Photoelectric Observations of AD Leo: 1989–1994

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1 Observations

An investigation of the activity of the flare star AD Leo was made using U-band patrol observations. 60 cm computer-controlled telescopes with identical single channel photon-counting photometers at the National Astronomical Observatory at Rozhen and at the Belogradchik Observatory were used. The integration time was 1 sec. Differential photometry was carried out, the AD Leo measurements were made relative to BD+20°2475. The data was reduced with the program package APR (Kirov et al. 1991).

Two simultaneous observing runs were made. The results of the first have already been published (Antov et al. 1991). The other was part of the observational campaign in May, 1991 with the *ROSAT* satellite. In Bulgaria, the observations were carried out at Rozhen in the U-band and at Belogradchik in the B-band. Four flares were detected by both.

2 Results

37 flares with amplitudes more than 4σ were detected during $71^{\rm h}05^{\rm m}17^{\rm s}$ total monitoring time. Approximately 16% are so called fast flares, with a duration <1 min. If flares with amplitude $< 4\sigma$ are added, the fast flares are ~23%. Usually the fast flares had an amplitude $\leq 0\overset{\rm m}{.}5$ (except one flare, detected on 29.3.1993 with an amplitude $0\overset{\rm m}{.}72$).

The reality of so-called single spikes on AD Leo, with a duration 1–2 sec was not confirmed during the period of the observations. Several such events were detected at Rozhen (altitude 1750 m) but none were detected at Belogradchik (altitude 630 m). One possible explanation is that the spikes were due to cosmic rays or artificial sources.

A rough investigation of the flare activity of AD Leo was carried out. The rate of the flare activity (the number of flares $\rm hr^{-1}$) was calculated for each year of the period (Table 1) and the result is shown in Fig. 1.

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Table 1. Rate of the flare activity of AD Leo

Year	No. of nights	Effective monitoring time	No. of flares	Flares hr^{-1}
1989	2	$2^h\ 51^m\ 45^s$	2	0.95±0.47
1990	15	$25^h\ 47^m\ 00^s$	18	0.70±0.16
1991	10	$12^h\ 53^m\ 12^s$	7	0.58±0.20
1992	10	$14^h\ 59^m\ 30^s$	5	0.33±0.15
1993	4	$3^h\ 25^m\ 08^s$	1	0.29±0.28
1994	7	$11^h\ 08^m\ 42^s$	4	0.36±0.18

It appears that the rate of flare activity changes from year to year in a systematic way. This fact could be explained by the existence of a change in the chromospheric activity on a long time scale.

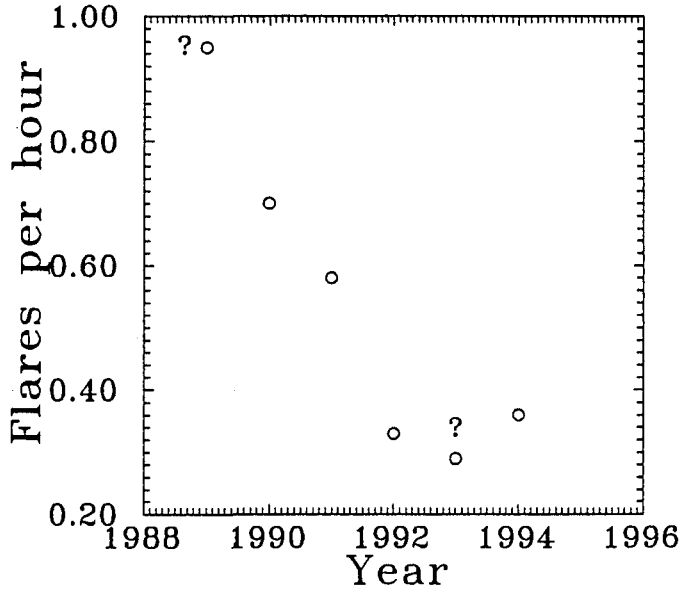

Fig. 1. Flare activity rate of AD Leo.

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References

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