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AD Leo FLARE MONITORING

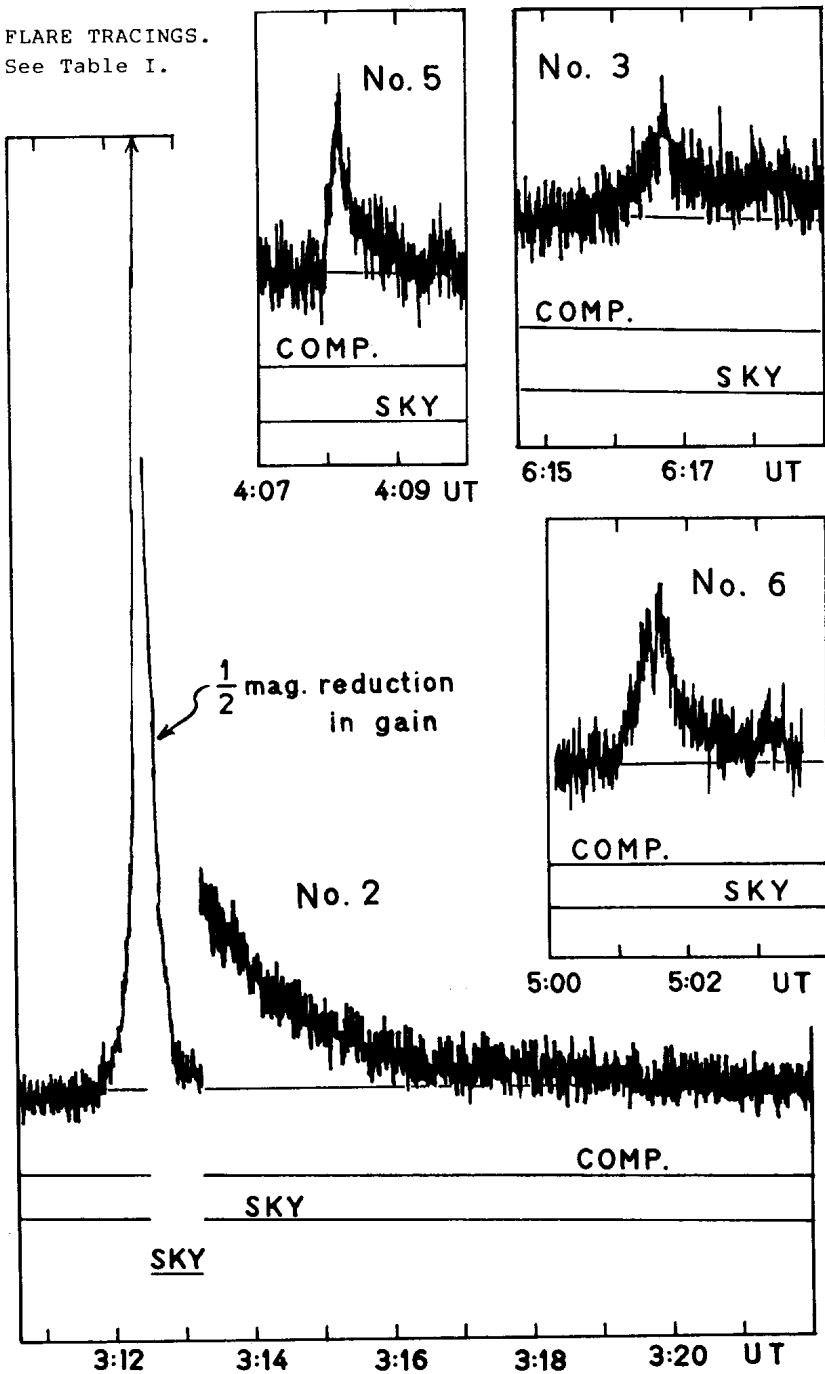
Thirteen hours and eleven minutes of photoelectric ultraviolet monitoring during the spring of 1982 yielded six events on AD Leonis. Light collected by the 61-cm Cassegrain (f/16) at Mt. Cuba Observatory was directed through a Corning 7-54 (standard U) filter and quartz Fabry lens to be measured by an EMI 6256S photomultiplier. The instrumental system is not transformed nightly to the Johnson UBV system but is consistent with previous AD Leo photometry from Mt. Cuba and uses the same comparison star, as recommended in I.B.V.S. No. 326.

Tracings from the strip-chart recorder are reproduced in the figures for the four largest flares. This unreduced data may be compared with the values tabulated in Tables I & II. Table I shows the time of maximum brightness for each event, the difference in magnitude between the star at maximum and at quiescence as interpolated from adjacent monitoring, the duration before (t_b) and after (t_a) maximum, the integrated intensity from the planimetered area between the flare tracing and the interpolated quiescence deflection in ratio to the mean quiescent deflection, and the air mass through which the star was viewed at the time of maximum.

Table I. Flares of AD Leo

| No. | U.T. of Maximum | | Δm mag | t_b min | t_a min | P min | Air Mass |
|-----|-----------------|----------------|-------------------|--------------|--------------|----------|-------------|
| | Date 1982 | Time hr min | | | | | |
| 1 | March 25 | 4 53.6 | 0.15 | 3.4 | 5.6 | 0.97 | 1.15 |
| 2 | March 29 | 3 12.46 | 2.5 | 0.8 | 8.2 | 3.85 | 1.06 |
| 3 | April 1 | 6 16.70 | 0.61 | 1.3 | 7.2 | 1.41 | 1.53 |
| 4 | April 15 | 3 23.5 | 0.33 | 1.5 | 3.0 | 0.40 | 1.14 |
| 5 | April 15 | 4 08.21 | 1.17 | 0.20 | 0.1 | 0.46 | 1.23 |
| 6 | April 15 | 5 01.6 | 0.69 | 0.8 | 0.4 | 1.52 | 1.43 |

FLARE TRACINGS.
See Table I.



