant temperature in an enclosure within the dome.

The 13 hours total coverage of EV Lac is given in Table I with Universal Time noted to the nearest minute. Parentheses indicate poor sky

Table I

Coverage (UT) of EV Lac in the Ultraviolet

1974

19 Aug	(2052-2102, 2103-20), 2121-50, 2154-2203, 2211-41, 2242-2319, 2324-29, 2336-2400.
20 Aug	0000-05, 0006-33, 0053-58, 0216-30, (0230-0311), (2050-2103, 2119-24), (2127-29), 2140-54, 2158-59, 2206-55, 2326-2400.
21 Aug	0000-23, 0033-38, 0050-0101, 0113-23, 0125-29, 0148-53, 0155-0203, (0205-08, 0210-19), 0255-0300, (2024-43), 2054-2109, 2115-28, (2128-33), 2146-57, 2219-21, 2127-29, 2241-45, 2302-51.
22 Aug	(0008-19, 0020-39), 0041-0105, 0114-16, 0118-19, 0134-41, (0241-49), (0259-0302), (2047-2100), 2109-28, 2146-53, 2256-2321, 2325-2400,
23 Aug	0000-06, 0008-22, 0052-0111, 0121-55, 0209-22, 0243-0308.

TOTAL COVERAGE 13^h08^m over 4 consecutive nights.

conditions or observations made during semi-twilight (Astronomical Twilight : End 21^h25^m, Begin 02^h40^m UT). A total of 3210 dual counts were successfully recorded on the data logger under good sky conditions. See Fig.1, which

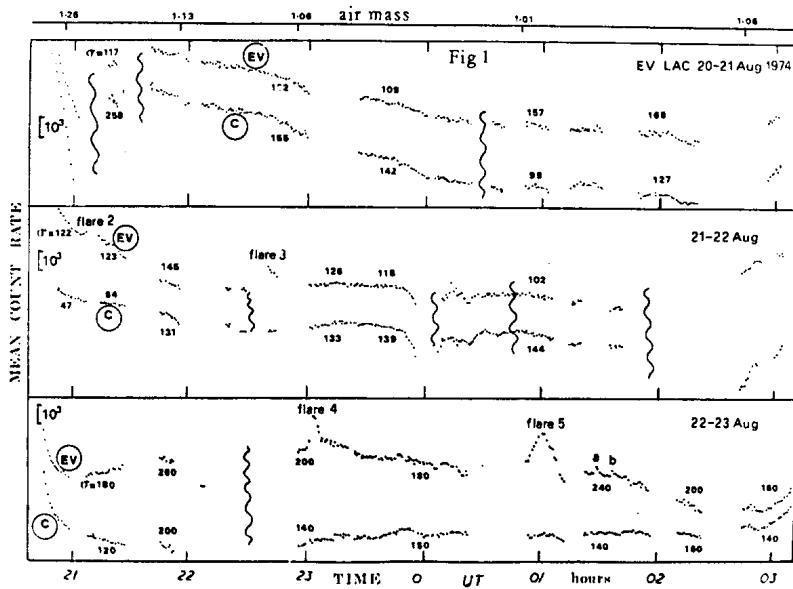


Figure 1

shows the mean count-rates over 1 minute intervals. Two partially-recorded flares were noted during 21 August (Nos.2 & 3), but fluctuations at 00^h12^m UT on the same night are thought to be noise. Flare No.5 on 22-23 August showed structure on its decline (a,b in Fig.1). Details of all flares are summarized in Table II. The r.m.s. scatter in the count rate is indicated

Table II
Observed Flares of EV Lac

No.	1974	UT(Max)	ΔU	Duration (mins)	I_{O+f}/I_O	P (mins)
1	19 Aug	23 ^h 05 ^m 45 ^s	~ 0.3	~ 14	-	-
2	21 Aug	(21 12)*	-	-	-	-
3	21 Aug	(22 40)*	>0.4	>4	-	-
4	22 Aug	23 03 00	0.66	31	1.84	4.71
5	23 Aug	01 00 26	0.41	16	1.46	4.72

* Incomplete light curves. Rise or maximum missed.

at intervals throughout the night in Fig.1, and the vertical curly lines indicate shifts in the zero point for the two stars. Observations were all made at small air mass. See top scale in Fig.1.

The well-observed flare on 22-23 August (No.4) was a typical, double-peaked event with a maximum amplitude of 0.66, and is shown in detail in Fig.2. Since the author had limited means to follow the quiescent light

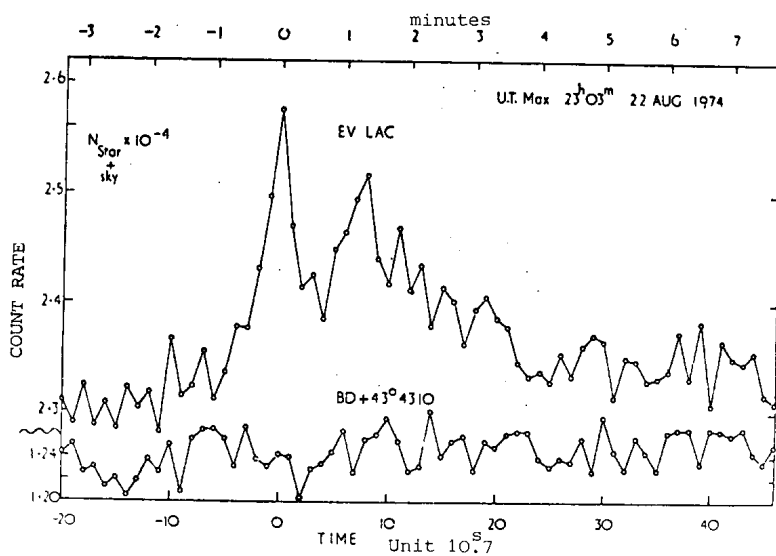


Figure 2

during the run using the data logger, the slow change apparent in Fig.1, amounting to a total rise of about 0.3^m only became evident during reductions. Flare No.4 occurred superimposed on this gradual rise in the ultraviolet. The second flare on that night two hours later was very slow with a rise time of about 8 minutes and an amplitude above "quiescence" of 0.41^m . The energy considerations for this night, however, are open to doubt due to the very small signal-to-noise ratio in the ultraviolet. The total data has not been searched for flare events on very short time scales.

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References :

- Andrews, A.D., 1973. IBVS 851.
Andrews, A.D. & Chugainov, P.F., 1969. IBVS 370.
(For details on the comparison star, BD +43^o4310, see I.B.V.S. No. 2253)