Noise estimates near the time of the flares may be found in Table II which also gives the difference in magnitude between AD Leo and its comparison star at a distribution of times when no flaring was obvious. Estimates of noise (σ) are made (as in previous reports) by examining four-minute intervals of typical monitoring centered on the tabulated times. Within each interval we note the deflection levels that are exceeded by the chart pen for fractions of the time appropriate to standard deviations of $\pm 2\sigma$ and of $\pm 3\sigma$. Our value of σ (in deflection units) is the average based on these four estimated levels. By dividing σ into I_0 , the mean signal deflection, we obtain the tabulated signal/noise ratio. Note that this procedure means that our noise estimates are based primarily on the high frequency components of the statistical noise; i.e., pen excursions often of only one or two seconds duration. Although this is descriptive of the quality of the signal, it is not a number to be simply equated to flare detectability, which also involves the duration and shape of the signal elevation.

Table II. Ultraviolet magnitude differences between the comparison star and AD Leo during moments of apparent quiescence, and estimates of signal/noise for AD Leo.

| 1982 | Date & Time | JD | $m_C - m_V$ | $\frac{I_0}{\sigma}$ | Air |
|-------|-------------|----------|-------------|----------------------|------|
| | hr min | 2445000+ | | | Mass |
| March | 23 3 43 | 51.6549 | 1.15 | 13.5 | 1.07 |
| March | 25 4 04 | 53.6694 | 1.14 | 9.1 | 1.08 |
| " | 4 30 | 53.6875 | 1.31 | 8.1 | 1.11 |
| " | 5 38 | 53.7347 | 1.19 | 7.2 | 1.25 |
| March | 29 2 43 | 57.6132 | 1.17 | 11.0 | 1.06 |
| " | 4 32 | 57.6889 | 1.20 | 10.6 | 1.14 |
| " | 5 22 | 57.7236 | 1.16 | 7.9 | 1.25 |
| April | 1 6 05 | 60.7535 | 1.06 | 8.6 | 1.47 |
| " | 7 26 | 60.8097 | 1.15 | 7.7 | 2.17 |
| April | 15 2 05 | 74.5868 | 1.33 | 10.8 | 1.06 |
| " | 3 49 | 74.6590 | 1.25 | 10.5 | 1.18 |
| " | 5 37 | 74.7340 | 1.21 | 8.4 | 1.63 |
| April | 20 3 33 | 79.6479 | 1.25 | 9.4 | 1.19 |
| " | 4 34 | 79.6903 | 1.16 | 9.4 | 1.39 |
| April | 22 2 49 | 81.6174 | 1.18 | 9.3 | 1.12 |
| " | 3 33 | 81.6479 | 1.19 | 10.5 | 1.21 |
| " | 4 12 | 81.6750 | 1.14 | 9.1 | 1.33 |

Table III. Monitoring Coverage in 1982

| Date | U.T. in hours and minutes | | |
|----------|--|--|--|
| March 23 | 3:35.3-3:46.6 | | |
| March 25 | 3:36.0-3:42.0, 3:57.2-4:08.0, 4:13.3-4:22.0, 4:26.5-4:37.0, 4:42.1-4:54.7, 4:56.0-5:09.0, 5:12.6-5:23.1, 5:26.5-5:34.0, 5:35.5-5:42.0, 5:46.0-6:00.0. | | |
| March 29 | 2:03.8-2:14.1, 2:16.5-2:25.3, 2:29.1-2:38.0, 2:40.8-2:52.1, 2:55.5-3:04.0, 3:07.3-3:23.7, 4:13.7-4:21.9, 4:27.0-4:37.0, 4:39.9-4:49.0, 4:51.6-5:02.0, 5:04.7-5:15.0, 5:18.7-5:29.0, 5:31.8-5:41.0, 5:43.6-5:53.0, 5:56.2-6:03.4. | | |
| April 1 | 5:56.8-6:07.0, 6:10.2-6:19.0, 6:21.4-6:30.2, 6:32.8-6:42.0, 6:45.0-6:54.9, 6:57.2-7:00.0, 7:01.0-7:07.0, 7:10.7-7:19.0, 7:21.0-7:31.0, 7:33.2-7:43.0. | | |
| April 15 | 1:03.6-1:13.0, 1:16.8-1:33.0, 1:36.9-1:46.9, 1:48.4-1:58.2, 2:00.6-2:10.9, 2:12.2-2:24.2, 2:44.0-2:55.9, 2:57.6-3:10.7, 3:13.6-3:26.0, 3:28.0-3:40.2, 3:41.9-3:54.0, 3:56.4-4:12.4, 4:16.2-4:27.0, 4:29.5-4:39.0, 4:44.7-4:53.2, 4:55.2-5:03.6, 5:06.0-5:18.0, 5:19.7-5:28.3, 5:30.9-5:40.3, 5:42.8-5:54.0, 5:56.4-6:05.6. | | |
| April 20 | 3:29.9-3:41.0, 3:43.4-3:53.0, 3:54.6-4:04.0, 4:06.0-4:17.0, 4:19.0-4:29.0, 4:31.6-4:41.3, 4:44.0-4:55.0, 4:57.3-5:10.2, 5:12.4-5:23.7, 5:25.2-5:37.0, 5:39.5-5:50.0. | | |
| April 22 | 2:44.2-2:54.1, 2:56.0-3:11.8, 3:15.6-3:25.4, 3:28.0-3:38.7, 3:40.8-3:51.0, 3:53.5-3:59.6, 4:01.0-4:07.0, 4:08.5-4:16.2, 4:18.5-4:28.5, 4:31.4-4:41.4. | | |

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